Safety assurance for automated driving systems

RAC's response to the National Transport Commission's Consultation Regulation Impact Statement

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For the better

RAC's response to the National Transport Commission's Consultation Regulation Impact Statement: Safety assurance for automated driving systems

Automated vehicle (AV) technology is rapidly advancing and is potentially 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.

The National Transport Commission's (NTC's) *Safety assurance for automated driving systems Consultation Regulation Impact Statement* (RIS) follows earlier release of its *Regulatory options to assure automated vehicle safety in Australia Discussion Paper*, and analyses four options to implement a Safety Assurance System (SAS) for AVs. The RIS identifies option four as the preferred model.

Option One: Current approach (baseline)
- Existing legislation and regulatory instruments

Option Two: Administrative safety assurance system
- Mandatory self-certification
- Existing legislation and regulatory instruments

Option Three: Legilsative safety assurance system
- Mandatory self-certification
- New legislation to allow safety assurance specific offences and compliance and enforcement options
- Regulatory agency responsible for administering AV safety

Option Four: Legislative safety assurance system + primary safety duty
- Mandatory self-certification
- New legislation to allow safety assurance specific offences and compliance and enforcement options
- Regulatory agency responsible for administering AV safety
- Legislated ongoing primary safety duty

Representing over one million members, RAC is 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.

RAC Intellibus: Australia's first Automated Vehicle Trial

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 the State and Local Government, launched Australia's first AV 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. As at the time of this submission on 20 August 2018, more than 14,800 people had registered to take part in the trial, and nearly 9,500 people had ridden on RAC's Intellibus, which had travelled over 14,000 kilometres. In this purposeful trial, RAC is seeking to understand how AVs operate and consider their likely impacts on Australia.

The Trial's three aims are to:

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

The Intellibus 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.

- Closed testing on a private track;
- Closed stage undertaken on public roads outside of peak periods, without the Intellibus carrying members of the public; and
- Open stage on public roads with the opportunity for the public to register and ride on the Intellibus.

Where we stand

Having considered the options within the RIS, RAC believes that a SAS can provide the framework for a process through which the potential safety benefits of AVs could be genuinely delivered and realised. For this to occur, the SAS must be able to address the problems identified in the RIS and prioritise the promotion of safety as the first and foremost aim. The RIS has not gone far enough in this respect, evidenced by the absence of clarity regarding reasonable safety outcomes and as a result, permitting the importance of safety to be considered secondary to the achievement of other objectives, such as network efficiency and technological developments. Should there be concerns relating to the relative trade-off with other potential benefits such as network efficiency, then the NTC should look no further than industries which have adopted this approach and maintained productivity such as the aviation and mining industries.

Development and implementation of a SAS in which AVs can deliver reasonably safe outcomes is an important step to encourage confidence and trust in the technology.

The SAS must sufficiently assure consumers, regulators and other market players to use, allow, and take up the technology. Notwithstanding the unacceptable social costs, early failure of autonomous driving systems (ADSs)[2] is likely to affect broad uptake of AVs and could therefore delay the anticipated positive outcomes for the community. It is important that the proposed SAS satisfactorily assures safety and therefore reduces the number of people killed and seriously injured on our roads.

As the RIS seeks to provide a SAS which covers AVs at all levels of automation, RAC supports implementation of option four which introduces AV-specific safety responsibilities through both self-certification and regulation. Option four must be implemented in a way that provides suitable flexibility and agility to manage rapid improvements in technology and international regulatory developments, while encouraging industry to enter the Australian market. To support implementation of option four, we have identified four issues that we consider require further attention. The table at the end of this submission contains our responses to the individual consultation questions raised within the RIS.

The proposed safety criteria may not ensure reasonably safe outcomes

The *Towards Zero* road safety strategies adopted by Australian states and territories are based on the understanding that all road injuries and fatalities are avoidable. The *National Road Safety Strategy 2011-2020*, recognises the inevitability for human error and the limitations of the human body to withstand impact before succumbing to injuries or fatalities and so promotes the four safe system cornerstones: safe road use, safe speeds, safe vehicles and safe roads. The safe vehicles cornerstone is a critical road safety strategy aimed at both encouraging the development of safer and more effective vehicle technologies, and by setting minimum standards, assuring the safety credentials of new vehicles.

