

# NTC

**RESEARCH PAPER - Safety assurance  
system for automated vehicles**



# NTC Research Paper - Safety assurance system for automated vehicles

National Transport Commission Australia

Client: National Transport Commission Australia

Co No.: 978 0 6480156 6 6

Prepared by

**AECOM Australia Pty Ltd**

Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia

T +61 2 8934 0000 F +61 2 8934 0001 [www.aecom.com](http://www.aecom.com)

ABN 20 093 846 925

27-Jul-2017

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001, AS/NZS4801 and OHSAS18001.

© AECOM Australia Pty Ltd (AECOM). All rights reserved.

AECOM has prepared this document for the sole use of the Client and for a specific purpose, each as expressly stated in the document. No other party should rely on this document without the prior written consent of AECOM. AECOM undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document. This document has been prepared based on the Client's description of its requirements and AECOM's experience, having regard to assumptions that AECOM can reasonably be expected to make in accordance with sound professional principles. AECOM may also have relied upon information provided by the Client and other third parties to prepare this document, some of which may not have been verified. Subject to the above conditions, this document may be transmitted, reproduced or disseminated only in its entirety.

## Quality Information

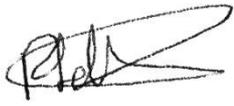
Document NTC Research Paper - Safety assurance system for automated vehicles

Date 27-Jul-2017

Prepared by Devina Hassanaly and Kirill Yushenko

Reviewed by Jay Stricker and Roger Jeffries

## Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
1	27-Jul-2017	Final	Roger Jeffries - Associate Director - Transport Advisory Technical Practice Leader	

## Table of Contents

Introduction	1
1.0 What is the role of government in regulating vehicles and driving?	2
2.0 What is safe for automated vehicles?	2
3.0 What testing methodology should assess and validate automated vehicles safety?	3
4.0 Assessment criteria for a safety assurance system	3
5.0 Option 1: continue current approach	4
6.0 Option 2: Self-certification	4
7.0 Option 3: pre-market approval	4
8.0 Option 4: Accreditation	5
9.0 Implementation- institutional arrangements	5
10.0 Implementation – access to road network	5
11.0 Implementation – how to ensure compliance?	5

<b>Company Details</b>	
<b>Trading Name:</b>	AECOM Australia Pty Ltd
<b>Legal Name:</b>	AECOM Australia Pty Ltd
<b>ABN / ACN:</b>	20 093 846 925 / 093 846 925
<b>Registered Address:</b>	Level 8, 540 Wickham Street Fortitude Valley, QLD 4006
<b>Place of Business Address:</b>	Level 21, 420 George Street Sydney, NSW 2000
<b>Postal Address:</b>	PO Box Q410, QVB PO Sydney, NSW, 1230
<b>Telephone:</b>	02 8934 0000
<b>Fax:</b>	02 8934 0001
<b>Email:</b>	Sydney.Reception@aecom.com

<b>Contact Person</b>	
<b>Name:</b>	Roger Jeffries
<b>Title:</b>	Associate Director - Transport Advisory Technical Practice Leader
<b>Telephone:</b>	0417 342 416
<b>Email:</b>	roger.jeffries@aecom.com

## Introduction

Over the past years, the emergence of new technologies impacting all travel modes has garnered significant attention across the spectrum of interests, from the research and technology communities to the transportation planning and policy communities to the public, media, and government authorities. This awareness and interest is evidenced by extensive media coverage and growing speculation on the implications on everything from roadway safety to the consequences for mobility, environment, land use patterns, and the economy.

Digital technologies are one, if not the strongest, driver and enabler of this changes in the road environment: the exchange of data between different actors in the transport system means supply and demand can be matched in real time, leading to a more efficient use of resources (costs, less traffic congestion, less road trauma, accidents, etc.).

Automated Vehicles use technologies that allow those exchanges between vehicles, with mobile devices and with roadside infrastructure as well as with other road users and have triggered rapid transport market transformation towards customer-centric new business models.

ANZ deployment of automated vehicles are expected on our roads around 2020, at first with Level 3 conditional automated vehicles then followed by the higher level of automated vehicles.

Thus, the National Transport Commission of Australia (NTC), on behalf of the Australian government, wants to explore the regulatory options to ensure safety in deploying automated vehicles in Australia by investigating the issues of such technologies being integrated into current existing transportation systems.

NTC also wants to ensure proper functioning of these systems throughout the necessary guidelines on the establishment of basic safety requirements, in particular for those aspects linked to the automated vehicles reliability.

