National Guidelines for Automated Vehicle Trials

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

February 2017

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We thank the National Transport Commission (NTC) for the opportunity to respond to the National Guidelines for Automated Vehicle Trials Discussion Paper. RAC is pleased to provide this response on behalf of its 900,000 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 technology and are rapidly becoming increasingly automated, requiring less driver intervention.

Since the project inception in 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 (RAC Intellibus) takes passengers along a 3.5 kilometre route in South Perth and as at the time of this submission on the 16th of January, 2016, 1,548 people have participated in our Trial and have ridden on RAC's Intellibus™. In total, more than 5,700 people have registered to take part in our Trial so far.

> **!** **With support from State and Local Government, RAC launched Australia's first Automated Vehicle Trial. In one of the first public trials globally, Navya's Arma (RAC Intellibus) takes passengers along a 3.5 kilometre route in South Perth.**

A well-defined roadmap for how we plan and manage the challenges of regulating AV technology has never been more important and we welcome the release of the Discussion Paper by the National Transport Commission.

National guidelines are necessary for trialling of automated vehicles but, given the complexity of current state-based structures and regulations, it is important to clarify key criteria for the safe testing of new and advanced technology, ensuring trials can continue to occur. AV trials cannot proceed without Government support and having recently worked closely with Government on this, RAC is well placed to provide advice on this Discussion Paper and by doing so, help to improve the process for regulating AV trials.

RAC's Intellibus: Australia's first Automated Vehicle Trial

In a purposeful trial, RAC aims to understand how AVs operate and consider their likely impacts on WA.

The Trial's three aims are:

› Increase understanding about the potential impacts and opportunities from the advent of AV technology;

› Give Australians the chance to see AV technology, and eventually use and experience it; and

› Further help WA prepare a roadmap for changes to support and safely transition to AV technology.

Our Trial involves three stages designed to test and evaluate AV technology in a variety of settings and scenes, involving increasing levels of complexity, then, interactions with road users. The Trial was officially announced on 9 February, 2016 and launched on 13 April when the vehicle arrived in WA.

Stage One

Vehicle commissioning and the closed testing stage were undertaken over an eight-week period (26 April to 29 June, 2016). With no pre-existing test guidelines in place, RAC worked hands-on with local specialist technicians and Navya to develop an extensive test plan.
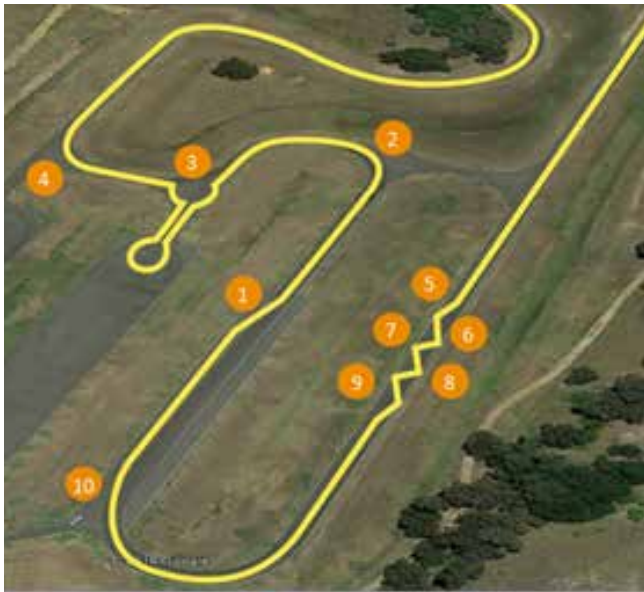
1	Merge	6	Obstacle 2
2	Controller stop	7	Obstacle 3
3	Roundabout	8	Obstacle 4
4	Controlled stop	9	Obstacle 5
5	Obstacle 1	10	Give way

Figure 1: Closed testing site and testing path

The scope of this phase was to observe the vehicle and investigate the limitations of its predicted behaviour including testing its boundaries of perception and operation in automatic mode. Tests also considered the system behaviour in different conditions, situations, and scenarios.

During our testing phase, stakeholders from our State Government partners (Department of Transport, Main Roads WA and Public Transport Authority) rode on the shuttle along the test path to experience the shuttle's capabilities.

Figure 2: Testing RAC's Intellibus at RAC's private track in "Static Object Detection" Test.