To ensure ADSs remain safe and genuinely make a positive impact on road safety, a 'reasonably safe outcome' should be clearly defined and aligned with *Towards Zero*.

The RIS proposes a mandatory self-certification approach for safe outcomes in which automated driving system entities (ADSEs)[3] are required to provide a Statement of Compliance against 11 criteria. These safety criteria are principle-based to accommodate and encourage rapid technological change, and do not prescribe detailed minimum thresholds. For an industry in which safety should be the first and foremost priority, we should question whether a solely principles-based approach to the criteria is appropriate. The RIS states, "the role of government in the SAS is to satisfy itself that the applicant has processes in place to identify and manage the safety risks," and requires that certain safety elements are addressed under each criterion. RAC acknowledges sufficient flexibility is necessary for timely adoption of rapidly advancing technology, however, it is unclear how the safety of an ADS may be assured without some assessment of these processes. Should there be a prescribed set of principles for safe system design and validation, or should an ADSE be allowed to determine how the vehicle behaves in the event of a life-threatening crash? Without a definition of what encompasses a 'reasonably safe outcome' an ambiguous environment may be created in which it is not clear as to which aspects of the vehicle's behaviour should be prioritised and programmed. Additionally, it is unclear how we will evaluate whether the SAS is delivering reasonable safety outcomes without appropriate benchmarks.

[2]Automated Driving System (ADS) means: the hardware and software that are collectively capable of performing the entire dynamic driving task on a sustained basis. It is a type of driving automation system used in vehicles operating in conditional, high and full automation mode
[3]Automated Driving System Entity (ADSE) means: the legal entity responsible for the ADS. There will only be one ADSE for each ADS type going through a safety assurance system; that is, the ADSE is the applicant in the safety assurance process. This could be the manufacturer, operator or legal owner of the vehicle, or another entity that is seeking to bring the technology to market in Australia.

Despite AVs being in the early stages of development, in RAC's community surveys (RAC AV surveys) of the perceptions and attitudes towards AVs, almost half of Western Australians surveyed felt positively towards them (28 per cent of which felt extremely positive). Crash history, attitudes towards driving, and driving frequency did not have any impact on these attitudes. However, given the newness of the technology it is not that surprising that 30 per cent of Western Australians surveyed had negative feelings towards AVs.

An AV industry motivated to consistently strive for better safety outcomes, beyond solely seeking to meet minimum regulatory requirements, would provide greater comfort to the community that potential market failures have been adequately addressed by government.

Emulating the safety-first approach of like industries, such as aviation, may result in greater positive outcomes for society and provide a level of comfort to both potential users and regulators.

In addition to regulation, government and industry should also consider ways to motivate ADSEs to continually improve on the safety features of AVs. For example, a review of the European New Car Assessment Programme in 2016 found it was effective in driving vehicle safety improvements and noted the potential role for the program to play in support of AV safety[4].

Industry performance criteria could be introduced to motivate original equipment manufacturers (OEMs) and ADSEs to continually improve safety features in vehicles, where the key performance indicator could be based on the incidents or near misses and crashes resulting in injuries from minor to fatal. An important point to note is that the timeframe for amendments to the Australian Design Rules (ADRs) has traditionally been protracted and therefore the ADRs do not keep up with important improvements in the road safety arena.

The level of uncertainty and confusion for industry is a potential barrier

In RAC's AV surveys, just over half of respondents believe vehicle manufacturers and industry should be leading the way to ensure readiness for AV technology. It is important that the AV regulatory framework enables innovation and encourages industry while also ensuring the required safety outcomes. The proposed self-assessment criteria are inexplicit and ADSEs are likely to find them ambiguous and difficult to complete. In addition, the introduction of a primary safety duty may be a significant concern for industry without prescription of what is required under the new legislation. Industry guidelines may be necessary to clarify 'as far as is reasonably practicable', particularly in the absence of common law specific to AVs.

