Action 3:
Automated Vehicles That Provide Convenient Access to Car Trips, Without Adding to Congestion

Phase 2
ENGAGEMENT BACKGROUNDER

TRANSPORT 2050 | TRANSLINK

This backgrounder expands on information in the Transport 2050 Phase 2 Discussion Guide.

Overview

Through Transport 2050, we are proposing actions to serve the needs of those who live, work, and play in Metro Vancouver. One of the transformative actions we are proposing is to *manage how automated vehicles are used in the region. Ensuring they provide convenient travel options without overwhelming the transportation system.*

During Transport 2050 Phase 1 engagement, we received significant feedback about taking advantage of emerging technologies, such as automated vehicles (AVs). Emerging innovations in AV technology have the potential to revolutionize the way we move around the region by promoting safer streets and making transportation more efficient.

At the same time, if not properly integrated, AV technology has the potential to negatively impact transit ridership, increase congestion on streets and curbs, or promote urban sprawl and a dependence on private vehicles.

As new mobility services rooted in AV technology begin to emerge and flourish, the region will need a comprehensive regulatory framework that allows us to benefit from the opportunities while minimizing some of the drawbacks.

What are automated vehicles?

Automation has the potential to drastically reduce crashes and congestion as well as remove barriers for people of different abilities or ages.

Fully-automated vehicles include cars, buses, trucks, drones, delivery robots, self-parking e-scooters, shuttles, and other vehicles that can perform all of the functions of driving using sensors and other technology without a human operator. Once the stuff of science-fiction movies, AV technology has significantly advanced over the last decade.

Increasingly, enhanced driver assistance systems have found their way into the commercial market, including lane assist, collision avoidance systems, and automatic parking. While these systems provide partial automation, a fully automated vehicle is one that never requires the human passenger to take control and does not require a steering wheel.

The Society of Automotive Engineers (SAE) has developed a six-level scale to define varying levels of automation *(see Figure 1)*. Each level represents additional transfer of driving responsibility from humans to computers. At the highest levels, vehicles can be operated under total computer control—in certain well-mapped environments for Level 4 (such as urban areas) and in any environment for Level 5. Some critics suggest that Level 5 automation may never be achievable, or is a long way off. However, Level 4 AVs are already in operation in several cities, providing revenue service for both passengers and freight. These are likely to become more commercially available within the decade and commonplace by 2050.