Stage Two

Operating RAC's Intellibus on public roads is and remains a complicated process and goes beyond controlled demonstrations achieved elsewhere. Critical steps in this process included selecting a route, gaining Special Permit approvals, undertaking risk assessments, developing a communications campaign and identifying an evaluation framework.

RAC, with WSP Parsons Brinkerhoff and State Government, developed a multi-criteria framework for assessing appropriate routes. The complexities of route selection cannot be overstated, with numerous factors requiring consideration:

› Height/density of the tree canopy;
› Urban environment;
› Road environment;
› Number/complexity of interactions
› Environmental/weather characteristics;
› Local/strategic access; and
› Strategic/transport function

In the first round of analysis, 18 routes were investigated, including urban streets/centres of activity, universities campuses and tourist destinations. RAC went on to investigate an additional seven route options including the eventual location for the Trial, South Perth. RAC also worked with GTA Consulting to carry out operational road safety audits and extensive mapping of geometric features and traffic conditions for the shortlisted routes. Traffic management plans, and risk assessments were also prepared by RAC.

Figure 3: Independent Feature Survey of South Perth site. (Prepared by GTA Consulting for RAC)

The second stage involved mapping and validating the public site (under traffic management). Navya and RAC completed this outside of peak traffic hours between 6pm and 6am. RAC worked closely with the City of South Perth to restrict on-street parking and to inform the City's local residents.

Stage Three

Following the launch of the public Trial, on the 31st of August, Stage Three officially began on the 1st of September 2016 and continues to take trial participants along South Perth Esplanade to the Old Mill and back.

A condition of the Special Permit with Compulsory Third Party Insurance is that a Chaperone must be on board the shuttle at all times with the ability to take back control when required. RAC has dedicated Chaperones who have been trained to operate and drive the shuttle. All Chaperones are trained in first aid and have a full driver's licence. Two RAC technical experts provide support to the Chaperones and have overarching
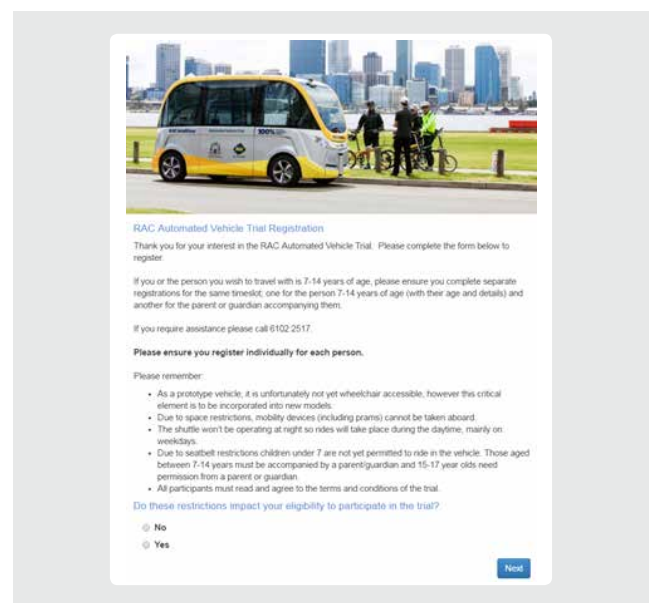
Figure 4: Trial Registration Booking Page on trial microsite, intellibus.rac.com.au

Figure 5: A map of the South Perth route in three phases. Currently, the Intellibus travels along Phase One (red line).

responsibly for daily operation, including the management of traffic wardens.

Although, the shuttle can seat 11 people and has standing room for four people, to enhance the opportunity for discussion, the allocation of seats via RAC's Microsite (Intellibus.rac.com.au) and booking page, is limited to a maximum of eight passengers per ride. There is also a minimum age requirement, that is, over the age of seven years as well as the need for a guardian or parent for all passengers under the age of 15 years.

Figure 6: RAC's Intellibus travelling along South Perth Esplanade with Trial participants.

RAC has a dedicated on site information hub, where the team of Chaperones provide detailed information about the Trial and induct participants before their ride. During the ride, the Chaperones, who remain in contact with the hub via two-way radio, describe and explain the workings of the sensors and the AV technology, as it interacts with a number of traffic conditions on the road. The Chaperones also complete a report which describes the journey, such as software or hardware issues, and unexpected traffic interactions (badly parked vehicles) after each ride.

