

Autonomous vehicle survey

2016

Autonomous vehicles (also known as driverless or self-driving vehicles) are no longer the stuff of science-fiction. Autonomous vehicle (AV) technology is rapidly advancing and is the biggest disruption to transport and mobility since the invention of motor cars themselves. Understanding the community's attitudes and perceptions about their operation on Western Australia's (WA's) roads will be crucial in preparing for a future with AVs.

Many vehicles already have built-in AV technology and these features are becoming increasingly common. From automatic emergency braking, radar cruise control and lane-keeping, vehicles are becoming more automated, requiring less driver intervention.

Research suggests AVs will deliver many benefits, including improved mobility and independence for many, reduced traffic congestion and reduced crash risk and severity by removing human error for instance. Increasing automation does, however, also raise a number of considerations which will need to be

explored, including potential issues such as systems failures, hacking, liability in the event of a crash, etc. Likewise, until such a time when all vehicles on our roads are fully autonomous, drivers and other road users will also need to learn how to safely interact with these vehicles.

While there are still many unknowns about what a future with AVs will look like, these vehicles will no doubt have considerable implications for our transport networks, towns and cities and will change the way we move around.

To understand what Western Australians know, think and feel about AVs, RAC

commissioned Painted Dog Research in March 2016 to undertake a community awareness and perceptions survey. The online survey was completed by 955 respondents (637 of which were RAC members and 318 non-members) from across WA (78 per cent from the Perth metropolitan area and 22 per cent from regional areas). Age, gender and location sampling quotas were applied and data has been weighted to be representative of the WA population, as well as RAC's membership composition. The margin of error at the total WA population level is +/-3.17 per cent.

In an Australian-first, RAC with support from the Western Australian State Government is trialling a fully driverless, fully electric shuttle bus under RAC's plan to test AV technology. The purpose of the trial is to:

- > consider the potential implications and opportunities of automated vehicle technology;
- > give Western Australians the chance to see this technology, and to potentially use and experience it; and
- > help WA develop a roadmap of changes that will need to occur for automated vehicles to safely transition on to our roads.

We anticipate this first step will lead to further trials, research and collaboration, which will increase WA's understanding of how AVs can be integrated into our transport system and how the technology will affect the way people move around our State.



For the better

Awareness of autonomous vehicles

The survey has revealed that awareness of the concept of AVs is high and a reasonable proportion of the community is familiar with some of the technology used by these vehicles.

Almost two thirds of Western Australians (64 per cent) have heard of AVs, with males, older generations (Generation X – born from 1965 to 1979, Baby Boomers – 1946 to 1964 and Builders – 1925 to 1945) and those residing in metropolitan Perth being amongst the most aware sub-groups. In describing AVs, 58 per cent referred to them as being driverless or self-driving and 30 per cent specifically mentioned they use technology (e.g. software, sensors, GPS) to drive themselves.

! Fully autonomous vehicles (also known as driverless or self-driving vehicles) are vehicles that do not need any human intervention to operate, so basically, they can drive themselves. They can detect their surroundings using advanced control systems that interpret sensory information to identify appropriate navigation paths, avoid obstacles and obey signage and traffic signals. Autonomous features in vehicles still currently require human control.

Once prompted with a definition, awareness increased to 88 per cent. Around half of Western Australians are also aware they currently drive vehicles which have some level of automation (Level 1 or 2), while half believe they drive vehicles with no automation (Level 0).

Males and those classed as Generation X are significantly more likely to currently drive a car with Level 1 or 2 automation, compared to their counterparts.

Levels of vehicle automation (based on the US National Traffic Safety Administration's levels):

- > Level 0: No automation. You as the driver are in complete and sole control of your vehicle but your vehicle may still have warning systems such as forward collision warning, reverse sensor warning and blind spot monitoring.
- > Level 1: Function-specific Automation. You have overall control of your vehicle, and are responsible for safe operation, but you can hand over limited control to the vehicle (e.g. electronic stability control) or your vehicle can provide you with enhanced control (dynamic brake support in emergencies).
- > Level 2: Combined Function Automation. You are responsible for monitoring the roadway and safe operation but your vehicle shares some control, for example, adaptive cruise control, lane centering and parking assistance systems. The vehicle has at least two primary control functions.
- > Level 3: Limited self-driving automation. You, as the driver, are no longer required to monitor the roadway and are only required to be present and able to override the system and take control in some circumstances, as the vehicle can perform all safety critical driving functions under certain conditions. The Google Car is an example of Level 3 automation.
- > Level 4: Full Self-Driving Automation. The vehicle can perform all safety critical driving functions. Under this level of automation, vehicles will be able to drive themselves around without any occupants. The RAC Intellibus is an example of Level 4 automation.