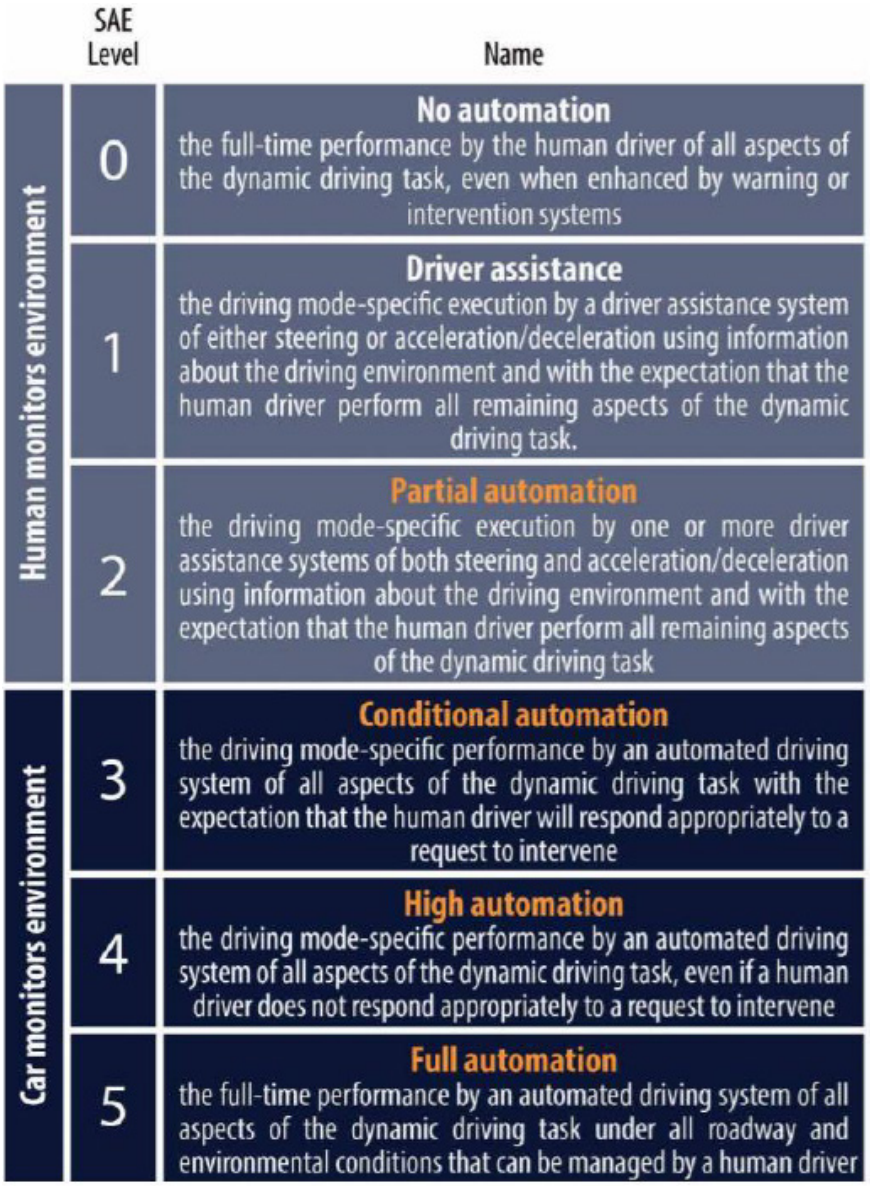

Figure 1 - Society of Automotive Engineers - Levels of Driving Automation

How could shared AV technology benefit our region?

Picture a world where you can conveniently access a vehicle trip without needing to own one or even having to drive. Where there are far fewer vehicles on the road, meaning less congestion, greenhouse gases, and safety hazards. This is a future that AV technology could make possible.

Instead of using mobile apps to hail a taxi or a ride sharing vehicle, users could hail an automated vehicle to help them reach their destination. Sidewalk delivery drones, such as those now operational in cities like Toronto, and larger goods delivery bots, which have been approved to operate on public streets in California, could reduce private vehicle trips to grocery stores while avoiding congestion from larger trucks and delivery vehicles.

Using smart technology to navigate, shared AVs could help users safely arrive at their destinations before moving on to pick up other passengers. This could reduce the total number of vehicles on the road, freeing up urban space and streets for other applications like wider sidewalks, protected bike lanes, public space, or transit priority lanes.

- **Affordability:** New services are already providing access to vehicles without the need to own one. Over the last few years, services such as carsharing, ride hailing, ride sharing, and peer-to-peer car rentals have become available and increasingly popular. The average personal car costs over $10,000 per year to own[1], whereas carsharing costs about $1,500 per year on average.

- **Access to vehicle trips:** Access to autonomous, connected, electric shared vehicles could improve transportation equity for people with disabilities, seniors, youth, people without driver's licenses, and others.

- **Safety:** Connected and automated vehicle technologies have the potential to improve road safety and roadway efficiency by increasing real-time communication and eliminating the human error that is responsible for the vast majority of collisions.

- **Regional cost-effectiveness:** Autonomous vehicles in a transit setting would be more cost-effective to operate and therefore could provide wider transit system coverage and higher frequency service. With fewer vehicles, there would be also less costs associated with maintaining road infrastructure.

- **People-oriented spaces:** Fewer vehicles on the road could allow us to repurpose urban space and streets currently used for parking and movement to create safer streets that prioritize pedestrians without compromising traffic flow.

- **Efficiency**: Automated and connected vehicles can communicate with one another in real-time and therefore could take advantage of 'platooning behaviour'. Platooning would allow several vehicles to travel closely together, improving energy efficiency and traffic flow. Dynamic lanes or curb space reallocation features could also prioritize access for higher order users such as emergency vehicles, as well as transit and shared vehicles.

[1] Canadian Automobile Association Driving Costs Calculator: https://carcosts.caa.ca

What considerations or challenges exist with automated vehicle technology?

The introduction of AVs presents challenges and opportunities that will need to be addressed:

- **Ensuring the technology is safe:** Before AVs will be allowed on public streets, the technology will need to be demonstrably safe for all road users, including vulnerable road users, such as pedestrians and cyclists. Of concern is the transition period when AVs are first introduced, and how AVs will interact with human drivers in mixed traffic conditions. Level 3 automated vehicles are noted to be particularly dangerous as they require an otherwise non-attentive driver to take control of the vehicle in uncertain situations. Some observers suggest that Level 3 AVs should not be permitted on public roads as a result of this safety challenge. The true safety benefits of AV technology are realized at SAE Level 4 or higher when human drivers are not required to pay attention.

- **Privacy and cyber-safety:** One concern related to AV technology is data privacy and the potential for cyber-attacks. Reliance on networked vehicles creates a new set of risks, which will require significant cyber-security measures and potential adaptations to safeguard.

- **Labour market considerations:** Local jobs related to goods movement and transportation services could be disrupted by automation. At the same time, the AV market has the potential to create substantial new employment opportunities related to technology, logistics, and communications. Prior to any introduction of AVs in B.C., labour laws and taxation systems will need to be updated to ensure a just, fair, and gradual transition for workers impacted by these technological changes.

