

NSW TRANSPORT CLUSTER RESPONSE
NATIONAL TRANSPORT COMMISSION DISCUSSION PAPER
REGULATORY OPTIONS TO ASSURE AUTOMATED VEHICLE SAFETY IN
AUSTRALIA



GENERAL COMMENTS

Overview

Transport for NSW (TfNSW) welcomes this opportunity to contribute to the Discussion paper developed by the National Transport Commission (NTC) on regulatory options for automated vehicle safety assurance systems. TfNSW has coordinated this submission on behalf of the NSW Transport Cluster, which includes Roads and Maritime Services. The latter sections of this submission respond to the specific consultation questions raised in the Discussion paper, and also raise some additional issues to consider in regard to automated vehicle safety assurance.

The NSW Government embraces technology and innovation, which have the potential to revolutionise the way we live and travel. It is committed to ensuring the safety of customers across the whole transport system. Earlier this year, the NSW Government launched the initial consultation for the *Future Transport Strategy*, a new approach to long-term transport planning that began with the first Future Transport Summit in April 2016. Input from industry and stakeholders who attended the summit has been distilled into the Future Transport Technology Roadmap (Roadmap), which will be driven by changes brought on by significant global technology and innovation. Enabling connected and automated vehicles (CAVs) is one of the key strategies in the Roadmap.

In NSW, the approach to CAVs is focused on the potential mobility and safety benefits these new technologies can bring to transport customers. The Transport Cluster believes a balance should be achieved between ensuring that safety standards are maintained or improved, and promoting innovation and road network efficiency.

General comment on automated vehicle safety assurance

Advancement in automated vehicle technology is rapid and in these early stages of development it is important to foster innovation. While some vehicles do not meet current standards or Australian Design Rules (ADRs), we need to work both at a state and a national level to develop processes that ensure safety but also allow for the trialling of new and emerging technology and supports industry involvement.

As part of any optimal safety assurance system for automated vehicles, consistent safety standards are needed to ensure that risks to all road users are appropriately managed as automated vehicles continue to be introduced on our roads. TfNSW acknowledges the need for a nationally consistent set of regulatory arrangements for automated vehicles, where possible, noting that Australia is a single vehicle market.

A safety assurance process for automated vehicles should include specification of compliance with vehicle standards through the Australian Design Rules (ADRs), particularly as automated vehicle technology is in its relative infancy and we enter the early stages of transition to vehicles with higher levels of automation. Mandatory vehicle standards are an essential means to ensuring vehicles supplied to the market meet at least the minimum safety standards expected by society. While some of the technologies being introduced into automated vehicles are so innovative that they are not covered by standards, TfNSW will continue to work with the Commonwealth Department of Infrastructure and Regional

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Development (DIRD) to provide input into the standard development review process at both national and international forums. The DIRD is part of an international group – UNECE Working Party 29 – that sets global vehicle standards. It is working to ensure that as existing standards are modified, and new standards developed, and these do not present a barrier to innovative vehicle design and operation.

In addition to technical standards, development of comprehensive performance-based safety standards for automated vehicles should form a key component of any safety assurance system for automated vehicles, and should be based on ongoing international-standard research evidence. To this end, the NSW Government has established the Smart Innovation Centre (SIC) to foster innovation and support industry to develop new technology, with a key focus on trialling automated vehicle technologies to maximise their benefits and help to inform the development of appropriate standards and regulatory frameworks. It should be noted that, pending development of a national legislative and regulatory framework for CAVs, the NSW Government passed NSW road transport legislation in August 2017 to facilitate the safe and legal trialling of CAVs in NSW. Safety assurance reporting should be a condition of approval of each trial, which will help to inform the broader regulatory approach to safety assurance for CAVs beyond individual trials.

In addition to road safety benefits, automated vehicles have the potential to increase transport options for the community, especially for those with mobility issues and in remote areas, and to also improve congestion management and reduce environmental pollution. An optimal safety assurance system for automated vehicles is likely to operate within a broader policy framework that will need to support the management of potentially competing mobility and safety considerations. This will enable a balanced approach to improve customer safety, service and economic productivity in NSW.

The next sections of this submission respond to the specific consultation questions raised in the Discussion paper, and also present some additional issues to consider in regard to automated vehicle safety assurance.

CONSULTATION QUESTIONS FROM NTC

1. Should government have a role in assessing the safety of automated vehicles or can industry and the existing regulatory framework manage this? What do you think the role of government should be in the safety assurance of automated vehicles?