Figure 1 » Awareness of the concept of AVs (unprompted)

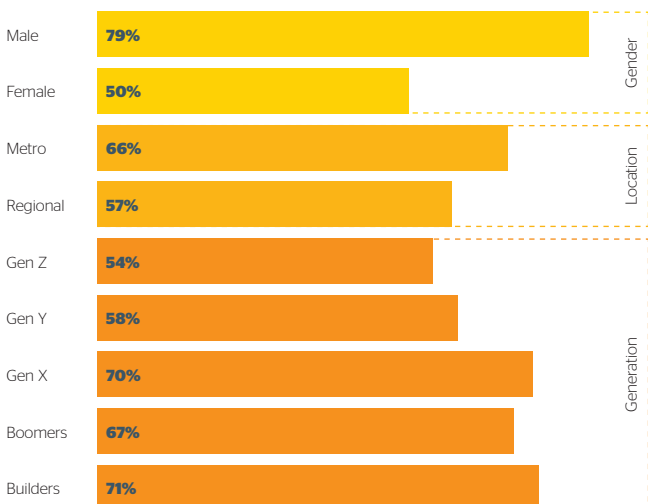
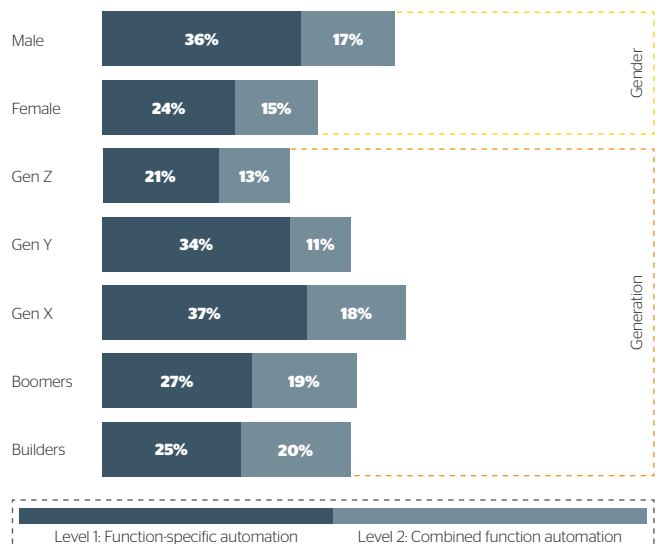


Figure 2 » Awareness of driving vehicles with Level 1 or 2 automation



Attitudes towards autonomous vehicles

Attitudes towards AVs are currently very mixed and safety is a major consideration, with Western Australians being uncertain whether we will be safer with or without them. Many believe there will be road safety benefits from AVs but a similar proportion have concerns about “trusting computers”.

Despite AVs being in the early stages of development, just under half of Western Australian’s feel positive towards them, with 28 per cent being extremely so. However, 30 per cent have negative feelings towards them. Crash history¹, attitudes towards driving and driving frequency do not have any impact on these attitudes.

Unprompted, safety, freedom and increased flexibility are the most frequently mentioned things that are welcomed most about the prospect of vehicles which are fully autonomous. Safety is however also the biggest unprompted concern, with 81 per cent of those who said they have a concern citing something safety related (not being in control / trusting technology and the possibility of computer breakdowns / malfunctions causing crashes are the main ones). This is followed by 19 per cent stating something related to missing driving, such as the risk of losing skills / becoming complacent and that driving gives them pleasure.

As shown in Figure 3, when prompted, the benefits most Western Australians agree would occur if all vehicles were fully autonomous are enhanced freedom and independence for the young, ageing and people with mobility difficulties (71 per cent agreeing this would occur), and more productive and efficient use of travel time (60 per cent). Reduced number and severity of crashes also features highly. More detailed analysis considering the relationship between attitudes towards AVs and opinions about the likelihood of these benefits occurring revealed fewer crashes and enhanced freedom are the two benefits which have the most impact on positive feelings. This is followed by reduced crash severity and lower traffic congestion.

