

28 July 2017

Attention: Automated Vehicle Team
National Transport Commission
Level 3/600 Bourke Street
Melbourne VIC 3000
Lodged via: www.ntc.gov.au

Response to NTC Discussion Paper – Regulatory options to assure automated vehicle safety in Australia

Thank you for the opportunity to provide a response to the discussion paper, *Regulatory options to assure automated vehicle safety in Australia*. The Amy Gillett Foundation has a direct interest contributing to the conversation about automated vehicle safety with regard to the safety of cyclists on Australian roads.

In our review of this Discussion Paper it was reassuring to see the mention of safe interaction with vulnerable road users including cyclists with specific reference to the need for compliance with minimum passing distance laws.

However, this mention highlighted the most important and overarching concern – the lack of comprehensive consideration of autonomous vehicles and the safe interaction with vulnerable road users as part of the regulatory framework. Governments have a critical role in establishing the minimum safety standards for all vehicles and to use all available policy frameworks to minimise the potential of any vehicle to cause harm in our community by protecting all of us when we are most vulnerable – that is when we are walking or cycling.

In this submission we have provided responses to the consultation questions. Further, recently the AGF has made submissions to three automated vehicle inquiries and the submissions are attached for your reference. Across all inquiries our principle goal remains the same – a safe environment for vulnerable road users.

We look forward to the next steps in this process. Please do not hesitate to contact me directly if you have any questions or require any additional information.

Yours sincerely

Phoebe Dunn



**Chief Executive Officer
Amy Gillett Foundation**

Amy Gillett Foundation

The Amy Gillett Foundation (AGF) is a national organisation with a mission to reduce the incidence of serious injury and death of bicycle riders in Australia. We draw on evidence and international best practice, and collaborate with governments, business and the community to create a safer environment for cyclists, while maintaining an efficient road network for all road users.

AGF responses to Discussion Paper – overview

Fears about safety are the biggest barriers to cycling in Australia. Specifically, people are afraid of riding alongside motor vehicles and the chance that they may be involved in a crash that results in serious injury or death. Automated vehicles have the potential to provide a step-change in cyclist safety by removing or reducing the role of the driver. But this can only be achieved if the detection and avoidance of cyclists are built into the requirements for all automated vehicles, including regulatory oversight.

In the Discussion Paper, three ways of ensuring safe operation of automated vehicles in Australia were identified (p11). For the AGF, the **most significant is the interaction between the vehicle and humans**. In particular the safe interaction with vulnerable humans **outside automated vehicles, particularly cyclists** and pedestrians.

As identified in the Discussion Paper, the automated driving system entity extends beyond the manufacturer to the operator, the owner and other entities, and requires the type of oversight that can only be implemented at a government level. The AGF is a stakeholder that expects ‘governments to continue to play a role in ensuring road safety in a more automated future’ (p14) and in creating a regulatory framework ensure that the safety assurance system mechanism to assess automated vehicle safety extends to all Australians, including when we are riding out bicycles.

We agree with the statement in the Discussion Paper, ‘the greater the risk, the higher the level of regulation’ (p25). Interaction on the road between motor vehicles and people on bicycles is an environment of great risk and requires a high level of regulation to ensure that the safety gains promised from automated vehicles are fully realised for cyclists.

Our detailed responses to the questions raised in the Discussion Paper are included below.

AGF responses to consultation questions

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 of the role of government should be in safety assurance of automated vehicles?

Yes, government has a role in assessing the safety of automated vehicles.

No, industry and the existing regulatory framework is not sufficient to manage this assessment.

The role of government in the safety assurance of automated vehicles fits within the existing requirement that government should maximise community safety, including on the roads. The issue of automated vehicle safety has been framed in the Discussion Paper as a new, imminent evolution of motoring, forecast to arrive from 2020. However, automated features of vehicles are already widespread in the Australian vehicle fleet. The AGF considers automated vehicles as the next step in the continuum of automated features of vehicles in Australia, one that requires continued government involvement including legislation and regulation action.