Yes. Governments have an important role in the assessment of the safety of automated vehicles to ensure consistency, provide consumer confidence, and to maintain an ability to hold accountable those who fail on safety.

This is particularly important during the early stages of transition to vehicles with higher levels of automation, where government may need to play a greater role in ensuring safety and other key outcomes from automated vehicle technology. As the technology develops and evolves over time, the role of government could focus on ensuring that matters contained in specified safety performance criteria have been appropriately considered by manufacturers and that the automated driving system entity has processes in place to identify and manage safety risks.

Governments have an important role in the evaluation of standards for automated vehicles, as well as vehicle-to-vehicle and vehicle-to-infrastructure communications that will be

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essential to the widespread adoption of highly automated vehicles. Government should maintain a role in developing, updating and maintaining relevant technical and/or performance-based standards.

Governments should regulate for manufacturers to report crashes involving their automated vehicles as well as other safety-critical incidents and near-misses, including the extent of driver intervention with the automated vehicle driving system. In regard to the security of automated vehicle data systems, authorities will also require appropriate access to data in the event of a crash or road rule violation. Specification of security for data systems should include consideration of data storage requirements for the period leading up to a crash, compliance with international standards as well as existing frameworks for data integrity and information privacy in NSW. In addition to data requirements, there needs to be a clear responsible person or body for incidents/crashes that can be held accountable if it's not the driver of the vehicle.

A regulatory framework for assuring automated vehicle safety must allow government to sanction technology failures on the grounds of public safety, with an effective compliance regime that should consider oversight of crashes and serious safety incidents by an independent body, including in-depth and forensic investigations for crashes involving automated vehicles.

2. Should governments be aiming for a safety outcome that is as safe as, or significantly safer than, conventional vehicles and drivers? If so, what metrics or approach should be used?

Automated vehicle technology should be safer than current vehicles and drivers, with the levels of safety continuing to improve over time. In the first instance, automated vehicles should demonstrate outcomes that are as safe as conventional vehicles and drivers; however, as technology develops and matures over time, the level of safety performance expected from automated vehicles is likely to increase based on ongoing research and testing of automated vehicle systems. Safety risk tolerability levels and targets should be considered to ensure ongoing improvement in desired safety outcomes.

Consistent with the Safe System approach, demonstrations of safety should account for the whole operating transport system and should relate not only to vehicle safety, but also safer road use, safer roads and safer speeds. It should be demonstrated how independent automated functions integrate with other safety critical functions to achieve overall system safety.

The current approach to safety performance involves compliance with existing vehicle safety standards through ADRs, Australian Consumer Law, the driver licensing regime, and the vehicle identification and roadworthiness inspection scheme. The principles of this current approach should be maintained, particularly as we transition to vehicles with higher levels of automation.

In addition to technical standards, future safety outcomes for automated vehicles should also be based on vehicle performance-based criteria (e.g. braking, object recognition, system reliability), and measured according to the rate of technical failure and incidents that result in customer harm and other adverse customer outcomes such as significant property damage.

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Development of outcomes-based regulation must also be considered, acknowledging that it may not be possible to specify the range of performance criteria for what will be highly complex systems. A positive safety duty may be an appropriate alternative to a rules-based approach, and could be reinforced through codes of practice which can be adapted as required.

3. Should the onus be placed on the automated driving system entity to demonstrate the methods they have adopted to identify and mitigate safety risks?

The onus should be placed on the vehicle manufacturer and their supply chain to have a safety management and assurance system in place that allows for the identification and management of safety risks, with the safety case for particular vehicles or systems to be verified by government. It will be important to allow industry the flexibility to ensure safety in any way that is effective and expedient, and equally, to balance this flexibility with a general obligation for industry to ensure safety.

Regardless of the regulatory regime adopted for automated vehicle safety, a consistent approach should be applied to ensure public and consumer confidence. A risk-based approach to the management of the automated driving system entity based on safety performance criteria would be optimal. Standardisation of the safety assurance criteria will be important to ensure that all automated driving systems and vehicles from all manufacturers can demonstrably meet the same minimum level of safety performance.

4. Are the proposed assessment criteria sufficient to decide on the best safety assurance option? If not, what other assessment criteria should be used for the design of the safety assurance system?

Yes, the proposed criteria are appropriate.