The route takes approximately 20 minutes to complete and interacts with travelling and parked vehicles, heavy vehicles, pedestrians and cyclists. Each participant is able to provide feedback on their experience and their views on the technology by completing a post-ride survey.

Evaluation and public feedback

RAC conducted a survey of the awareness and understanding of AVs prior to the announcement of the Trial in April 2016. In it, four in five Western Australians believe fully automated vehicles will be commercially available between 2020 and 2030[1]. Attitudes towards 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 (52%) believe vehicle manufacturers and industry should be leading the way.**

RAC continues to survey participants who have taken part in the Trial. Of the 1,548 people who have taken part in the Trial, RAC has received an excellent response to its post-ride survey[2]. In response to the question on whether a vehicle like the Intellibus could be used as a service in WA in the future, 97.8% of the respondents believe so.

The awareness and understanding of AVs survey was conducted again late in 2016 and RAC will release results in the near future.

97.8% of people who have participated in RAC's Trial, believe that a vehicle, like the Intellibus could be used as a service in the future.

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[1] RAC WA, (2016), "Autonomous vehicle survey", http://intellibus.rac.com.au/media/Autonomous%20Vehicles%20Survey_FINAL%20HR.pdf
[2] The RAC's post ride survey is ongoing and results from this survey are preliminary.

Insurance

To ensure the safe delivery of the Trial, RAC has sought and acquired a number of levels of insurance through private brokers as well as the public insurance agency, the Insurance Commission of WA (ICWA).

The levels of insurance include:

› Comprehensive insurance
› Compulsory Third Party (CTP) insurance
› Public Liability Insurance
› Voluntary Workers Insurance

! **The support of ICWA and the WA State Government to obtain CTP insurance was pivotal and a necessary outcome to progress the Trial beyond the first stage, which was, closed testing on a private track.**

A nationally consistent approach

RAC agrees in principle that a set of national guidelines should provide the basis for conditions of an exemption to trial and test automated vehicles. Having said that, it is equally important to recognise that mandatory regulations at a national level will increase the complexity of the process to undertake a trial where road regulations are typically state specific. The Discussion Paper outlines a number of options which detail what guidelines state traffic agencies ought to require from an organisation and a table summarising the options RAC supports is listed on page 6.

A safety first approach

As discussed, RAC has taken a safety first approach, undertaking testing on a closed site, before attempting to trial on public roads, then with members of the public.

! **All stages of the trial were supported by risk assessments, safety audits, communications plans, and close consultation with our State Government partners (Department of Transport, Main Roads WA and Public Transport Authority).**

A trial's outcome has the potential to accelerate or stall the adoption of automated vehicles. It is therefore, pivotal that a safety first approach is applied to future Trials..

A partnership approach

Any agency or organisation seeking to undertake a trial of automated vehicles, must accept a number of risks and challenges. Equally, regulators allowing the trial of an automated vehicle must ensure that risks and challenges are appropriately identified and carefully mitigated.

A strong partnership, built on mutual trust and collaboration is critical. This can be achieved in a number of ways and must be supported by the provision of documents such a description of the technology being trialled, security measures that are in place or will be in place, manual and emergency override abilities, system failure warnings, and provision of data collection and updates.

With all new and innovative trials, many of the questions that a road authority has may not be fully responded to due to the newness of the technology, however, a trial presents the opportunity to learn and share these findings together.

! **RAC continues to meet on a regular basis with its Government partners to provide updates and share knowledge.**

Conclusion

We trust RAC's response, which recognises the need for organisations and regulators to work together to safely undertake AV trials, will be of assistance to the NTC to formulate conditions of an exemption to trial and test AV technology.