A key role of government is to maximise community safety. From a road safety perspective, the government's commitment is to the Safe System approach¹ which takes a holistic view of the road transport system. The human-centred guiding principles recognise that humans make mistakes, humans are frail and that the road transport needs to be forgiving. This needs to be extended to recognise that automated driving systems will fail or contain errors. The level of prevention or tolerance of these requires government oversight.

A step-change in driver automation to minimise driver error would be transformative for safety when we are riding our bikes. However, the concern is that the automobile industry will not prioritise technology that ensures the vehicle will detect and avoid people on their bikes. This concern is evidenced by the long history of motor vehicle manufacturers that consider road safety principally in terms of the safety of vehicle occupants.

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?

Significantly safer than conventional motor vehicles and drivers.

Vehicles

Conventional motor vehicles are not safe enough when considered from the perspective of the injury outcomes resulting from a crash with a cyclist.

Current safe motor vehicles tests and metrics place more value on the humans inside the motor vehicle compared to humans outside. Both drivers and passengers have been of greater importance, as demonstrated in safety technology (e.g. driver/passenger airbags, ESC, AEB, seat belt reminders, roll-

¹ National Road Safety Strategy 2011-2020. http://roadsafety.gov.au/nrss/files/NRSS_2011_2020.pdf

over protection, etc.) compared to people outside the car – that is cyclists and pedestrians. This disparity is further highlighted in the current Australasian New Car Assessment Program (ANCAP) which includes only one non-occupant safety test, the pedestrian protection test and no direct safety test for cyclists. Given the lack of a cyclist safety test, the pedestrian protection, which only considers front impact, is used as a proxy measure for cyclists.

It is alarming that vehicles that score poorly on the pedestrian protection test can still be given a five-star rating due to the weighting of the other test scores. Recent examples include²:

Vehicle	ANCAP safety rating	Pedestrian protection score
Ford Tourneo Custom (mar 2014-onwards)	★★★★★	48%
Ford Transit Custom (Mar 2014-onwards)	★★★★★	48%
Hyundai Tucson (Nov 2015-onwards)	★★★★★	Marginal
Kia Picanto (2016-onwards)	★★★★★	Marginal
Toyota Landcruiser Cab Chassis (Sept 2016-onwards)	★★★★★	Marginal

Safety measures for conventional motor vehicles need to be improved to take into account and value humans who will come into contact with motor vehicles but are unprotected by a motor vehicle themselves.

Drivers

While considering the relative performance of automated driving systems and humans, it is important to recognise that there is scope for significant improvement in driver training, particularly in relation to sharing the road with cyclists.

Drivers in Australia are not adequately trained or tested about how to share the road safely with cyclists. This was evidenced in a research study in the Australian Capital Territory that identified that the inclusion of cyclists in the driver training material was limited and when cyclists were mentioned it was negatively. Recent changes to the driver licensing process in the ACT in relation to the driver licensing process and cyclists has improved, however, change is required nationally in relation to teaching all drivers - new and existing - about safely sharing the road with cyclists.

Metric/approach

The safety of cyclists must be a mandatory inclusion in the safety assurance system for automated vehicles. Currently, some vehicle manufacturers list cyclist detection and avoidance technology as a fourth generation technology that will come after the protection of vehicle occupants. This delay is not acceptable. Cyclist detection and avoidance technology need to be incorporated as soon as possible to maximise the safety outcomes for Australians when they ride their bikes.

Several metrics need to be used to assess the safety of automated vehicles including, but not limited to:

- Timely monitoring of technical failure that does and does not result in harm to people
- Timely monitoring of crashes involving cyclists and automated vehicles
 - Including injury severity

² ANCAP Safety Ratings (2017). <http://www.ancap.com.au/safety-ratings>

- Accurate monitoring of number of people cycling to enable comparisons of trips by bicycle as automated vehicles increase – both in terms of conditional to full automation and number of automated vehicles on the road
- Perceptions of safety of current bicycle riders and non-riders
- Metrics related to correct predictions of automated vehicles movements by humans outside the vehicles, thereby allowing humans to interact safely with automated vehicles **Should the onus be placed on the automated driving system entity to demonstrate the methods they have adopted to identify and mitigate safety risks?**

In direct response to the text that precedes Question 3 on pages 33-36, Option 2 appears to be the preferred option with Option 3 a placeholder until international process and standards are developed. Our discussion above states our concern with the reliance on the industry to test and validate safety measures for automated vehicles, given the failings of some manufacturers in the past to adequately consider the safety of cyclists. It would seem more likely that an international process, particularly one that includes the EU, will be more likely to take the safety of vulnerable road users into account than the industry.