Currently, the process to import then operate AVs is different for each jurisdiction. When RAC made an application to the Australian 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

[4]Van Ratingen, M., Williams, A., Lie, A., Seeck, A., Castaing, P., Kolke, R., Adriaenssens, G. & Miller, A., (2016), "The European New Car Assessment Programme: A historical review", Chinese Journal of Traumatology, 19(2), 63-69.

so under the 'Testing and Evaluation' category as the vehicle did not comply with existing ADRs. This application required supporting documentation, including a 'letter of in principle support' from the State Government transport regulator, the WA Department of Transport. Further, we provided other available information such as vehicle specifications, project proposals as well as the Vehicle Identification Number. Prior to putting Navya's Arma shuttle on public roads, RAC independently undertook several activities to ensure that the risks associated with running the vehicle could be mitigated and controlled, and eventually, received discretionary approval from the state regulator to operate it as a non-compliant vehicle under a special permit. Presently, different processes and requirements exist to operate the same vehicle across Australia. An agency acting as the single point of contact (proposed in options three and four) may simplify the process and support conformity to developing product standards.

If industry perceives the responsibilities and processes associated with introducing ADSs in Australia too ambiguous or onerous, ADSEs may delay entry into the Australian market (which is comparatively small), and opt for larger, more attractive international markets. Should this occur, in the shorter term we may miss the opportunity to realise the safety improvements AVs are expected to deliver, in the form of less people killed and injured on our roads.

In summary, Australia needs a consistent process for introducing ADSs that prioritises safety and is managed by a single point of contact, probably at the national level.

The delineation of responsibilities is not clear

Responsibility in the event of a crash was one of the top concerns for Western Australians demonstrated by our surveys. Unclear responsibilities are likely to affect consumer and industry confidence and therefore AV uptake and supply[5].

The mandatory self-certification model places responsibility on ADSEs to ensure safe ADS performance. However, the RIS does not consider how responsibilities may be delineated in complex circumstances such as where there is more than one ADSE associated with an ADS. AV technology contains many components likely to be supplied by different manufacturers. Statements of Compliance may be difficult to complete where the ADSE seeking approval does not hold all the requisite knowledge. To illustrate, the proposed SAS would identify RAC as the responsible ADSE in its Intellibus Trial. However, RAC works in partnership with Navya, a French company that manufactured the vehicle. Furthermore, Navya's Arma contains technical products with a potential to affect performance such as LiDAR sensors that are supplied from different companies (e.g. Velodyne and SICK). The SAS should consider the issues that are likely to arise should one ADSE assume sole responsibility under the proposed framework, particularly given the likelihood for third party failures such as inadequate external repairs. To overcome liability uncertainties, it is also possible ADSEs/OEMs will increase costs (to cover liability insurances etc), and therefore diminish some of the potential benefits associated with AVs. Currently, Australia Consumer Law defines a manufacturer to include entities responsible for sale (and not assembly) of motor vehicles. These entities are likely to be held liable for the safety of products where the manufacturer responsible for assembly cannot be identified or does not have a place of business in Australia. RAC submits that further consideration should be given to the liability of an assembly manufacturer that is not the ADSE responsible for completing the Statement of Compliance.

Ensuring the effectiveness of a SAS amid rapid technological advancements and unknown impacts

It is certainly a challenging task to determine and apply a set of standards to a range of vehicles where the technology supporting the driving behaviour remains in the early stages of development, testing and trialling. As we have already identified, to accommodate the rapid changes in technology the safety criteria must be agile enough to enable timely modifications, particularly as ADSs become available in regional areas and able to operate in all circumstances on all roads. Flexibility will further assist harmonisation with international frameworks.

To complement the SAS it is critical that government carry out the necessary infrastructure planning to support the safety of vehicles with high levels of automation.

As technology progresses the SAS must consider the interoperability between old and new systems, and communication between local and interstate infrastructure. Limited operation design domains resulting from infrastructure deficiencies may negatively affect take up of AVs and discourage industry from investing in the Australian market. More importantly however, insufficient infrastructure to support these vehicles may adversely impact safety.

A summary of RAC's recommendations:

- Safety of AV technology should be the first and foremost aim of the SAS.
- The SAS should support an approach to 'reasonably safe' that aligns with *Towards Zero* road safety strategies.
- Industry performance criteria and/or clear minimum thresholds should be developed to underpin the proposed safety criteria.
- There should be a process for introducing ADSs that prioritises safety with a single point of contact nationally.
- RAC submits that further consideration should be given to the liability of manufacturers that are not the ADSE responsible for completing the Statement of Compliance.
- The SAS and the increased uptake of AVs on Australian roads should be supported by a plan and appropriate levels of funding to ensure that there is sufficient and necessary infrastructure to support the safety of vehicles with high levels of automation.

