AUSTRALIAN TRUCKING ASSOCIATION

CLARIFYING CONTROL OF AUTOMATED VEHICLES

AUSTRALIAN TRUCKING ASSOCIATION SUBMISSION
6 JUNE 2017

1. About the Australian Trucking Association

The Australian Trucking Association (ATA) is the peak body representing trucking operators. Its members include state and sector associations, some of Australia's major logistics companies and businesses with leading expertise in truck technology. Through its members, the ATA represents many thousands of trucking businesses, ranging from owner drivers to large fleets.

2. Recommendations

Recommendation 1
The introduction of automated driving systems and clarification of the control of vehicles needs to be focused on achieving a safe road system, and not on the introduction of a particular form of technology.

Recommendation 2
Due to the unpredictable rate of change in technology, the NTC should review changes in automated vehicle technologies and the implications for the Australian road network every 12 months.

Recommendation 3
For vehicles with conditional automation driving systems (SAE level 3), the human driver cannot be designated as in control of the vehicle until:

- Safety risks with the possible loss of driving skills and awareness by human drivers is addressed.
- It is demonstrated that a human driver can safely resume control of the vehicle.
- The automated driving system is recognised in legislation and a safety assurance system is implemented, similar to the proposed approach for SAE levels 4 and 5.

Recommendation 4
For vehicles with high or full automation driving systems (SAE levels 4 and 5), the ATA agrees that the application of proper control to the automated driving system should be delayed until the automated driving system entity is recognised in legislation, a safety assurance system is implemented and it is demonstrated that the automated driving system can operate safely on Australian roads.

Recommendation 5
The role of the Australian Transport Safety Bureau should be extended to provide independent, no-blame, safety investigations for road accidents involving heavy or autonomous vehicles.

3. Summary and NTC project objectives

Increasing levels of automation holds great promise for the Australian road network, with improved driver assist technologies already on our roads with a number of safety focused technologies.

In November 2016, the Transport and Infrastructure Council tasked the National Transport Commission (NTC) to develop national enforcement guidelines to clarify regulatory concepts of *control* and *proper control* for automated vehicles. The NTC discussion paper identifies four key issues relating to enforcement and automated vehicles. These are:

- Who is in control?
- What will it mean to have *proper control* of an automated vehicle?
- How should *proper control* apply to the automated driving system?
- How do enforcement agencies interact with automated vehicles?

The ATA is broadly supportive of the objective of clarifying the control of automated vehicles, and the assumptions and objectives of the NTC project to develop national enforcement guidelines.

The ATA also supports the approach of adopting the international standards for classification of levels of automation. Ultimately, vehicles in Australia will be imported from other markets, and there is a clear and pressing need for the Australian framework for automated vehicles to have regard for international approaches, and to not impose unwarranted barriers and costs on the importation of vehicles.

The levels of driver automation defined in SAE International Standards is referenced in the NTC discussion paper, and is summarised in the below table.

SAE level	Name	Description
0	No driving automation	The performance by the driver of the entire dynamic driving task, even when enhanced by active safety systems
1	Driver assistance	Specific execution by a driving automation system of either the lateral or longitudinal vehicle motion subtask of the driving task, with the expectation that the human driver performs the remainder of the dynamic driving task
2	Partial automation	The sustained and operational design domain-specific execution by a driving automation system of both the lateral and longitudinal vehicle motion control of the dynamic driving task subtasks, with the expectation that the driver completes the object and event detection and response subtask and supervises the driving automation system.
3	Conditional automation	The sustained and operational design domain-specific performance by an automated driving system of the entire dynamic driving task – with the expectation that the fallback-ready user is receptive to system-issued requests to intervene, as well as to dynamic driving task performance-relevant system failures in other vehicle systems, and will respond appropriately.
4	High automation	The sustained and operational design domain-specific performance by an automated driving

		system of the entire dynamic driving task – and fallback without any expectation that a user will respond to a request to intervene.
5	Full automation	The sustained and unconditional performance by an automated driving system of the entire dynamic driving task – and fallback without any expectation that a user will respond to a request to intervene.