AECOM Australia Pty Ltd (AECOM) understands that the purposes of NTC investigation are:

- to understand if there is a need for explicit regulation of automated driving functions above exiting transport and consumer law
- to get feedbacks on the form this regulation should take if needed.

AECOM is a leading global design consultant and transportation expert that has an in-depth understanding of, and shares the Australian Government's aspirations for promoting innovative and modern transport network.

AECOM has been promoting industry-wide conversation on the seamless integration of Automated vehicles with road transport, public transport, new and existing multi-modal mobility services, working with ANZ (Australian and New Zealand) and Global governments, road and transport agencies on their Automated Vehicles Strategic Implementation Plan. Highly experienced transport planners with expertise in government policy development and in the development of autonomous vehicles public and private transport schemes have contributed to this research paper.

AECOM welcomes the opportunity to comment and support NTC on the consolidation of their regulatory options for automated vehicles for the Government of Australia, and is looking forward the outcomes of NTC research.

## 1.0 What is the role of government in regulating vehicles and driving?

### Question 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?**

AECOM recommends that the Australian government needs to play an active role in setting up policies and regulations for automated vehicles to ensure that users are safe.

The role of the government would be to define the Common Safety framework for automated vehicles on the Australian territory, in a way they ensure compliance with all the sectors impacted (such as Industry and Transport, Communications, and Industry, Innovation and Science) by:

- Having regulatory oversight of assessing the safety of automated vehicles nationally
- Developing an adaptive safety regulatory framework to evolve as technologies evolve ensuring integration and continuity with existing and future road transport services, ensuring practical implementation of the safety rules and laying down rules on the safety compliance assessment process.

A national legislative power is necessary but the actual regulations and testing would need to be flexible to avoid gaps and inconsistency in the regulatory framework and governing bodies representing it.

We can learn from, but cannot rely only on testing of automated vehicles safety in other countries as for example, some existing vehicles technologies (Volvo) don't recognise the shape and movement of kangaroos as an obstacle.

AECOM strongly believes that community confidence in automated vehicles will need to be supported by government regulation.

## 2.0 What is safe for automated vehicles?

### Question 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?**

AECOM thinks that government should be aiming for safety outcomes that are significantly safer than conventional vehicles and drivers.

AECOM has noticed globally that automated vehicles stakeholders feel that their deployments (at several levels of automation and if well planned) would have positive impacts by increasing road safety, improving congestion issues and facilitating multimodal transport.

The potential for greater safety performance is one of the 'selling points' of AVs and we desperately need to reduce the road toll in Australia.

Metrics would include, but not be limited to, crash avoidance and crash rates per vehicle-kilometre travelled (VKT). The government needs to have a framework developed which would establish the minimum set of requirements necessary to achieve an acceptable level of safety and performance for automated vehicles. These minimum requirements will be used in safety certification process.

One of the approaches could be similar to a system used in Automated People Mover Standard from the American Society of Civil Engineers (ASCE 21-13) when risk assessment is established for Automated People Movers through Mean Time Between Hazardous Events (MTBHE).

### 3.0 What testing methodology should assess and validate automated vehicles safety?

#### Question 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?**

AECOM believes that the onus should be placed on the automated driving system entity to demonstrate the methods they have adopted to identify and mitigate safety risks.

These risks should be audited and certified by a specific safety compliance assessment body such as, for example, the Australasian New Car Assessment Program (ANCAP).

The government will have to identify/create an independent vehicle safety compliance assessment body to cover validation of tests and procedures and issue the safety certificate of compliance for automated vehicles.

### 4.0 Assessment criteria for a safety assurance system

#### Question 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?**

AECOM agrees with the 8 criteria developed, and would recommend, in addition to criteria 7 on other policy objectives, to develop a criteria or sub-criteria related to the interoperability of the safety policy of automated vehicles with the safety policies of other applications or group of applications such as C-ITS (Connected Intelligent Transport Systems), as those innovative technologies, under-development and deployment, will also impact on automated vehicles safety, in particular for the Vehicle-to-Vehicle (V2V) C-ITS technologies that are fully part of the automated vehicles.

There should be a collaboration with these other policy objectives for coordination and convergence as those markets are developing globally (specifically in Australia) and simultaneously.

#### Question 5

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

AECOM agrees with the transitional approach to the development of a safety assurance system and believes it would be more efficient to develop in relation with the five recognised standards of automation.

