

Changing driving laws to support automated vehicles

RAC's Response to the National Transport Commission's Discussion Paper

December 2017



For the better

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Thank you for the opportunity to respond to the National Transport Commission's Discussion Paper on *Changing driving laws to support automated vehicles* (Discussion Paper). RAC is pleased to provide this response on behalf of its 985,000 Western Australian members.

We are a leading advocate on the mobility issues and challenges facing our State and we work collaboratively with all levels of Government to ensure Western Australians can move around using safe, easy, and sustainable mobility options. Automated vehicle (AV) technology is rapidly advancing and is the biggest disruption to the mobility sector since the invention of motor cars. Many vehicles now have built in AV or driver-assist technologies and are rapidly becoming increasingly automated, that is, requiring less driver intervention.

Since 2015, RAC has been working to test and evaluate a fully driverless, electric shuttle bus and on the 31st of August 2016, RAC, with support from State and Local Government launched Australia's first Automated Vehicle Trial. In one of the first public trials globally, Navya's Arma now named RAC Intellibus®, takes passengers along a 3.5 kilometre route in South Perth and to date, over 6,200 people¹ have participated in our Trial and have ridden on RAC's Intellibus®, which has travelled over 7,700 kilometres. In total, more than 10,700 people have registered to take part in our Trial so far.

Further, we have recently acquired a second Navya Arma to support our objectives, which are to better understand how reliably level four AVs operate in real traffic conditions and their likely impact in an Australian-specific environment as well as ensuring the community has an opportunity to use and experience automated vehicle technology while it remains in the early stages of development.

In determining the potential changes to driving laws to support automated vehicles, it is important to clarify and understand how AVs operate and which entity may be operating and to what degree the entity is in control of the AV from level three-conditional automation to level five- full automation. In a full automation vehicle where the dynamic driving task and the decision making process is controlled by artificial intelligence (AI), it may be an impossible task for regulators, enforcement agents, auditors to determine the cause of the behaviour as AI programs increasingly make decisions on their own, lack transparency and may change frequently. The Automated Driving System (ADS) should always have an operator overseeing the overall performance of the vehicle, whether by having an on-board

chaperone, or via remote supervision and fleet management. In principle, automated driving system entities (ADSEs) should be liable to the extent that they are able to intervene and take back control of the vehicle.

The challenge of tasking responsibility to the ADS or the ADSE is made more complex when considering that there are five groups of technologies combined to operate an AV and for each step there is another entity that is responsible for the operation of the ADS:

1. Human-vehicle interface;
2. Sensors / communications (V2I and V2X) that collect data about vehicle operation;
3. Sensors / communications (V2I and V2X) that collect data about the external environment;
4. Algorithmic control over vehicle operation and function; and
5. Artificial intelligence control over vehicle operation and function.

Determining the level of control that an operator/driver has over the vehicle requires an explicit understanding of this responsibility. To this end, the human-machine interface must be designed in such a way that at any time, it is clearly regulated and apparent on which side the individual responsibilities lie, especially regarding the responsibility for control.

There also needs to be a fail-proof system that when in the case of an emergency, the vehicle must autonomously enter into a "safe condition", so as to limit situations where a crash eventuates. To that end, the level of liability must extend to providers of infrastructure or other technologies that affect the overall performance of the vehicle and this should be reflected in legislation.

Laws and regulations continue to be challenged by rapid technological innovation, and the emergence of automated vehicle offers an opportunity to review and create a new set of governing rules that provide for a number of responsible entities.

¹As at 30th of November, 2017

RAC Intellibus®: Australia’s first Automated Vehicle Trial

In this purposeful trial, RAC is seeking to understand how AVs operate and consider their likely impacts.

The Trial’s three aims are to:

1. Increase the understanding about the potential impacts and opportunities from the advent of AV technology;
2. Give Australians the chance to see AV technology, use and experience it; and
3. Further help Australia prepare a roadmap for changes to support and safely transition to AV technology.

The Trial involves three stages, with each stage designed to test and evaluate AV technology in a variety of settings, involving increasing levels of complexity, then, interactions with road users:

- » **Stage 1:** Closed testing on a private track;
- » **Stage 2:** Closed stage undertaken on public roads outside of peak periods, without the Intellibus® carrying passengers; and
- » **Stage 3:** Open stage on public roads with the opportunity for the public to register and potentially ride on the Intellibus®.

