

SUBMISSION TO THE

**National Transport Commission
Regulatory Options
for Automated Vehicles**

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SUBMISSION TO THE NATIONAL TRANSPORT COMMISSION

Regulatory options for automated vehicles

The Australian Academy of Technology and Engineering (ATSE)¹ welcomes the opportunity to provide input to the National Transport Commission (NTC) issues paper *Regulatory options for automated vehicles*.

ATSE strongly endorses regulatory reform to enable the advancement of autonomous vehicle technology and implementation in Australia. Autonomous vehicles have the potential to reduce congestion and fuel consumption, reduce infrastructure requirements, increase road safety, reduce road fatalities, increase mobility, reduce costs in certain industries such as trucking and public transport and redefine or shift industry sectors. In addition, autonomous vehicles provide an exciting opportunity for Australia to fulfil its ambitions of becoming an innovation nation. The potential for economic growth, through advancements in research and development, collaboration with large multinationals and commercialisation, are immense if Australian governments embrace and pursue automated vehicles.

As outlined by the NTC's discussion paper, ATSE recognises that the introduction of automated vehicles on to Australian roads presents an array of challenging and complex regulatory issues for state and federal governments. ATSE believes that the key issues are:

- Development of a flexible and adaptable legislative framework
- Learning from and modelling regulations based on global best-practices

Development of a flexible and adaptable legislative framework

Autonomous vehicle technology is already well and truly in existence and creating significant opportunities for companies and cities across the world. A report by lux research² showed that every major original equipment manufacturer in the world is investing in autonomous vehicles. Google initiated its own self-driving project in 2008 and is continuing to create technological headlines. Tesla³ introduced self-driving capability into its Model S vehicle, which is driven in Australia. Finally, automated vehicles are already extensively used in the

¹ ATSE advocates for a future in which technological sciences, engineering and innovation contribute significantly to Australia's social, economic and environmental wellbeing. The Academy is empowered in its mission by some 800 Fellows drawn from industry, academia, research institutes and government, who represent the brightest and the best in technological sciences and engineering in Australia. The Academy provides robust, independent and trusted evidence-based advice on technological issues of national importance. ATSE fosters national and international collaboration and encourages technology transfer for economic, social and environmental benefit. www.atse.org.au

² https://portal.luxresearchinc.com/research/report_excerpt/21582

³ https://www.teslamotors.com/en_AU/presskit/autopilot

mining industry, in Australia and beyond. Although autonomous trucks used in mining sites are not on-road vehicles, Australia is a world leader in the development of these vehicles and the systems involved in their control, and this experience may provide useful lessons for the deployment of autonomous cars.

These examples illustrate that automated vehicle technology is rapidly evolving and is increasingly in demand by a range of industry sectors and consumers. Hence, Australian governments must introduce flexible and adaptable legislative frameworks that can keep pace with the technology and ensure that Australia becomes a key competitive player in the global market of automated vehicles. Owing to a long-lived but now almost extinct automotive manufacturing industry, Australia already has the skills and capabilities to become a global competitor in the development and implementation of automated vehicles. ATSE strongly recommends that an adaptive legislative framework is developed, to enable regulations to be seamlessly adjusted as the technology and sectors develop.

Learning from and modelling regulations and insurance based on global best-practices

Automated vehicle technology is a universal and generally shared technology. The regulatory and insurance hurdles that must be faced in Australia are the same internationally. ATSE therefore strongly recommends that any regulatory and insurance changes should be aligned with overseas examples, and where possible, draw on best practice from around the globe. It is almost always easier and more effective to take a learned approach compared with developing a whole new set of models. Sharing best practices globally and opening Australian roads to more international testing will provide the necessary knowledge base to produce productive, efficient, safe and fair regulation and insurance.

The views of ATSE on regulation and insurance of automated vehicles align with the Academy's international counterparts, including The Royal Academy of Engineering (UK), the National Academy of Engineering (US) and the National Academy of Science and Engineering (acatech, Germany). Acatech released a Position Paper⁴ last year on autonomous vehicles and argued that regulatory frameworks must be developed at the national and international level and that these frameworks must be able to evolve alongside the technology. The Royal Academy of Engineering discussed regulatory issues of autonomous vehicles in a 2009 report⁵ and argued that public engagement on the issue is needed in order to ensure that a regulatory model is built that will be supported by the public. Finally, the NAE held a regional meeting in May this year⁶ on the topic of driverless cars and discussed the value of the technology, as well as issues such as cybersecurity.