Section	Options	Option supported by NTC	Relevant question	RAC's response
1.2 When would national guidelines apply?			Q1. Do you agree that national guidelines should provide the basis for conditions of an exemption?	Yes. However, mandatory guidelines at a national level are not supported due to the complexity of state-specific regulations.
1.3 How would national guidelines be used as part of an exemption process?			Q2. How should road transport agencies use the guidelines in relation to exemptions?	Guidelines should be optional in most cases, but regulators must work closely with trial operators to balance the delivery of innovative projects against the need to meet minimum standards and guidelines.
1.4 A safety management system approach			Q3. Should national guidelines take a safety management approach?	A safety management approach is a sensible and logical way to support AV trials and its operators without limiting the scope of innovation.
3.1 Should trials be allowed anywhere on the road network?	Option 1: Guidelines do not include reference to trial location Option 2: Guidelines include providing the trial locations as an option for road transport agencies to add. Option 3. Guidelines require trialling organisations to propose trial locations as part of their application.	Option 3		Option 3 is supported
3.2 Should trials require a traffic management plan?	Option 1: Guidelines do not include a traffic management plan Option 2: Guidelines include a traffic management plan as an option for road transport agencies to add. Option 3. Guidelines include a traffic management plan as an essential criterion for any trial.	Option 3		Option 3 is supported
3.3 How should trials manage infrastructure and network requirements?	Option 1: Guidelines do not reference infrastructure requirements Option 2: Guidelines include notification of infrastructure requirements as an option for road transport agencies to add. Option 3: Guidelines require trial applicants to notify road transport agencies of infrastructure requirements.	Option 2		Option 2 is supported

Section	Options	Option supported by NTC	Relevant question	RAC's response
3.4 Should trialling organisations document what is being trialled?	Option 1: Guidelines do not require trialling organisations to provide a description of the technology being trialled Option 2: Guidelines include a description of the technology being trialled as an option for road transport agencies to add Option 3: Guidelines require trialling organisations to provide a description of the technology being trialled.	Option 3		Option 2 is supported. If a trial is being undertaken by an operator who is not the supplier, it may be difficult for the operator to provide detailed description of the technology being trialled. In this case, the operator should be able to test the technology to provide this to the road authority.
3.5 Should guidelines include compliance with existing road rules and traffic laws?	Option 1: Guidelines do not include compliance with existing road rules and traffic laws Option 2: Guidelines include compliance with existing road rules and traffic laws as essential (except where an exemption has been granted).	Option 2		Option 2 is supported
3.6. Should guidelines include compliance with existing vehicle standards?	Option 1: Guidelines do not include compliance with existing vehicle standards. Options 2: Guidelines include compliance with existing vehicle standards as essential (except where an exemption has been granted).	Option 2		Option 1 is supported
3.7 Should guidelines include compliance with existing privacy laws and principles?	Option 1: Guidelines do not include compliance with existing privacy laws and principles Option 2: Guidelines include compliance with existing privacy laws and principles as an essential criterion	Option 2		Option 2 is supported
3.8 Should trialling organisations be required to engage with the public?	Option 1: Guidelines do not include community consultation and public engagement requirements. Option 2: Guidelines include community consultation and public engagement as optional criteria for road transport agencies to add. Option 3: Guidelines include community consultation and public engagement as essential criteria of any trial.	Option 2		Option 2 is supported

Section	Options	Option supported by NTC	Relevant question	RAC's response
4.1 Should guidelines include system security?	Option 1: Guidelines do not include system security. Option 2: Guidelines include system security as an optional criterion for road transport agencies to add. Option3: Guidelines include the system security as an essential criterion of all trials, to be addressed as part of the safety management plan.	Option 3		Option 3 is supported
4.2 Should guidelines ensure a vehicle has been trialled at a test facility before being allowed on public roads?	Option 1: Guidelines do not include any requirement for pre-trial testing of vehicles. Option 2: Guidelines include the pre-trial testing of vehicles as an optional criterion for road transport agencies to add. Option 3: Guidelines include the pre-trial testing of vehicles as an essential criterion for all trials, to be addressed as part of the safety management plan	Option 2		Option 2 is supported
4.3 Should guidelines require a human in a trial vehicle?	Option 1. Guidelines do not allow trials with a human driver or operator present Option 2: Guidelines allow testing with a human driver or operator, but require safety issues to be addressed as part of a safety management plan as an essential criterion.	Option 2		Option 2 is supported
4.4 Should guidelines include driver or operator duties and training?	Option 1: Guidelines do not include driver or operator duties or training requirements Option2: Guidelines include driver or operator duties and training requirements as optional criteria for road transport agencies to add. Option 3: Guidelines include driver or operator duties and training requirements as essential criteria to be considered as part of a safety management plan.	Option 2		Option 3 is supported
4.5 Should guidelines include fitness to drive requirements?	Option1: Guidelines do not include driver and operator fitness for duty requirements Option2: Guidelines include driver and operator fitness for duty as an optional criterion for road transport agencies to add. Option 3. Guidelines include driver and operator fitness for duty as an essential criterion, to be considered as part of a safety management plan.	Option 2		Option 2 is supported