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?

In response to Question 3, there is a role for the automated driving system entity to demonstrate safety outcomes. However, the definition of ‘automated driving system entity’ is expansive and as per the Discussion Paper currently includes:

- Manufacturer
- The operator
- The legal owner of the vehicle
- Or other entity

It is likely that the level of responsibility will vary across the automated driving system entity as it is foreseeable that a manufacturer will issue an upgrade that is either automatically installed or must be installed by the operator or owner. It may not be reasonable for the operator or owner to be able to evaluate or foresee a safety risk that could be introduced by that upgrade. In which case responsibility to demonstrate safety risk mitigation would lie with the manufacturer.

The operator or owner’s responsibility is likely to be similar to that of current motor vehicles owners, for example ensuring that any after-market modifications meet safety standards. In the case of automated vehicles, there may also be a requirement for operators/owners to install system updates within a specified time period. Or there may be a requirement that software/system updates must be able to be installed by the manufacturer even after purchase, which removes the requirement for the operator/owner. These passive options need to be balanced with the potential risks of hacking and cybersecurity breaches.

Finally, it is not clear what is intended by 'Or other entity'. Conceivably this could and should extend to platform managers such as Uber or Lyft or intelligent highway operators. It might be useful to identify some general principles for determining what might constitute an 'other entity'.

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?

Additional assessment criteria are required.

An assessment criteria is needed that clearly requires automated vehicles to minimise the potential for harm to vulnerable road users, explicitly including cyclists and pedestrians.

This is because currently, the safety assurance system is based on the requirement that 'automated vehicles must be designed to operate safely'. However, there is no explicit explanation of how safe operation is defined. It is conceivable that, again, the focus of safe outcomes will be on the protection of human life in relation to motor vehicle drivers and passengers to the neglect of cyclists and pedestrians.

While this explicit requirement may not fit neatly into the safety assurance options as proposed it is required if automated motor vehicles are to realise the road safety benefits to Australians when we are walking and riding our bikes.

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

The development of a safety assurance system needs to keep pace with the introduction of automated motor vehicle technology.

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

From the detail provided in the Discussion Paper, it does not appear that continuation of the current approach is suitable as it does not have provision for existing technology and would permit technology on Australian roads without any oversight. It is foreseeable that, should a negative event occur, redressing the situation would be complicated and expensive.

Further, as stated above, the current regulatory requirements for safe motor vehicles in Australia are failing cyclists and need to be improved.

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?

At this stage in the evolution of automated vehicles, self-certification is not the best approach to regulating automated motor vehicle safety. Given the transformative nature of automated vehicle technology, the public needs to be reassured that it is safe and independently assessed. This may change in the future as the technology becomes accepted and reliability is determined. We are all familiar with the historical requirements for men with red flags to precede the first cars to operate on public roads. In a sense, we are at an analogous time of history with respect to automated vehicles. We don't need men with red flags, but we do need to ensure that the technology is introduced with appropriate safeguards.

If this option is adopted, the approach must be mandatory, otherwise there is no way of determining compliance.

Yes, if self-certification is adopted it should be supported by a primary safety duty. While there is some duplication in relation to the Australian Consumer Law, given that this is new and evolving technology, this potential duplication is considered a reasonable safeguard.

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?

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

As presented in the Discussion Paper, both the pre-market and the accreditation approach appear to have merit beyond the 'business as usual' or self-certification approach. The reluctance to adopt the pre-market or accreditation approach appears to be related to the perceived delay in the implementation as these approaches are depicted as regulation and resource intensive.