4 Acatech 2015, Position Paper: The Future World of Automated Road Traffic, http://www.acatech.de/fileadmin/user_upload/Baumstruktur_nach_Website/Acatech/root/de/Publikationen/Stellungnahmen/acatech_POSITION_PAPER_New_autoMobility_web.pdf

5 The Royal Academy of Engineering 2009, Autonomous Systems: Social, Legal and Ethical Issues, UK, <http://www.raeng.org.uk/publications/reports/autonomous-systems-report>

6 <http://www.engin.umich.edu/college/about/news/stories/2016/june/driverless-cars-top-agenda>

Overseas governments have already started incorporating policies and initiatives to facilitate the development and introduction of automated vehicle technologies on to roads. For instance, in 2015 the UK Government published a Code of Practice⁷ for testing driverless cars and the Swedish Government launched a Strategic Innovation Program (Drive Sweden) in 2015⁸ to optimise the introduction of automated transport systems. Together, these examples illustrate that similar regulatory and insurance issues on autonomous vehicles are being faced throughout the world and Australia would benefit by looking overseas for how best to face these challenges. Importantly, Australia should not create Australian-specific standards unless there are genuine regulatory needs to do so. The nation should instead adapt international best practice as it is evolving and avoid over-regulation, which would stifle innovation.

Below are brief responses to the specific questions outlined in the NTC's Discussion Paper:

Supporting on-road trials

Question 1a: Do you agree that automated vehicle trials should be supported with national guidelines? If not, why?

Agree.

ATSE is in strong support of ensuring consistent guidelines across states and territories for on-road trials. The only way that potential problems and concerns on automated vehicles can be solved is through commercial experimentation. One potential application of the technology that is relevant to Australia is in providing public transport services, by using on-demand driverless pods which would deliver passengers and freight to desired locations or becoming a convoy on busy routes. This service would be particularly useful in our extensive low-density suburbs and for people unable to drive, such as the physically impaired. Australian trials of this service could be relevant.

The University of Michigan for example launched a driverless car research centre in 2015 and developed a fake town to road-test autonomous vehicle technology. In November 2015, South Australia became the first (and currently the only) jurisdiction in Australia to introduce specific legislation to facilitate on-road trials of automated vehicles. This initiative recognised the expanding potential that on-road autonomous vehicle trials have for boosting international collaboration and facilitating innovation. Following South Australia's success, all Australian governments must cooperate to achieve a set of well-developed and progressive policy guidelines that facilitate and promote on-road trials.

⁷ UK Department for Transport 2015, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/446316/pathway-driverless-cars.pdf

⁸ Drive Sweden 2016, <http://www.drivesweden.net/en/about-drive-sweden>

Question 1b: What key conditions should be included in any national guidelines?

In order to develop a robust dataset from which to build legislation from, it is important there is mandatory tracking of all trial vehicle data, time of day and location. Consideration must be made on what issues will emerge as technology providers and car manufacturers request to test fully automated vehicles (Level 4)⁹, which will not require a human driver. Furthermore, there must be mandatory specifications set on the vehicles and systems undergoing trials, to ensure consistency, safety and reliability of data, including:

- minimum sensor equipment that vehicles need to carry (e.g. LIDAR or no LIDAR)
- Vehicle-to-X (V2X) communication systems installed in all vehicles
- minimum 'test harness' for self-driving software
- testing of the compliance with the test harness

The changing meaning of *control* and *proper control*

Question 2a: Do you agree that issues of control and proper control should be addressed through national enforcement guidelines? If not, why?

Agree.

As was highlighted in the Discussion Paper, ATSE agrees that it is important to clarify who or what is in control of a vehicle that is conditionally automated. There is also a need for clarity on what is meant by "proper control" for conditionally and highly automated vehicles, since the current rule of holding the steering wheel with at least one hand will likely be unnecessary for automated vehicles.

Question 2b: How should control and proper control be defined?