An additional criterion that should be considered is the ability of the model to manage safety changes. This may be important given the likely need for a transitional approach to regulating automated vehicle safety. Safety-related changes can relate to many areas such as regulatory changes, driver competency changes, roadside configuration changes, CAV software configuration changes, and operating rules changes.

In regard to criterion 4b ('the process of assurance should minimise structural, organisational and regulatory change necessary to implement the model'), given that the optimal regulatory regime for automated vehicles will need to deal with a complex transition to vehicles with higher levels of automation, such changes should be considered if it enables more effective safety assurance of automated vehicles as technology evolves.

5. Should governments adopt a transitional approach to the development of a safety assurance system? If so, how would this work?

A transitional approach to the development of a safety assurance system for automated vehicles is a feasible option.

This approach would acknowledge that automated vehicle technology will develop and evolve over time. Stronger regulation and safety assurance for automated vehicles will be desirable and possibly necessary to secure public trust in the early stages of introducing more highly automated vehicles, particularly driverless vehicles, where confidence in the safety performance of automated vehicles will be critical in determining future success and

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uptake. The regulatory approach should evolve over time as further testing of technology is carried out and appropriate technical and/or performance based standards are developed.

A risk-based approach to automated driving system management based on safety performance criteria would allow for a transitional approach to be implemented and reduce the need for significant change as the technology evolves.

6. Is continuing the current approach to regulating vehicle safety the best option for the safety assurance of automated vehicle functions? If so, why?

Continuing the current approach to regulating automated vehicle safety may be an option in the short term but is not the best option in the long run, particularly if it impedes innovation that could improve desired safety outcomes by reducing road deaths and injuries. Changes to the current regulatory regime for automated vehicle safety are needed to keep up with technological innovation. It will most likely be several years before international standards are developed and introduced that relate to automated vehicle safety. Given that ADRs are not currently specified in regard to automated vehicle technologies (noting work currently undertaken by UNECE Working Party 29 to develop more general performance-based standards for automated driving systems), this would expose road users to risk from automated technologies and result in a lack of government oversight needed to ensure public safety of automated vehicles supplied to the market.

Development of outcomes-based regulation must be considered. This would impose a positive duty to ensure safety (i.e. a general duty) supported by codes of practice that might address specific aspects of CAV operation and which could be changed relatively easily, even frequently, as industry and government experience developed, including through drawing on international experience and ongoing trial and research findings.

7. Is self-certification the best approach to regulating automated vehicle safety? If so, should this approach be voluntary or mandatory? Should self-certification be supported by a primary safety duty to ensure automated vehicle safety?

Self-certification may be an option in the short term and likely to be an optimal approach in the long run, particularly for larger manufacturers with internal capability for research and testing. A self-certification approach would need to be accompanied by more specific safety performance criteria (e.g. for braking, maintaining safe headway, object recognition) and other safety assurance elements to ensure government oversight, consistency and accountability for the safe deployment of automated vehicles. A self-certification approach is likely to be more effective in producing desired safety outcomes if supported by appropriate compliance measures including some form of random compliance check regime.

The adoption of a primary safety duty for all relevant parties should be considered in conjunction with a self-certification approach to encourage compliance with safety assurance.

8. Is pre-market approval the best approach to regulating automated vehicle safety? If so, what regulatory option would be the most effective to support pre-market approval?

While pre-market approval is unlikely to be the optimal approach in isolation, elements of this approach may ensure a balance is achieved between safety outcomes and other benefits of

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automated vehicle technology such as congestion management and network performance. Pre-market approval based on testing and validation of system safety may be better for smaller manufacturers that do not have in-house facilities and capability, which would support continued innovation in this area. This approach may also allow recognition of pre-market approvals obtained in other countries.

The broader challenge associated with pre-market approval is having the appropriate expertise required to make a meaningful assessment of operator systems and vehicles against specified safety criteria, which would then be a resource-intensive approach.

9. Is accreditation the best approach to regulating automated vehicle safety? If so, why?

While an accreditation approach to regulating automated vehicle safety has the potential for high safety outcomes to be achieved based on performance in other industries, it is complex, costly and resource-intensive, and would represent a significant change for government and manufacturers in this area. It is unlikely that this approach would be effective until the automated vehicle industry has matured and the technologies and safety risks are better understood through ongoing testing and trialling of automated driving systems.