From outside the bureaucratic system, this decision seems to be a trade-off between a quick, unimpeded entry of automated motor vehicles into the market on one hand and comprehensive safety checks and balances on the other. As stated on page 28, this relates to risk appetite.

At the AGF, the risk appetite for automated vehicles is high with the aim of achieving a safe cycling environment. However, in contrast to the sentiment on page 28, this does not equate to a case for low regulatory oversight – While we believe that motor vehicle manufacturing and vehicle safety testing is generally done with the best intentions, strong verification is needed given the consequences of systematic errors. These are likely to arise due to a focus on occupant protection to the detriment of those outside vehicles. Required regulatory oversight is higher than the risk appetite might suggest due to the historical lack of inclusion of the safety for cyclists in relation to safe vehicles in Australia. The step-change needs to hold automated vehicles to a higher standard as, to date, 'safe vehicles' have failed cyclists in Australia.

The preferred system is a single national system that aligns with international agreements and protocols. The system needs to ensure that automated motor vehicle technology enters the Australian market unimpeded but has passed motor vehicle safety testing, including protection of cyclists and pedestrians.

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

Institutional arrangements should be centralised to ensure consistency nationally and minimise duplication. From the information provided, Option 2: a national entity to manage automated vehicle safety assurance appears to be the most viable option, followed by Option 5, an ANCAP style commercial entity or Option 1: the Commonwealth manages automated vehicle safety assurance.

The state-based options of 2 and 3 are likely to lead to delays in implementation and increased duplication. Further such approach will perpetuate the existing issues between states and territories of inconsistencies and confusion.

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?

Intuitively it seems that there is a benefit in treating automated motor vehicles the same way as conventional motor vehicles. That is, a national body determines safety (ADRs, VSSB) and the registration of motor vehicles is managed by each state and territory.

From the information provided, there does not seem adequate justification to introduce a national scheme to replace registration at the jurisdiction level as this may create duplication and confusion at the state/territory level. This may change if and when we move to a mainly automated vehicle fleet.

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

One note on a primary safety duty approach. It seems that this approach has been developed for high automation and full automation motor vehicles. While this is a reasonable approach for motor vehicles with low/no driver engagement, this is not a suitable approach for motor vehicles with partial or conditional automation. This raises the question – will a primary safety duty approach have the capacity to determine if a human was operating the vehicle or not and how will this impact the response to infringements and enforcement? There is a role for driver-based enforcement for infringements that are due to the driver's behaviour and should apply to motor vehicles with low levels of automation that are comparable to conventional motor vehicles.

For breaches that are caused by technical or design fault, there is certainly a need to extend compliance with the safety assurance system to the manufacturer/corporation including a corporate multiplier. In addition to a monetary penalty, breaches of this nature must also require corrective action from the manufacturer/corporation across the entire vehicle fleet. Consideration needs to be given to the cost of this type of corrective action and whether it will need to be covered by the manufacturer/corporation or whether they will be permitted to pass that cost on to people who have already purchased the automated motor vehicle. Safeguarding the consumer against the manufacturer/corporation passing on the cost for expensive corrective actions for technical or design faults needs also to be considered.

Appendix A – AGF Submission to Senate Inquiry into the Social Issues Relating to Land-based Driverless Vehicles in Australia, April 2017



13 April 2017

Attention: Chair Michelle Landry MP
Standing Committee on Industry, Innovation, Science and Resources
PO Box 6021, Parliament House, Canberra ACT 2600
Lodged via email: iisr.reps@aph.gov.au

Dear Ms Michelle Landry MP,

Thank you for the opportunity to make a submission to the Inquiry into the social issues relating to land-based driverless vehicles in Australia. The Amy Gillett Foundation has a direct interest in contributing to the conversation about the social issues relating to driverless vehicles, particularly in relation to the safety of cyclists.

The primary concern in relation to driverless vehicles is the safe interaction with other road users, in particular physically vulnerable cyclists and pedestrians. In this submission we have provided responses to the Terms of Reference. Further, this is the third submission related to driverless vehicles the Amy Gillett Foundation has prepared in recent months. The two earlier submissions have addressed issues that are likely to be considered by this committee and we draw your attention to these submissions(attached): New South Wales Parliamentary Inquiry into Driverless Vehicles and Road Safety (Appendix A) and VicRoads Discussion paper – On-road trials of automated vehicles (Appendix B).