In the short term, proper control should be defined as it is today, but with the added caveat that the human driver is responsible even if the vehicle is in self-driving mode. In other words, it should be treated like adaptive cruise control, lane assist and other such features are today. In the longer term, when vehicles reach Level 4, the definitions will need to be changed.

⁹ National Highway Traffic Safety Administration 2013, U.S. Department of Transportation Releases Policy on Automated Vehicle Development, <http://www.nhtsa.gov/About+NHTSA/Press+Releases/U.S.+Department+of+Transportation+Releases+Policy+on+Automated+Vehicle+Development>

Safety assurance for vehicles that do not require a human driver

Question 3a: Do you agree that governments should oversee the safe operation of automated vehicles through the development of a national safety assurance framework? If not, why?

Agree, providing governments are able to keep up with the pace of development.

Question 3b: What objectives and criteria should such a framework include?

Similarly to on-road trials, there must be mandatory specifications set on the vehicles and systems to ensure safety and consistency, including:

- Minimum technical specifications for a vehicle to be self-driving regarding sensors, communications and algorithms
- Minimum 'test harness' which the vehicle must be proven to comply with
- Minimum data recording standards

The changing meaning of *driver* and *driving*

Question 4a: Do you agree that the definition of driver and driving should be amended in relevant legislation? If not, why?

Agree.

In many laws the current definition of a driver, which requires a human driver, will likely become obsolete once Level 4 in vehicle automation is met. The meaning should eventually be expanded to include an automated driving system.

Identifying responsibility for a vehicle at a point in time

Question 5: Do you agree that the driver or registered owner should be deemed responsible for the actions of the automated vehicle, and for governments to further investigate options as the technology and market develops? If not, why?

Disagree.

Placing the responsibility on the driver or registered owner would prevent vehicles from being driven without occupants, which may be necessary for some of the time. Rather than mandating automatic assumption of responsibility, it is more just and accurate to rely on data to uncover who or what should be responsible. Data recording with cloud storage will allow post-hoc evaluation of responsibility if an incident occurs.

Vehicle design and standards

Question 6: Do you agree that governments should continue to rely on vehicle standards exemptions at this point in time? If not, why?

Disagree.

Self-driving vehicles will have common technical characteristics, which can be specified for each of the 4 levels of automation. Compliance with standards (through passing a standard 'test harness') will be essential to build confidence in self-driving vehicles.

Vehicle modification and in-service compliance

Question 7: Do you agree with the development of industry-led standards to address modification of automated vehicles? If not, why?

Disagree.

The Federal Government should develop a national set of standards. Automated vehicles are unlike ordinary vehicles, as they cannot compensate for variation in the same way as a human. Thus, automated vehicles will need to be tested against stringent requirements.

Privacy

Question 9: Do you agree that personal information generated by automated vehicles should continue to be regulated by privacy principles and with no additional legislative controls at this time? If not, why?

Agree.

Privacy is a sensitive issue in our society. There is generally strong negative public perception of governments having readily-available access to personal information and activities. This was easily evident when the Federal Government announced its controversial metadata retention policy¹⁰, which the general public strongly opposed. Contrarily though, most people happily use Google's or Apple's GPS systems on their phones to get around, which constantly track and collect user information. Thus, any changes to privacy should only be introduced when potential privacy risks (e.g. hackers or terrorists hacking and taking control of autonomous vehicles) are established.

¹⁰ Australian Government 2016, Data retention, <https://www.ag.gov.au/dataretention>

Additional consultation questions

Question 10: Do you agree with the proposed approach to use different automated vehicle classification systems depending on the purpose for which they are used? If not, why?

Agree.

Question 11: Are there other issues that we have suggested are out of scope or that have not been identified, and which you think should be considered as part of the NTC project? If so, why?

As indicated above, specifications and 'test harnesses' need to be considered.

Question 12: Do you agree with the staged approach to reform and the suggested timeframes to address the identified issues? If not, why?

Agree.

ATSE would be pleased to recommend members of the Academy's Infrastructure Forum to provide the NTC with further assistance. For further information, please contact Dr Milla Mihailova, ATSE Research and Policy Officer, at milla.mihailova@atse.org.au or 03 9864 0920.