However, it is not possible to come to a final judgement on some of the consultation questions. The ATA holds concerns about the practical application of automated driving systems assuming control of a vehicle, and the ability of a human driver to assume control from an automated system. This is particularly relevant for the control of a vehicle with conditional automation (SAE level 3).

The ability of a human driver to maintain control, or to intervene to take control, also cannot be considered apart from issues of driver skills and the maintenance of these skills.

Ultimately the legislative and enforcement guidelines and framework for the control of vehicles need to seek a safe road system. They should not unnecessarily restrict innovation and advances in technology that can contribute to improved safety outcomes, but also not seek to introduce automated vehicles as an end in itself. Automated vehicles should only be introduced when they can demonstrate improved safety outcomes, and this must be accompanied by careful consideration of any safety implications of new technologies.

The future development of technology is ultimately not guaranteed, and may develop in variations on what might be presently expected. Revisiting the predictions and intentions behind a technological change that has already been introduced – such the iPhone and the resulting introduction of smartphones, serves as a cautious reminder of this point. It has been reported that Apple did not originally foresee the ways the iPhone would change the ways people connect and shop, or that the App Store would become a multi-billion dollar business. The intention was to create an iPod that made phone calls.[1]

It has also been suggested that the rate of technological change is accelerating as the evolutionary progress of technology speeds up exponentially.[2] As such, it is hard to predict the form, timing or the commercialisation of technological change in driving systems and the potential introduction of automated vehicles.

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Recommendation 2
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4. Driving skills, awareness and ability to intervene

In the absence of fully automated vehicles on fully automated and controlled environments, such as a train on a railway, any consideration of the control of a vehicle needs to include the human driver and their maintenance of driving skills, awareness, and ability to respond to

[1] Pierce, David. Even Steve Jobs didn't predict the iPhone decade, 19 January 2017.
[2] Berman, A. & Dorrier, J. Technology feels like it's accelerating – because it actually is, 22 March 2016.

emergency situations. Presently a vehicle still needs a human driver to remain in control and to be able to respond to hazards. The ATA supports the clarification that a human driver remains in control of a vehicle with partial automation or driver assistance.

A number of issues, with relation to the human driver, need to be considered with conditional automation (SAE level 3). The NTC discussion paper defines conditional automation as:

> the system drives the vehicle for sustained periods of time. The human driver does not have to monitor the driving environment or the automated driving system but must be receptive to any system failures and intervene if requested and be the fallback for the dynamic driving task.

At the level of conditional automation there are key issues in determining whether a human driver or automated system can be determined as being in proper control of a vehicle.

Challenges to a human driver exercising proper control

It is problematic to determine a human driver as being in proper control of a vehicle with conditional automation. If the human driver is not expected to monitor either the driving environment of the automated driving system when it is engaged for a sustained period of time, then it is difficult to see how the human driver will be receptive to system failures.

The ability of a human driver to intervene in a system failure is also complicated. If a system failure, or unsafe situation, arises whilst the vehicle is under automatic driving control, it may be impossible or unsafe for the driver to suddenly intervene, assuming they became aware of the situation with time to respond. For example, if a vehicle begins to run wide on a bend, sudden interaction by the driver could lead to loss of control or even a roll-over event.

There are also no guarantees that a human driver will be in a position to intervene. With no obligation to monitor the system or driving environment, and with the limited reaction time for many road crashes, the ability of a driver to become aware of a situation in time cannot be relied upon.

This is a critical point if the objective is to improve the safety of the road system, as opposed to introduce a new technology. Where automated technologies can reduce the risk caused by human drivers, such as with emergency braking or lane departure warnings, they should be encouraged. But automated driving systems should not be pursued if they increase fatigue related crashes. The ability of the human driver to remain unfatigued, when not engaged with the driving task, has not been demonstrated.