When RAC made an application to the Department of Infrastructure and Regional Development in January 2016 and again in April 2017, to import a Level Four High Automation vehicle, we were required to do so under the ‘Testing and Evaluation’ category as the vehicle did not comply with Australian Design Rules.

This application required supporting documentation, including a ‘letter of in principle support’ from the State Government transport regulator, the Department of Transport. Further, we provided other available information such as vehicle specifications, project proposals as well as the Vehicle Identification Numbers.

The type of permit which allows the RAC Intellibus® to operate on a pre-determined route in South Perth is “Special Exceeding 48 hours” and states that it must have a “person on hand at all times to take control of vehicle if necessary”. It further includes a condition that a licence is to be carried in the vehicle at all times. Due to the high level of interaction between passengers and RAC Chaperones, we now have two operators on board at all times, one Chaperone who explains how the technology

works and responds to questions from passengers while the other Chaperone remains attentive to the traffic environment and is ready to take back control if necessary.

RAC has a group of six Driverless Vehicle Chaperones all with a valid WA driver’s licence. Further, our Chaperones have undergone intensive theoretical and practical training and assessment.

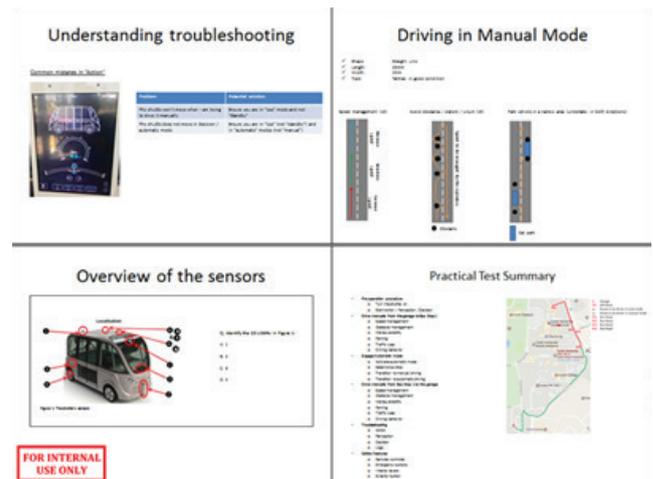


Figure 1: An example of RAC’s Driverless Vehicle Chaperone training modules

RAC’s Driverless Vehicle Chaperones record and describe every journey during its operation hours in South Perth. In these reports, four types of interventions exist: external; Shuttle - AV technology; Shuttle - Mechanical; and other or unknown.

The 3.5 kilometre route is divided into six sections with the Chaperones being able to specify the section as well as the direction they are heading if an intervention was required. A type of intervention which can be applied, for example, is the Chaperone regaining control of the shuttle and manually driving around an oversized vehicle parked outside of the designated parking bay. Logging and collecting operational data in the form of these reports continues to inform ongoing Road Safety Audits and Corrective Action Reports in liaison with the City of South Perth; and knowledge about how road users feel about and interact with the technology.

Perceptions of safety

Community perception and surveys are a useful way to gauge the general views of the community and RAC has been conducting a series of surveys designed to better understand the awareness and understanding of AVs. The first survey was conducted in April 2016, four months prior to the launch of the public Trial and the most recent in December, 2016. A repeat survey is currently in-market.

In it, four in five Western Australians believe fully automated vehicles will be commercially available between 2020 and 2030². Attitudes toward AVs are very mixed and safety is a major consideration, with respondents being uncertain whether we will be safer with or without them. Three in five respondents agree the Government should be investing to ensure readiness for AVs by 2025 and half (55 per cent) believe vehicle manufacturers and industry should be leading the way. Only one in five has confidence the Government can be ready in this timeframe.

Despite AVs being in the early stages of development, half of Western Australians feel positively towards them (30 per cent of which feel extremely positive). Crash history, attitudes towards driving, and driving frequency does not have any impact on these attitudes. However, given the newness of the technology it is not that surprising that 26 per cent of Western Australians have negative feelings towards AVs.

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, and more productive and efficient use of travel time. Males, those who drive vehicles with Level 1 and 2 automation and those with an awareness of AVs are significantly more likely to have a higher level of agreement with all prompted benefits. In terms of concerns relating to the operation of AVs on WA's roads, when prompted, not being able to manually override the vehicle is the top concern, followed by cyber security issues and responsibility in the event of a crash.

! The gradual adoption of various components of the total system is already happening: GPS, lane corrections, distance to vehicle in front etc. I believe it will gradually come in so that the final step to no steering wheel or accelerator will be a small step.