[5]Marchant, G.E. & Lindor, R.A., (2012), "The coming collision between autonomous vehicles and the liability system", Santa Clara Law Review, 52, 1321-1561.

Question	RAC's response
1. To what extent has the consultation RIS fully and accurately described the problem to be addressed? Please provide detailed reasoning for your answer.	RAC agrees with the problems identified however considers the term 'reasonably safe outcomes' requires definition to both monitor and evaluate success of the SAS.
2. What other factors should be considered in the problem statement?	Nil.
3. Has the consultation RIS provided sufficient evidence to support the case for government intervention? What else should be considered and why?	Yes. There is a reasonable risk that market failures will produce unsafe outcomes.
4. To what extent have the community and industry expectations of a regulatory response been accurately covered?	The RIS has not comprehensively covered the responsibilities of industry for each proposed option. RAC considers a comparison of each option would be useful for industry; and also the community to better assess the likely safety outcomes.
5. Are the four options clearly described? If not, please elaborate.	Our submission highlights a few gaps, particularly the lacking description of approval processes and responsibilities for each option, and the uncertainty attached to the proposed safety criteria.
6. Are the proposed safety criteria and obligations on ADSEs (detailed in chapter 4 and Appendix C) sufficient, appropriate and proportionate to manage the safety risk?	Ambiguity of the criteria will create uncertainty for industry and the community, and it is unclear how the Safety Assurance System will deliver 'reasonable safety outcomes'.
7. Are there any additional criteria or other obligations that should be included?	Nil.
8. Do you agree with the impact categories and assessment criteria? If not, what additional impact categories or assessment criteria should be included?	Broadly agreed. RAC considers some of the assessment criteria under the road safety criterion may inappropriately weight the overall assessment. Please see our response to question 10.
9. Has the consultation RIS captured the relevant individuals or groups who may be significantly affected by each of the options? Who else would you include and why?	Nil.
10. Does our analysis accurately assess the road safety benefits for each reform option? Please provide any further information or data that may help to clearly describe or quantify the road safety benefits.	Disagree. The benefits identified are not all critical to safety assessments given there are other laws which provide the community and consumers protection. Further RAC does not agree with the NTC's assessment of the "clear identification of responsible entities" benefit given the issues we have raised concerning delineation for all options.
11. What additional safety risks do you consider the primary safety duty in option 4 would address compared with option 3?	Option four may have greater compliance potential to ensure ADSEs continue to monitor the safety of their vehicles long after the point of purchase and provides AV-specific penalties. Option four may better manage safety issues specific to AVs.

Question	RAC's response
12. Does our analysis accurately assess the uptake benefits for each reform option? Please provide any further information or data that may help to clearly describe or quantify the uptake benefits.	Regulatory expectations are unclear. As addressed in our feedback, minimum thresholds have not been prescribed and 'reasonable safety outcomes' has not been defined.
13. Does our analysis accurately assess the regulatory costs to industry for each reform option? Please provide any further information or data that may help to clearly describe or quantify the regulatory costs.	Regulatory expectations are unclear. As addressed in our feedback, minimum thresholds have not been prescribed, and 'reasonable safety outcomes' has not been defined.
14. Are there any specific regulatory costs to industry that we have not considered?	There are likely to be specific costs associated with meeting the required safety responsibilities that have not been considered.
15. Does our analysis accurately assess the costs to government for each reform option? Please provide any further information or data that may help to clearly describe or quantify the costs to government.	Structural/institutional costs appear to be narrowly defined (upfront only). What about the ongoing costs of the regulatory agency?
16. Does our analysis accurately assess the flexibility and responsiveness for each reform option? Please provide any further information or data that may help to clearly describe or quantify the flexibility and responsiveness of the options.	Broadly agreed.
17. Do you consider the relevant factors and conditions for government in choosing an option to be valid? Are there any factors and conditions you do not agree with?	Broadly valid. Industry and government costs do not appear to be appropriately covered by the factors. The interaction between consumer law and the proposed safety legislation is not clear.
18. Do you agree with our view on the relevant factors and conditions for government in choosing an option?	Broadly agreed.
19. Has the consultation RIS used an appropriate analytical method for assessing the benefits and costs of the options? What else should be considered?	Agreed in the circumstances.
20. On balance, do you agree that the preferred option best addresses the identified problem? If not, which option do you support?	Agreed.
21. How does your choice of option better address the problem than the preferred option?	N/A

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

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