While the first outcome of the safety regulation is developed for Level 3 automated vehicles, it needs to take into account the development of automated vehicle technology to the next level to be able to cover extra aspects.

## 5.0 Option 1: continue current approach

### Question 6

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

AECOM considers that the current approach to regulating vehicle safety is an appropriate option to ensure the continued introduction of automated vehicles, as it will take a long time to develop an alternative.

However, a transitional approach is important to:

- start transitioning from the current approach to a new approach that will be a mixture of the current with addition of mandatory self-certification
- updating gradually the Australian Design Rules to reflect the introduction of automated vehicles and to recognise other safety features that could be beneficial to gradually introduced automated vehicle different levels and functions.

## 6.0 Option 2: Self-certification

### Question 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?

AECOM strongly considers that self-certification to regulate automated vehicle safety is a necessary approach and should be implemented as mandatory. Self-certification should be supported by primary safety duty for the operational design domain of the automated vehicles function in addition to the Australian Design rules.

## 7.0 Option 3: pre-market approval

### Question 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?

AECOM believes that, in the short term, the pre-market approval route is not the best approach to regulate automated vehicle safety. It might however become more appropriate through transitioning in future decades.

Indeed, for short-term deployments, the pre-market approach does not allow flexibility and support for innovation. Automated vehicles will soon be on our roads but not tomorrow. Meanwhile, the technology keeps developing fast, so the pre-market approach might be made obsolete as fast as the technology will evolve before its readiness to enter the market.

The pre-market approach is very resource-demanding from a legislation and approval point of view and might create a heavy load on government to create and maintain procedures. Approval processes can also be lengthy and might involve issues on the updates of the pre-market approach to keep pace with technology changes.

## 8.0 Option 4: Accreditation

### Question 9

- **Is accreditation the best approach to regulating automated vehicle safety?**
- **If so, why?**

Following our response to the previous question, AECOM also sees accreditation as a long term option, but not in the short term.

This approach could be developed at a future stage as the next stage for self-certification approach, after government has accumulated enough knowledge on accreditation and safety regulation management, as well as greater certainty related to automated vehicle technology, functions, standards, business models, interaction and co-existence with other transport solutions and with other sectors policies.

## 9.0 Implementation- institutional arrangements

### Question 10

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

AECOM believes that institutional arrangements at a national level, by a national entity, should support the option for safety assurance of automated vehicle functions.

Indeed the national entity will facilitate the Australian national market development and the national collaboration on a cross-border compliant and relevant safety assurance system.

The coordinated and rapid deployment of automated vehicles in road transport requires a national facilitator institution that will be independent and will enable national and international dialogues to encourage and support the creation of safety regulations, promote safety and transport innovation and initiatives towards national Australian needs and enable decision-making on investments.

## 10.0 Implementation – access to road network

### Question 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?**

To be consistent with the above, AECOM considers that a national approach to access to the road network should be provided and will not require additional approval by a registration authority or road manager.

## 11.0 Implementation – how to ensure compliance?

### Question 12

- **How should governments ensure compliance with the safety assurance system?**

AECOM considers that governments should use primary duty of care for safety assurance system compliance and add specific sanctions for automated driving entities. We believe this would be necessary for insurance purposes as lack of compliance testing for safety can generate safety vulnerabilities, which are difficult to address after the design and deployment phases.

The basic safety aspects of the compliance assessment model should be defined for the compliance assessment: what primary safety criteria evaluation model would be appropriate in automated vehicles and up to which level and what implications for the criteria related-to-safety policies such as security and privacy).

## About AECOM

AECOM is a premier, fully integrated professional and technical services firm positioned to design, build, finance and operate infrastructure assets around the world for public- and private-sector clients. The firm's global staff — including architects, engineers, designers, planners, scientists and management and construction services professionals — serves clients in over 150 countries around the world. AECOM is ranked as the #1 engineering design firm by revenue in Engineering News-Record magazine's annual industry rankings, and has been recognised by Fortune magazine as a World's Most Admired Company.

The firm is a leader in all of the key markets that it serves, including transportation, facilities, environmental, energy, oil and gas, water, high-rise buildings and government. AECOM provides a blend of global reach, local knowledge, innovation and technical excellence in delivering customized and creative solutions that meet the needs of clients' projects. A Fortune 500 firm, AECOM companies, including URS Corporation and Hunt Construction Group, have annual revenue of approximately \$19 billion.

More information on AECOM and its services can be found at [www.aecom.com](http://www.aecom.com).

Follow us on Twitter: @aecom