There is already increasing concern in the community and industry about rising distraction for drivers and its ability to contribute to road crashes. It is extremely unlikely that human drivers would not face increased risks of distraction with a vehicle engaged in a conditional automated driving task, again limiting the ability of the human driver to assume proper control of the vehicle. For professional drivers, the prospect of reduced job interest and increased boredom whilst a vehicle is engaged in a conditional automation driving task also raises serious questions about distraction and possible increased risks of fatigue.

The ATA is also concerned about the potential loss of driving skills. The less a skill is utilised the more likely it is to disappear. There is a need to consider how to maintain driving skills, where human drivers remain ultimately in control of a vehicle, if conditional automation driving systems are likely to reduce the utilisation and practice of these skills. There are already significant concerns in the community, and amongst driving trainers and industry, about the loss of quality driving skills.

The discussion paper identifies that the NTC is not presently aware, as of April 2017, of any vehicle manufacturer or technology provider who is developing or commercialising vehicles with conditional automation. The paper also identifies that because of the potential safety risks, some manufacturers have indicated they intend to progress from vehicles with partial automation to vehicles with high automation.

The automated driving system in a vehicle at SAE level 3 level of automation is still a theoretical entity. In the absence of an actual vehicle with conditional automation it has not been demonstrated that a human driver can demonstrate proper control of a vehicle with conditional automation.

Recommendation 3
For vehicles with conditional automation driving systems (SAE level 3), the human driver cannot be designated as in control of the vehicle until:

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- It is demonstrated that a human driver can safely resume control of the vehicle.
- The automated driving system is recognised in legislation and a safety assurance system is implemented, similar to the proposed approach for SAE levels 4 and 5.

5. Automated systems cannot yet exercise proper control

For vehicles with conditional or higher levels of automation, automated driving systems have not yet demonstrated the ability to apply proper control of a vehicle.

It is yet to be demonstrated how an automated driving system would respond to emergency situations, traffic diversions, directions from emergency or enforcement personnel, severe weather, and failed traffic signals, to name just a few. Also of concern is if the automated software fails, or is subject to security concerns (hacking or viruses, for example).

Recommendation 4
For vehicles with high or full automation driving systems (SAE levels 4 and 5), the ATA agrees that the application of proper control to the automated driving system should be delayed until the automated driving system entity is recognised in legislation, a safety assurance system is implemented and it is demonstrated that the automated driving system can operate safely on Australian roads.

6. Improved safety investigations of road accidents

The introduction of increasing levels of automated driving technologies and fully autonomous vehicles will require reform to safety investigations of road accidents involving heavy or autonomous vehicles.

Accidents involving autonomous vehicles will need to be investigated by experts in the technology, safety systems and human factors so safety improvements can be made.

Presently road accidents are investigated by police and/or the coronial system. This existing system is not suitable to the need to investigate the causes of the accident with relevant experts, including where technology and software needs investigation.

In contrast, the Australian Transport Safety Bureau (ATSB) conducts independent investigation of transport accidents and other safety occurrences in the aviation, marine and

rail modes of transport. The ATSB also seeks to improve safety and public confidence in those transport modes by pursuing excellence in safety data and research and fostering safety awareness, in addition to independent investigation of accidents.

The ATSB is an independent statutory agency that is separated from transport regulators, policy makers and service providers. It is not a function of the ATSB to apportion blame or to provide a means for determining liability.

The ATSB's role should be extended to include road accidents involving heavy or autonomous vehicles. The best way to understand the causes of accidents involving autonomous vehicles and generate recommendations to prevent their recurrence would be for those accidents to be investigated through a no-blame accident investigation process, including the ability to access data from the vehicles involved.

By also extending ATSB safety investigations to road accidents involving heavy vehicles, the reform can be implemented and improve road safety in the short term, and demonstrate to the community in advance of the widespread introduction of autonomous vehicles the improved safety investigation framework for accidents involving autonomous vehicles.

Recommendation 5
The role of the Australian Transport Safety Bureau should be extended to provide independent, no-blame, safety investigations for road accidents involving heavy or autonomous vehicles.