Males, those who drive vehicles with Level 1 and 2 automation and those with an awareness of AVs are significantly more likely to have higher levels of agreement with all prompted benefits.

Western Australians are equally concerned about being an occupant in

an AV as they are with being in another vehicle interacting with an AV. When it comes to concerns about increasing levels of automation, two in five have concerns about vehicles with Level 3 automation and half are concerned about vehicles with Level 4 automation. Females and older generations (particularly Builders) are the most concerned.

As shown in Figure 4, when prompted, not being able to manually override the vehicle is the top concern relating to fully autonomous vehicles (Level 4) operating on WA’s roads, with 79 per cent being concerned about this (67 per cent extremely so). Cyber security issues and who is responsible in the event of a crash are also in the top three concerns. More detailed analysis identified the prospect of not being able to drive themselves, AVs not driving as well as humans and interacting with AVs while still driving non-automated cars as being the most influential prompted concerns impacting on negative feelings about AVs.

Figure 3 » Likelihood of anticipated benefits occurring with Level 4 AVs (prompted)

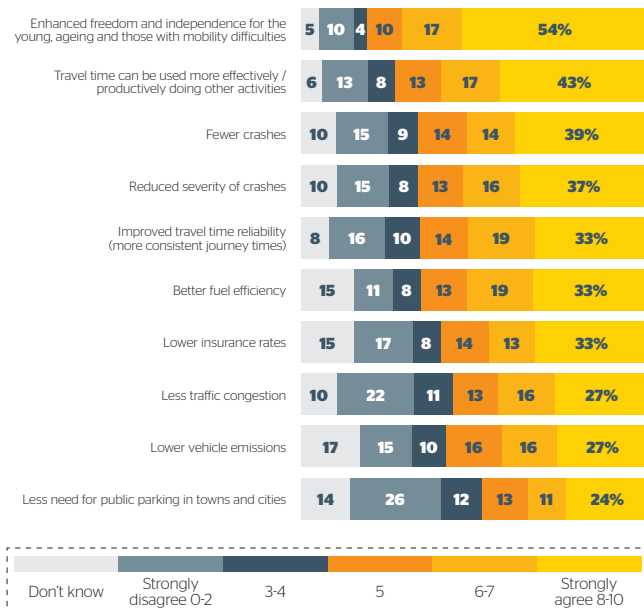
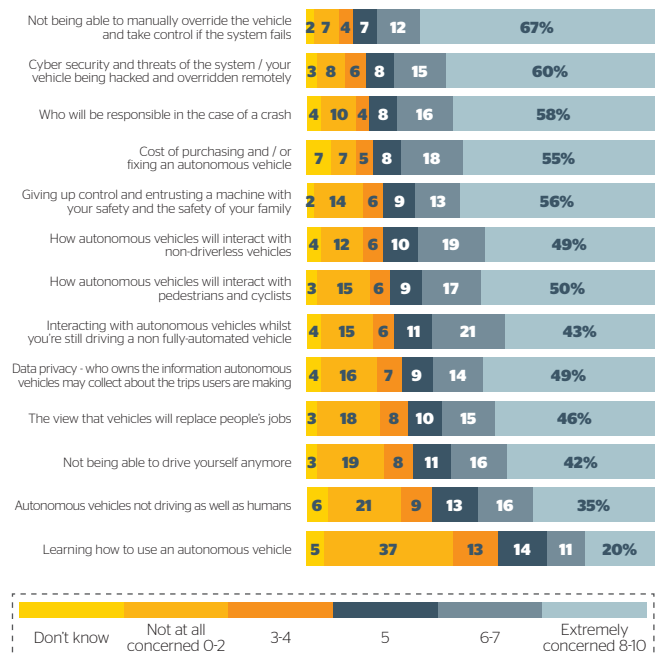


Figure 4 » Concerns about Level 4 AVs (prompted)



¹ Respondents were asked how many crashes they had been involved in over the past five years, as a driver and a passenger.

Future of autonomous vehicles in WA

There is clear interest from Western Australians in travelling in private AVs once commercially available, but uncertainty over whether the Government will be ready in time for when these vehicles operate on WA roads.

Currently, one in two Western Australians feel they would be very or extremely likely to travel in an AV which is privately owned (with 30 per cent being extremely likely to). Those with no crash history² are significantly less likely to travel in a private AV than those with a crash history (28 per cent compared to 22 per cent).