– Trial Participant

Each person who participates in the RAC AV Trial receives a survey which asks similar questions to the above.

Across all three surveys, safety is the biggest concern, with 53 per cent of respondents in the post ride survey saying that they are very concerned about 'not being able to manually override the vehicle and take control if the system fails (compared to 79 per cent in the first wave and 78 per cent in the second) and 59 per cent are concerned about 'cyber security and threats of the system / your vehicle being hacked and overridden remotely' (compared with 74 per cent in the first wave and 72 per cent in the second wave).

! I hope passengers still have ability to stop the vehicle and manually get out if systems fail. I remember someone being trapped in a car in hot weather in Pilbara after buying a new Studebaker in the mid 60's and electric failed and they could not open the doors or windows to get out – so bit phobic about that aspect.

– Trial Participant

Building community trust and confidence in the technology is pivotal to the uptake of AVs and our surveys show that there is community interest in understanding the driving ability of AVs and the ability to regain control of the vehicle as well as the possibility of the ADS being disabled by an external source.

A well-defined roadmap for how we plan and manage the challenges of regulating AV technology has never been more important to ensure the safe transition of AVs onto roads and maximise their contribution as part of an integrated transport system.

We trust RAC's response, which recognises the need for organisations and regulators to work together to prepare for, and safely transition to AVs will be of assistance to the NTC.

²RAC WA, (2016), "Autonomous vehicle survey", http://intellibus.rac.com.au/media/Autonomous%20Vehicles%20Survey_FINAL%20HR.pdf

Question	Options	Option supported by NTC	RAC's response
<p>1. Do you agree that reform to existing driving laws is required to:</p> <ul style="list-style-type: none"> i. allow an ADS to perform the dynamic driving task when it is engaged? ii. ensure a legal entity (ADSE) is responsible for the actions of the vehicle when the ADS is engaged? 		<p>It is essential to clarify in legislation that the ADS is legally permitted to perform the dynamic driving task for a vehicle with conditional, high or full automation.</p>	<ul style="list-style-type: none"> i) Agreed ii) Agreed
<p>2. Do you agree that if the ADS is engaged, legislation should provide that the ADS is in control of the vehicle at conditional, high and full levels of automation? If not, do you think a human in the vehicle should be considered in control of the vehicle, and at what levels?</p>	<ul style="list-style-type: none"> 1. The human driver is always in control of a vehicle with all levels of automation even if the ADS is engaged; 2. The ADS is in control of a vehicle with high or full automation only; a human driver is in control of a vehicle with conditional automation even if the ADS is engaged; 3. The ADS is in control of a vehicle with conditional, high or full automation when it is engaged 	<p>Option 3</p>	<p>Option 3 is supported</p>
<p>3. Do you agree that the proper control offence should not apply to the ADS, provided there are appropriate ways to hold the ADSE to account for the proper operation of its ADS?</p>		<p>The rule 297 proper control offence should not apply to an ADS. Penalties for systemic and safety-critical events are likely to be better addressed by product liability under the Australian Consumer Law.</p>	<p>Agreed</p>
<p>4. Do you agree that if a safety assurance system is approved that requires an ADSE to identify itself, the identified ADSE should be responsible for the actions of the vehicle while the ADS is engaged? If the ADSE is not identified through the safety assurance system, how should the responsible entity be identified in legislation?</p>	<ul style="list-style-type: none"> 1. The entity responsible for the ADS is the fallback-ready user; 2. The entity responsible for the ADS is the operator; 3. The entity responsible for the ADS is the registered operator; 4. The entity responsible for the ADS is the manufacturer of the vehicle; or 5. The entity responsible for the ADS is the ADSE identified through the safety assurance system. 	<p>Option 5</p>	<p>A hybrid approach of Option 4 and Option 5 is supported.</p>
<p>5. Do you agree that when the ADS is engaged:</p> <ul style="list-style-type: none"> i. an ADSE should be responsible for compliance with dynamic driving task obligations? ii. obligations that are part of the dynamic driving task that the ADS cannot perform should be modified where appropriate, or the ADS exempted from the obligation? iii. an ADSE should not be responsible for existing driver duties and obligations that are not part of the dynamic driving task 		<p>The ADSE is only made responsible for things within its control and therefore, it should only be responsible for dynamic driving task obligations.</p>	<ul style="list-style-type: none"> i) Agreed ii) The ADSE should perform the dynamic driving task so as long as it is according to the manufacturer's specifications which can be reviewed and amended in the safety assurance system iii) Agreed