We look forward to the next steps in this inquiry. Please do not hesitate to contact me directly if you have any questions or require any additional information.

Yours sincerely



Phoebe Dunn
Chief Executive Officer
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Amy Gillett Foundation

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AGF Response to Terms of Reference

1. What social issues are relevant-such as:
 - o general social acceptance levels
 - o passenger and non-passenger safety
 - o legal responsibility and insurance
 - o potential impacts on employment and different industry sectors (such as the taxi industry)
 - o access and equity issues (such as increasing individual mobility for the elderly and people with disabilities)
 - o potential public transport applications

Driverless vehicles have the potential to create a step-change in road safety globally. By removing or reducing 'driver error', safety gains could be achieved for all road users, including cyclists. However, there is one essential question that must be considered before the introduction or expansion of drivers vehicles in the Australian vehicle fleet:

What is the potential for a driverless vehicle to cause harm?

The potential for these vehicles to cause harm is the lens through which all considerations about their introduction need to be assessed. This includes the potential for harm to non-occupant road users such as cyclists.

Irrespective of whether a driverless vehicle is used for a private, shared or commercial trip, such vehicles will interact with cyclists and pedestrians. It is critical that the safety of other road users is a paramount consideration.

Further, it is foreseeable that driverless vehicles will be used in all capacities, commercially, shared and private use, to maximise efficiencies for individuals and organisations. Driverless vehicles that drop off the passengers then drive without occupants to a parking area or to the next passenger pick up will essentially drive themselves and 'behave' as autonomous entities on the roads in increasingly higher

AGF submission - Inquiry into the social issues relating to land-based driverless vehicles in Australia

2

volumes. At all times, with or without passengers and for all trip purposes (commercial or private), the safety of other road users must be foremost in all considerations, and the potential for the driverless vehicles to cause harm must be considered and mitigating action enforced, including by legislation if necessary.

2. How each social issue is being handled- including the opportunities and challenges for each issue

The introduction of any new technology requires a multi-faceted approach to ensure all the opportunities are maximised and innovative solutions are found to any challenges.

We encourage the committee to establish a review process for the introduction of driverless vehicles that includes representatives of all sectors of the community, to ensure the safeguards needed for the more vulnerable members of our community are considered and adequately protected. As Australia's national cycling safety organisation, the Amy Gillett Foundation would welcome the opportunity to be part of such a review process, to ensure the safety of cyclists is appropriately considered and addressed.

3. Recommendations to progress action on the social issues identified

Technology offers a seemingly simple solution to ensure driverless vehicles interact safely with cyclists. Introducing and enforcing minimum standards for technology to all driverless vehicles imported and sold in Australia could ensure that all driverless vehicles are able to 'see' cyclists. Technology to detect cyclists and pedestrians without the reliance on a driver could provide substantial safety benefits to cyclists and would overcome the most pernicious crash type where the driver 'looked-but-failed-to-see' the cyclist. However, these obvious and essential safeguards are only effective if the minimum technology required to ensure safety for non-occupant road users are legislated, monitored and transgressions are enforced.

We also draw your attention to recent work from the respected Dutch safety research institute, SWOV¹. This highlights the need to anticipate behavioural adaptations by vulnerable road users to an increase in automated vehicles. Pedestrians and cyclists are likely to appreciate messages from the vehicles that they have been detected and what action the vehicle is going to take. The form of these messages needs to be determined.

As noted above, we have provided extensive responses to issues related to driverless vehicles. We have included these in full below to avoid repetition.