There is less of a willingness to travel in an AV which is public / shared with other travellers or an on-demand service. However, this could be as much to do with feelings towards these types of transport services as it is about the use

of AVs for such services. Those who consider themselves to be first to try new things and purchase the latest gadgets are significantly more likely to be willing to travel in an AV.

Unprompted, four of out five Western Australians believe fully automated vehicles will be commercially available sometime between 2020 and 2030, which is the timeframe within which most manufacturers are claiming their vehicles will be released into the market³.

Those classed as Generation Z (born from 1995 to 2000⁴) and Generation X were the nearest, with average estimates

of 2025 and 2039 for these sub-groups. When prompted with a conservative mid-point year of 2025, 52 per cent are not surprised at how soon or how far away the vehicles are expected to be commercially available.

Three in five think the Government of Western Australia should be investing to ensure roads are ready for AVs by 2025 and just over half (52 per cent) believe vehicle manufacturers and industry should be leading the way. Only one in five have confidence that the Government will be ready in this timeframe.

Figure 5 » Likelihood of use

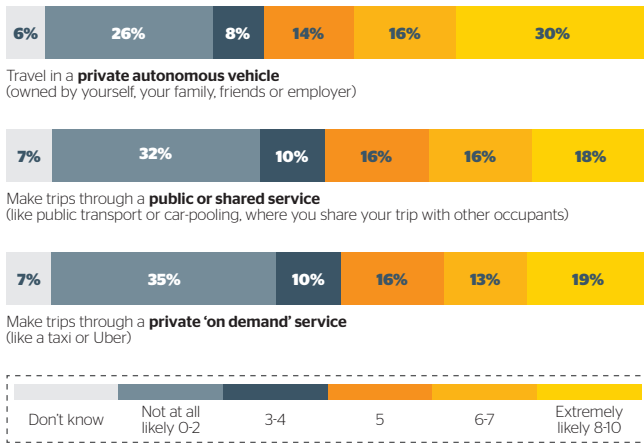


Figure 6 » Estimated timeframe for AVs to become commercially available

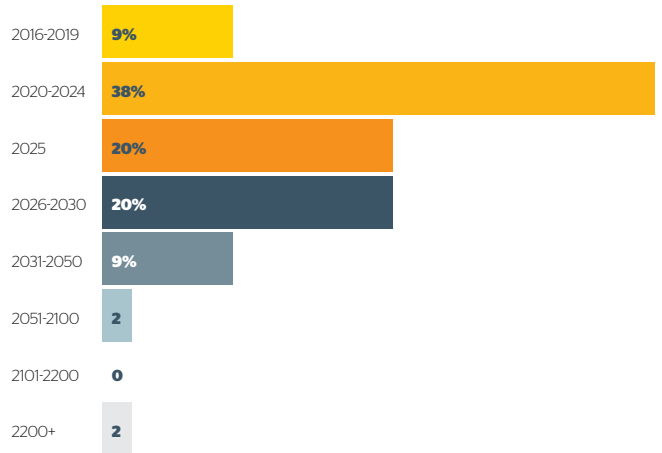
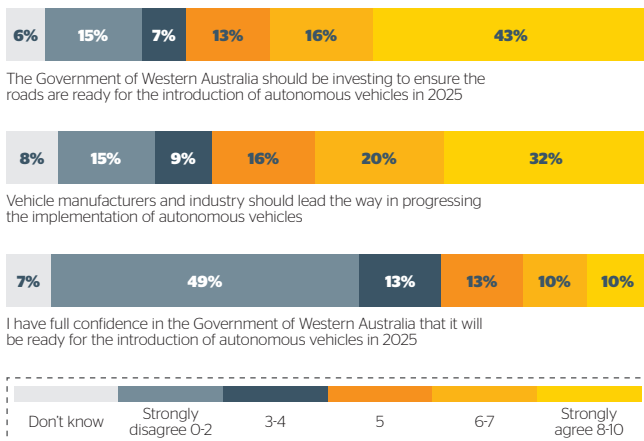


Figure 7 » Readiness for AVs



²Not having been involved in a crash, either as a driver or a passenger, in the past five years.

³Main Roads Western Australia. 2015. Automated Vehicles. Are we ready?

⁴While Gen Z includes those born from 1995 to 2009, all survey respondents were 16 years of age and older (so, born before 2000).