10. Based on the option for safety assurance of automated vehicle functions, what institutional arrangements should support this option? Why?

Given the likely need for a graduated approach to assurance of automated vehicle safety, it is unlikely that institutional arrangements will be determined until the optimal regulatory approach has been identified.

However, management of safety assurance system for automated vehicles should include some level of Federal Government approval to ensure consistency and supports Australia as a single market for the deployment of automated vehicles, while ensuring flexibility to encourage innovation. Pending Federal Government approval, each Australian State or territory would need to identify what is required for the automated vehicle to operate in that jurisdiction (e.g. register the vehicle with appropriate exemption from applicable vehicle standards as necessary or exempt the vehicle from road rules for the purpose of trialling under specific conditions). This approach acknowledges the need to comply with existing road rules and registration requirements, and would present opportunities for mutual recognition of work across Australian jurisdictions to enable consistency and reduce duplication of work by and costs for automated driving system entities.

At present in NSW, to authorise an automated vehicle trial, NSW would need to seek approval from the DIRD to import a non-complying vehicle for research purposes. Any such vehicle needs to be assessed against the ADRs that would normally apply to a vehicle within its classification, and a risk management framework developed to determine how best to control any outstanding risks that the non-compliance may create. The use of the vehicle would then be subject to an exemption order conditional on implementation of the controls outlined in the risk assessment.

In the longer term, a national approach to the management of automated vehicle safety assurance systems could only be considered pending consistency across jurisdictions and the development of nationally consistent rules to govern the use of automated vehicles in Australia.

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11. How should governments manage access to the road network by automated vehicles? Do you agree with a national approach that does not require additional approval by a registration authority or road manager?

As a long term option, this submission supports the NTC proposal that a national approach to managing access to the road network by automated vehicles be adopted, incorporating State and territory based automated vehicle registration and network access into the safety assurance process. Adopting this approach should be conditional on further exploration of access issues once a regulatory model has been agreed, and pending appropriate legislative change to State and territory laws to mandate the implementation of the safety assurance system entity's decisions. This approach would ensure national consistency, reduce jurisdictional duplication, and support lower costs, administrative convenience, and certainty for manufacturers of automated driving system entities.

Currently, however, individual state and territory governments need to remain in control of access to their road network, to ensure that automated vehicles comply with existing road rules and registration requirements in the relevant jurisdiction. It is noted that, if a vehicle has an identification plate affixed in accordance with an import approval under the Commonwealth legislation, the Registration Authority may accept this as evidence of compliance with the applicable standards and may be registered. For establishing trials involving automated vehicles in NSW, even after federal approval is gained to import an automated vehicle, approval is still required by Roads and Maritime Services as the road manager to permit the operation of an automated vehicle on the network under the circumstances specified for the trial contained in an exemption order approved by the Minister.

Even in the long run, as technology develops and evolves over time, each Australian State or territory would still need to identify what is required for a Federally approved automated vehicle to operate in their jurisdiction, pending the development of nationally consistent rules to govern the operation of automated vehicles in Australia.

Roads and Maritime Services proposes that the NTC consider the current type approval process and examine whether it can be adapted to CAVs. For example, if the performance standards are adequately clear, and the law imposes a general duty (incorporating risk management obligations), identifying roads for access could potentially be left to automated vehicle system operators or the manufacturer. The obligation would be to select roads that allowed the vehicle to perform at a certain level (and objectively, so far as is reasonably practical). This would have the effect of ensuring that the manufacturer or operator were continuously monitoring and improving the performance of their fleet. It would also provide an incentive for manufacturers and operators to cooperate in any investigation following an incident. The usual suite of enforcement tools for performance-based regulation would also be essential, including improvement notices, prohibition notices and enforceable undertakings.

While the Discussion Paper focuses on automated vehicles, this submission notes the need to ensure that connectivity with other vehicles and infrastructure is in place to support their safe and reliable operation. This is critical to the success of automated vehicles and the NSW Government is already actively engaged in research regarding cooperative intelligent transport systems (C-ITS). Effective and reliable connected infrastructure is needed to support operation of automated vehicles in a comprehensive range of conditions and

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locations, if CAVs are to be as safe and reliable as possible and fully acceptable to consumers. The need for assistance from infrastructure outside the vehicle is particularly important because safe and reliable control decisions need to be made to protect not only the automated vehicle occupant, but also road users outside the vehicle such as pedestrians, bicycle riders, motorcyclists and occupants of other approaching vehicles.