¹ Safe interaction between cyclists, pedestrians and automated vehicles; Hargeneiker et al.
<https://www.swov.nl/en/news/automated-vehicles-traffic-how-will-pedestrians-and-cyclists-react>

Appendix B – AGF Submission to VicRoads On-road Trials of Automated Vehicles Discussion Paper,
February 2017



3 February 2017

Hon Luke Donnellan MP
Minister for Roads, Road Safety and Ports
c/o Future Directions Paper – *How Victoria will continue
to support the development of automated vehicles*

Lodged via: engage.vicroads.vic.gov.au

Dear Minister Donnellan,

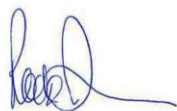
Thank you for the opportunity to provide feedback on the VicRoads *Future Directions Paper: How Victoria will continue to support the development of automated vehicles*. The Amy Gillett Foundation has a direct interest in contributing to the conversation about on-road trials involving automated vehicles, particularly regarding the interaction with cyclists.

The most important and overarching concern related to trials of autonomous vehicles is the safe interaction between autonomous vehicles and other road users, in particular people not travelling inside a motor vehicle, such as cyclists, pedestrians and motorcycle riders.

In this submission we have provided details of this main concern and responses to six of the questions raised in the Future Directions Paper. We have also attached our submission to the recent New South Wales Inquiry into Driverless Vehicles for your reference.

We look forward to the next steps in relation to autonomous vehicle trials. Please do not hesitate to contact me directly if you have any questions or require any additional information.

Yours sincerely,

A handwritten signature in blue ink, appearing to read "Phoebe Dunn".

Phoebe Dunn
Chief Executive Officer

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Future Directions Paper – safe interaction with all road users, including cyclists

The most important and overarching concern in this discussion about autonomous vehicles is the safe interaction with non-occupant road users such as cyclists and pedestrians. Currently the safety of unprotected road users is typically overlooked, with priority given to vehicle occupant safety (i.e. driver and passengers).

Motor vehicles can be adapted to engage with autonomous vehicles using vehicle-to-vehicle technology. However, it is essential that all autonomous vehicles are able to detect and safely respond to the presence of non-vehicle road users including cyclists, pedestrians and motorcycle riders.

Further, clear protocols need to be established that can be followed in the event of a collision between an automated vehicle and a non-occupant road user. For example, in the event of a crash between an automated vehicle and a cyclist, who will be responsible for the action of the vehicle (e.g. driver, individual/organisation conducting the trial, vehicle manufacturer)? Will the incident and any subsequent costs to the cyclist be covered by the vehicle operator/owner's insurance or the Transport Accident Commission?

We strongly recommend that VicRoads prioritises the safety of all Victorians on the road, both inside and outside of a motor vehicle, when considering the parameters of introducing or trialling autonomous vehicles. Regulations need to reflect this consideration.

Below, we have provided specific responses to six of the questions raised in the Future Directions Paper.

AGF submission – VicRoads Future Directions Paper: Automated Vehicles2

Future Directions Paper – AGF responses to questions

The importance of on-road testing

- Do you agree that on-road testing of automated vehicles is necessary for the long-term safe deployment of automated vehicles?

Yes. While it is highly probable that we will ultimately move to a fully automated vehicle fleet, this is a long-term prospect and one with many intermediary steps – on-road testing is central to the safe introduction of automated vehicles on Victorian roads.

- What do you consider to be the key risks associated with on-road testing?

The key risk is in relation to the safe interaction of automated vehicles with non-occupant road users, such as cyclists and pedestrians. It is foreseeable that the vehicle-to-vehicle technology can minimise crash risk between vehicles. However, it is essential that automated vehicles are also able to operate safely with road users who are not protected by a vehicle. This includes detection, crash avoidance and interaction that ensures the safety of all types of cyclists (e.g. children, bunches of cyclists, solo cyclists) and pedestrians (e.g. older pedestrians who may be slower moving, children who may be unpredictable). Due to the vulnerability of these road users, when compared to vehicle occupants, it is arguable that the technology should prioritise their safety over vehicle occupants. In addition to reducing the risk of crashes to the maximum extent possible, autonomous vehicle design and regulation needs to incorporate the latest features for reducing injuries to vulnerable users in the event of a crash.

Victoria's existing regulatory framework

- Should VicRoads seek to capture testing, trialling and development of automated vehicles operated in a conditionally automated mode in any regulatory changes, thereby imposing trial guidelines and providing VicRoads with power to remove its support for a trial?