Question	Options	Option supported by NTC	RAC's response
<p>6. How should legislation recognise an ADS and an ADSE? In assessing the options in section 5.6, please consider the following factors:</p> <ul style="list-style-type: none"> i. legislative efficiency ii. timeliness iii. impact on compliance and enforcement iv. impacts on other schemes such as compulsory third-party insurance 	<ol style="list-style-type: none"> 1. Expand the definition of driver in Acts that deal with the dynamic driving task to include the ADS when it is engaged and make the ADSE responsible for the actions of the ADS; 2. Exclude the ADS from the definition of driver. Make the ADSE responsible for the safe operation of the vehicle, including compliance with dynamic driving task obligations when the ADS is engaged; 3. Create a new Act for automated vehicles that establishes the dynamic driving task obligations. Make the ADSE responsible for non-compliance with those obligations by the Ads when it is engaged. 	<p>Option 1</p>	<p>We support Option 1 in the short term. We also support that a new Act for automated vehicles should remain the ultimate goal with a view to incorporate a nationally consistent no-fault compulsory third party insurance scheme, or a suitably designed replacement scheme.</p>
<p>7. Do you agree that driver obligations need to be assessed to ensure there are no obligations that cannot be fulfilled if an ADS is in control? If gaps are identified, should other appropriate entities—such as fallback-ready users, other vehicle occupants, registered operators and operators—be made responsible for the obligation?</p>		<p>The intent of existing driver obligations need to be maintained both to ensure safety and to ensure a party who is capable of fulfilling the obligation has responsibility for it.</p>	<p>The obligations upon the driver/operator/ADSE to oversee the dynamic driving task of an ADS needs to be clear and explicit. In addition, manufacturers need to ensure the true capabilities of their AV are clearly communicated.</p>
<p>8. Do you agree that obligations on a fallback-ready user of a vehicle with conditional automation, who will be required to take over driving if requested by the ADS should include:</p> <ul style="list-style-type: none"> i. sufficient vigilance to acknowledge warnings and regain control of the vehicle without undue delay, when required? ii. holding the appropriate licence for the vehicle type? iii. Complying with drug, alcohol and fatigue driver obligations? 		<p>A fallback-ready user should have legal obligations to ensure they are alert and ready to take control if required.</p>	<ul style="list-style-type: none"> i) Agreed ii) Agreed iii) Agreed
<p>9. Do you think it is necessary to impose readiness-to-drive obligations on humans who will take over driving when a vehicle with high automation that includes manual controls reaches the limit of its operational design domain? If not, do you think a human in the vehicle should be considered in control of the vehicle, and at what levels?</p>		<p>No additional obligations are placed on human occupants of vehicles operating in high automation mode.</p>	<p>Should the driver be required to take over driving, then there should be appropriate readiness-to-drive obligations.</p> <p>However, the less a human is required to intervene, the greater the responsibility of the ADSE to ensure the safe operation of the ADS. There may be a service where the ADSE is fully responsible for the ADS allowing greater participation from those who are unable to drive.</p>

Question	Options	Option supported by NTC	RAC's response
10. Do you agree that no readiness-to-drive obligations should be placed on passengers in dedicated automated vehicles (designed to be 'driverless')?			Agreed if the vehicle is designed to require no operator, then the obligation should not be placed on the operator. However, the obligation must be shifted to the ADSE, that is, the readiness-to-override.
11. Should exemptions from the drink- and drug-driving offences concerning starting a vehicle and being in charge of a vehicle be provided to a person who is starting, or who is a passenger in, a dedicated automated vehicle?		A person who starts an automated vehicle and may take over driving should not be exempted from these offences.	Agreed
12. Should exemptions from the drink- and drug-driving offences concerning starting a vehicle and being in charge of a vehicle be provided to a person who is starting a vehicle with high or full automation that includes manual controls?			Not agreed.
14. How do you think road traffic penalties should apply to ADSEs?		<ul style="list-style-type: none"> > Without change, existing road traffic penalties are unlikely to be appropriate or effective when applied to an ADSE; > If penalties apply to an ADSE, corporate multipliers are likely to increase the effectiveness of those penalties; > Breaches of road traffic laws should be taken as evidence of a broader failure to provide safe automated vehicles > A primary safety duty be examined as part of the safety assurance reforms. 	Should be the subject of further consideration and consultation
15. Do you think obligations and penalties on ADSEs in the safety assurance system should complement, or be an alternative to, road traffic offences?			Should be the subject of further consideration and consultation

For further information please
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