12. How should governments ensure compliance with the safety assurance system?

The NTC has proposed the following broad approaches to ensure compliance with a safety assurance system for automated vehicles:

1. adopting a general safety duty with relevant penalties,
2. adopting specific offences linked to the adopted regulatory approach, and
3. adopting a range of alternative sanctions for regulators to ensure compliance.

It is likely that a combination of these measures will be needed to ensure compliance with a safety assurance system.

It is important that governments have sufficient oversight of safety compliance to enable them to hold manufacturers accountable for any failures to comply with the safety assurance system criteria. Whatever compliance regime is adopted, it should aim to be proportionate, with appropriate incentives for manufacturers to comply (e.g. require manufacturers to report safety-critical incidents).

An effective compliance regime will also need to consider in-depth investigation for serious safety incidents (either by government or an independent body) and assurance of automated vehicle safety in after-market (e.g. modifications). Other compliance considerations include the need for system safety assessments and a safety governance audit regime.

ADDITIONAL ISSUES TO CONSIDER

This submission notes the following additional issues to be considered for development of a safety assurance system for automated vehicles in Australia:

- While the Discussion Paper exclusively refers to the term ‘automated vehicle’, it should be acknowledged that an optimal safety assurance framework should account for varying degrees of automation found in new cars sold today.
- While the Discussion Paper focuses on automated vehicles, this submission notes the need to ensure that connectivity with other vehicles and infrastructure is in place to support their safe and reliable operation. This is critical to the success of automated vehicles and the NSW Government is already actively engaged in research regarding cooperative intelligent transport systems (C-ITS). Effective and reliable connected infrastructure is needed to support operation of automated vehicles in a comprehensive range of conditions and locations, if CAVs are to be as safe and reliable as possible and fully acceptable to consumers. The need for assistance from infrastructure outside the vehicle is particularly important because safe and reliable control decisions need to be made to protect not only the automated vehicle occupant, but also road users outside the vehicle such as pedestrians, bicycle riders, motorcyclists and occupants of other approaching vehicles.

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- Vehicle standards primarily relate to individual components of the vehicle. It is unclear how ADRs and in-service vehicle standards could effectively have regard to vehicle performance, including compliance with road traffic laws by the vehicle's registered owner. An integrated system safety approach to automated vehicle safety assurance may be optimal, involving all aspects of the transport system (roads, vehicles, drivers and speeds), and where individual CAV functions and components are considered as a collective to produce desired system safety outcomes of reduced road deaths and injuries.
- Regulatory options to assure the safety of automated vehicles should include consideration of aftermarket automated systems that can be installed onto existing vehicles, as well as vehicle modifications. Modifying standard vehicles – for functional, performance or aesthetic purposes – and even building unique vehicles is a common pastime among motoring enthusiasts. It is the basis of a multi-million dollar aftermarket industry. As more and more automated systems are introduced into vehicles, the scope for modifying them reduces, either because the systems are too complex to be altered or they are fundamental safety features that cannot be changed. These enthusiasts and the associated industry need to be considered in establishing an appropriate regulatory framework to accommodate automated vehicles.
- Some emerging automated vehicles are being designed to operate in pedestrian areas (e.g. community shuttle buses) and private property (e.g. automated freight vehicles to deliver goods). Clarity should be provided as to whether a proposed regulatory approach would apply only to automated vehicles that operate on the road. It is noted that the NTC is currently leading a project to consider a suitable regulatory approach for small automated vehicles.
- There exist a range of non-standard and innovative 'alternative vehicles', ranging from small personal mobility devices to full-scale passenger and freight vehicles. With the advent of new automated vehicle technologies, the term 'alternative vehicles' now also covers vehicles with varying degrees of autonomy, right through to fully driverless vehicles. A problem with many alternative vehicles is that they are either not primarily intended to be used on roads so there are no ADRs covering them, or they are so innovative that they are outside the scope of the ADRs. Safety principles should guide development of appropriate standards that incorporate non-standard vehicles, including separate categories for smaller slower devices suitable for use in footpaths, and larger, heavier devices for road use.
- Consideration should be given to safety assurance requirements to address the automated driving system operating under different operating modes. Operating modes may include normal mode, interim mode, degraded mode (including fault mode where failure has occurred and operation is limited), emergency mode (including incident recovery, security, backup control), and maintenance mode.