Yes. Trial oversight by VicRoads, including the option to remove support and discontinue a trial of automated vehicles is essential. It is assumed that in this role, VicRoads will take action to maximise the safety of all road users and that autonomous vehicle trials will operate within an ethical framework that includes a Safe System approach.

AGF submission – VicRoads Future Directions Paper: Automated Vehicles3

New legislative powers

- Do you agree that the South Australian model for automated vehicle trial exemptions provides a sound basis for Victorian law?

While the South Australian model provides a valuable starting point, in its brevity it may not address the full range of issues that could or should be specified in law. We recommend that the Committee review other Australian and international examples, such as the ACT Exposure Draft bill¹ which appears to provide more specific direction, particularly in relation to the driver.

- What other limitations or risks do you see with this approach?

Risks to vulnerable road users and the active mitigation strategies that will be employed by anyone who conducts an on-road trial of autonomous vehicles needs to be a requirement of any trial and included in the Victorian law. Further, all crash incidents must be reported, including crashes involving vulnerable road users and specifically where there is no property damage. Lessons need to be learned and shared from all crash events (including near misses to the extent possible) and it is imperative this reporting ensures study operators are able to take corrective action if possible – or so VicRoads can suspend a trial until it is safe to continue.

This new law provides an opportunity to ensure the safety of Victorians when they are the most physically vulnerable, that is when they are riding their bicycles or walking, is protected. The safety of cyclists and pedestrians needs to be fundamental to road safety including the safe conduct of autonomous vehicles trials and is too important to be left to the study operators who are potentially motivated by economic objectives.

Further, one submission to the New South Wales Inquiry into Driverless Vehicles recommended that automated vehicles be identifiable (e.g. an A on the licence plate). We consider this an option worth exploring. Being able to identify autonomous vehicles may help to reduce public concern in relation to the safety of autonomous vehicles.

- If a new legislative power was to be adopted in Victoria regarding automated vehicles, should trial guidelines be enforced by VicRoads withdrawing permission (approvals, permits, notices authorising the trial) for the trial, or are penalties required such as those the South Australian model?

Both withdrawal of permission and penalties may be appropriate, depending on the breach.

¹ Road Transport (Safety and Traffic Management) (Autonomous Vehicle Trials) Amendment Bill 2016
http://www.legislation.act.gov.au/ed/db_53368/20160125-62756/pdf/db_53368.pdf
AGF submission – VicRoads Future Directions Paper: Automated Vehicles4

Appendix C – AGF Submission to New South Wales Inquiry into Driverless Vehicles and Road Safety,
April 2016



11 April 2016

The Chair
Joint Committee on Road Safety
Submitted electronically via staysafe@parliament.nsw.gov.au

Inquiry into Driverless Vehicles and Road Safety in NSW

The Amy Gillett Foundation (AGF) welcomes the opportunity to provide a response to the inquiry into driverless vehicles and road safety. The AGF is a national organisation with a mission to reduce the incidence of serious injury and death of bicycle riders in Australia. We draw on evidence and international best practice, and collaborate with governments, business and the community to create a safe environment for bicycle riders, while maintaining an efficient road network for all road users.

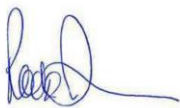
The AGF strongly supports the use of technology to overcome human limitations. However, we anticipate that there could be unintended consequences as we introduce driverless vehicle technology. We commend the inquiry for seeking to anticipate these consequences and capture the maximum benefits – especially in trauma reduction.

Our response focuses on the potential for Driverless Vehicle Technology (DVT) to improve road safety outcomes (Item 1. in the terms of reference) and issues associated with the introduction and regulation of DVT from the perspective of bike-rider safety.

The potential benefits of DVT are manifold. However, it is difficult to clearly see the way from where we are now to a driverless future¹. As we take steps along the uncertain DVT pathway, we need to make sure that those of us who are on the outside of DVT equipped machines are not made worse off, and hopefully are major beneficiaries of the safety dividends from DVT.