- **Urban sprawl**: The low cost and convenience of AVs may encourage people to move further from the urban core, particularly when paired with rising real estate prices in dense urban centres. Urban sprawl promotes greenspace and agricultural land degradation. In addition, with more people living in suburban and exurban areas, the cost to provide infrastructure services increases on a per-capita basis. Demand management tools (such as pricing) can help better manage urban growth by factoring in transportation costs.

- **Regulatory framework**: Work is required to identify roles and responsibilities for governance of automated vehicles, including the identification of regulatory changes needed to address vehicle standards, licensing, registration, insurance and liability. Learning from B.C.'s experience with ride sharing, a coordinated regional approach would be an important factor to ensure functionality.

- **Congestion:** Of particular concern for Transport 2050, without a careful introduction, AVs have the potential to substantially increase vehicle kilometres travelled and traffic congestion. The advent of AVs combined with electrification will drastically reduce the cost to drive per kilometer, incentivizing the additional deployment and usage of private vehicles. AVs will permit zero-occupant trips. And they will allow e-commerce operations to warehouse their goods in automated pods on our streets, closer to end customers. All of these dynamics could lead to more traffic. To avoid increasing congestion, the region will need to have measures in place to promote carsharing and manage transportation demand *(see pages 6 and 7)*.

How do we get to an AV future that creates the kind of region we want to live in?

To make AV technology work well in our region, government, transit agencies, and private partners must cooperate.

In the Phase 2 engagement survey, we're asking for your input about three specific elements of the proposed action around AVs as outlined below.

1. **Promote carsharing.** Create incentives to make the sharing of vehicles easier, cheaper, and more convenient.

Carsharing and ride hailing have already given residents greater access to transportation without needing to own vehicles. These services provide vehicle access for short trips to the grocery store, or longer trips to the ski slopes. Importantly, each carshare vehicle is estimated to take between 5-11 personally-owned cars off the road[2], because one car can perform multiple trips throughout the day instead of being parked empty.

AV technology has the potential to further shift the trend towards carsharing away from private vehicle ownership because the vehicle will be able to reposition itself and meet the next user as needed, making accessing the vehicles more convenient for more people.

Measures to promote carsharing, both now and in a more automated future, could include:

- Infrastructure access (including parking, road space, curb space, refueling/charging) that prioritizes space for carshare vehicles;
- Taxation, pricing and other financial measures to incentivize carsharing;
- Physical integration of carsharing with other modes of travel, including public transit and active transportation, resulting in more convenience and quicker trips; and
- Integration of trip planning, ticketing and payment of carsharing with other pay-as-you-go modes, such as transit and bikeshare, into a single "Mobility-As-A-Service" app.

2. **Reduce the number of empty cars on the road.** For automated vehicles, introduce fees to discourage trips without any passengers.

As noted earlier, by making driving cheaper, easier and more accessible, AVs could prompt more car travel, including longer trips and trips without anyone in the car.

Imagine someone working in a busy downtown core sending their private AV home after dropping them off in the morning to avoid paying for parking. Or someone sending their AV around the block a few times while they run an errand. Both of these scenarios create trips on our roads with empty cars.

Charging a fee for empty car trips could discourage behaviour that could otherwise have empty cars taking up space on our roads, causing unnecessary congestion.

[2] *The Metro Vancouver Car Share Study* (2016).

3. **Reduce congestion.** For automated vehicles, introduce fees for pick-ups and drop-offs in congested areas (i.e., congested urban cores, entertainment districts, etc.).

In certain areas of our region, such as in urban cores or busy commercial streets or at sports or concert venues, we already see exceptionally busy curbs at certain times where many people are being picked-up or dropped-off by taxis, ride hailing services, family and friends; and where there is simultaneously demand for the same curb-space from trucks and vans delivering cargo to businesses or parcels to residents.

The ability to conveniently summon a low-cost AV on-demand to pick us up and drop us off anywhere we like will be one of the great advantages of automated vehicles. In essence, it will reduce the cost and improve the availability and convenience of using a taxi, ride-hail or carshare, making this on-demand shared option even more attractive than owning a personal AV for many people. However, now imagine this significant increase in pick-up and drop-off activity in the context of the busy curb-sides described above.

One way of addressing this increased demand for the curb-side could be through implementing an easy and automated system of reservations for curbside pick-ups and drop-offs. This would provide certainty for commuters that they would have a confirmed time and space at the curb. Instead of paying for parking for longer periods as we do today, we would pay to use the curb space in congested areas for just a short period of time.

The future is AV

The emergence of AV technology will change the face of transportation in our region. While the technology may be years away from full commercial implementation, work can begin now to help shape the future of our region and how we want to live in a fully automated world.

By choosing a future with more carsharing and less car ownership, AVs could help foster more sustainable and more equitable mobility options in our cities, and create a greener region with less congestion, and safer streets.

Urban Mobility: Credit "Bosch"

We need your input

What types of measures would be acceptable to help ensure that our region benefits from the advantages of automated vehicles without adding to congestion on our roads and at the curb?

Visit transport2050.ca to take the survey.