Section	Options	Option supported by NTC	Relevant question	RAC's response
4.6 Should guidelines include requirements for transitioning between driving modes?	Option 1: Guidelines do not include requirements for a process for driving mode transition. Option 2: Guidelines include requirements for a process for driving mode transition as an optional criterion for road transport agencies to add. Option3: Guidelines require a process for driving mode transition as an essential criterion, to be considered as part of a safety management plan.	Option 2		Option 2 is supported
4.7. Should guidelines include system failure warnings?	Option 1: Guidelines do not include a requirement for system failure warnings. Option 2: Guidelines include a requirement for system failure warnings as an optional criterion for road transport agencies to add. Option 3: Guidelines require system failure warnings as an essential criterion, to be considered as part of a safety management plan.	Option 3		Option 2 is supported, and should be required particularly if the trial is being undertaken on public road with passengers. However, it should be noted that mandatory warnings does not necessarily equate to safe or high quality system failure warnings.
4.8. Should guidelines include visual or other identifiers?	Option 1: Guidelines do not include consideration of visual identifiers. Option 2: Guidelines include consideration of visual identifiers as an optional criterion for road transport agencies to add. Option 3: Guidelines require visual identifiers as essential criterion of trials.	Option 2	Q4. Are there additional criteria that should be included in the guidelines?	Option 2 is supported.
5.2 Compulsory third-party insurance	Option 1: Guidelines do not include insurance Option 2: Guidelines include: a. "appropriate" insurance as an option for road transport agencies to add b. Prescribed insurance as an option for road transport agencies to add Option 3: Guidelines include: a. "appropriate" insurance as an essential criterion for any trial b. Prescribed insurance as an essential criterion for any trial	Option 3a	Q5. Do you support the guidelines including prescribed insurance? If so, what kind of insurance should be prescribed?	Option 3a is supported.
6.1 Should guidelines include crash data?	Option 1: Guidelines do not require the collection and sharing of crash data Option 2: Guidelines include the collection and sharing of crash data as an optional criterion for road transport agencies to add. Option 3: Guidelines require collection and sharing of crash data as an essential criterion for all automated vehicle trials	Option 3	Q6. If trialling organisations are required to collect crash data and share it with road transport agencies, what data should be required?	Option 3 is supported.

Section	Options	Option supported by NTC	Relevant question	RAC's response
6.2. Should guidelines include providing ongoing data updates?	Option 1: Guidelines do not include collecting and providing incident and event data Option2: Guidelines include collecting and providing incident data as an optional criterion for road transport agencies to add. Option 3: Guidelines require collection and provision of defined incident and event data as an essential criterion for any trial.	Option 2	Q7. How should an automated vehicle "incident" be defined? What data should be required for such incidents?	Option 2 is supported.
6.3 Should guidelines require updates on research outcomes?	Option 1: Guidelines do not require trialling organisations to provide research outcomes Option 2: Guidelines include providing research outcomes as an optional criterion for road transport agencies to add. Option 3: Guidelines require trialling organisations to provide research outcomes as an essential criterion for any trial.	Option 3		Option 2 is supported
6.4 Should guidelines include providing updates on network operation and road conditions?	Options 1: Guidelines do not include collecting and sharing of data on network operation and road conditions. Option 2: Guidelines include collecting and sharing of data on the condition of the network as an optional criterion for road transport agencies to add. Option 3: Guidelines require collecting and sharing of data on the condition of the network as an essential criterion.	Option 2		Option 2 is supported
7.2 Cross-border opportunities to consider for future reforms			Q8. How important is it that state and territory road transport agencies facilitate cross-border trials of automated vehicles? How could governments enable cross-border trials?	NA
8.1 How are trials of automated heavy vehicle trials different form light vehicle trials?	Option 1: Develop separate guidelines for trialling heavy vehicles and light vehicles Option2: Include heavy vehicles in the guidelines and clarify any specific matters relevant to the trialling of automated heavy vehicles, including the role of the NHVR.	Option 2	Q9 Are there any unique issues for heavy vehicles that require special consideration in guidelines for automated vehicle trials?	NA

For further information please
contact advocacy@rac.com.au

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