The AGF makes three recommendations in our response to the Inquiry's terms of reference in the interest of New South Wales becoming a truly safe cycling state. We welcome engagement on issues related to bicycle rider safety, and encourage the Staysafe Committee to contact us directly if additional information is required. Please do not hesitate to contact me if you have any questions or require any additional information.

Yours sincerely



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¹ The UK government's inquiry summary supports this view. Department for Transport (2015). The Pathways to Driverless Cars: Summary report and action plan. DfT. London, DfT Publications.

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Recommendations

The NSW government can act to ensure maximum benefit from DVT flows to its citizens, however it needs to act cautiously. The Amy Gillett Foundation recommends the following action to the Committee:

1. Require autonomous emergency braking (AEB) with pedestrian and vehicle detection

Support changes in national vehicle standards to require AEB with pedestrian and cyclist detection from 2018. This alone will save many lives and raise the awareness in the community of the potential benefits of DVT.

2. Code of Practice for DVT testing and development

Provide a clear Code of Practice for DVT testing and development that emphasises the importance of responsibility towards non-occupants and vulnerable road users in particular.

3. Ensure ITS includes vulnerable road users

Ensure that Government participation in Intelligent Transport Systems developments factor in the requirements of vulnerable road users.

These recommendations are discussed in detail in our response below.

AGF response to Terms of Reference

1. The capacity of driverless technology to deliver improved road safety outcomes including a lower road toll, and fewer accidents and injuries to drivers, pedestrians and other road users.

In Australia, the Safe System is the conceptual framework that informs a system-wide approach to road safety. Safe people is one of the four key components of the Safe System approach, along with safe roads and roadsides, safe speed and safe vehicles. The recognition that humans make mistakes is fundamental to this framework.

Human factors such as distraction, impairment from alcohol and drugs, fatigue, age related conditions etc. are major risk factors in road trauma. Computer systems do not suffer from these susceptibilities which is a major attraction to DVT.

There are, however, manifold technical and regulatory challenges in the introduction of DVT.² Many of these are surmountable and are no doubt being anticipated by major DVT developers. The current investment in vehicles without DVT means that there will be mixing of DVT with human drivers and other road users. To mix DVT and non-DVT operators will be complex and require careful management. How this could be done has been covered in other inquiries (see for example the UK report).³ Some jurisdictions are already advanced in considering conditions to be applied to the introduction of autonomous vehicles and are trialling different aspects of vehicle autonomy or intelligent highway systems.

Pathways for DVT

It is possible that we will ultimately move to a fully DVT system where there are no human drivers of vehicles on any public roads. This is a radical vision given the existing vehicle fleet and it is commonly suggested to be 20 years in the future. It requires many technical factors to be addressed, and changes to existing systems. Interconnected vehicles would likely be a feature of such a system, and protocols, rules, and standards involving roadways and vehicles would be required. Moving to fully automated systems requires community acceptance and legislative endorsement in a number of areas.

Some of the alternative or intermediary regulatory frameworks for DVT to be possible include:

- Limited permissions for DVT operation (e.g. on certain designated sections of road)
- Requirement to have a human driver on standby whenever the vehicle is in “driverless” mode with specific duties placed on the standby driver. This requirement is a feature of Californian experience - the graphic from Statistica below highlights the variable role of the test “driver”
- Designated areas where only DVT vehicles are allowed to operate and human controlled vehicles are banned (e.g. city centres where the driving task is extremely complex, or for segments of highway where serious crash risk is high and capacity benefits from DVT are important)
- Requirements to incorporate DVT on certain vehicles (e.g. specific heavy vehicles being required to incorporate DVT for certain operations)
- Speed limiting driverless vehicles (e.g. to 25km/h in driverless shuttles in Singapore, the Netherlands)

² Some of these are identified in the popular motoring press, see

<http://www.wheelsmag.com.au/features/misfire/1508/autonomy-or-anarchy-the-problem-with-self-driving-cars/>

³ Department for Transport (2015). The Pathways to Driverless Cars: Summary report and action plan. DfT. London, DfT Publications.

- Requirements for certain operations included in DVT to be fitted to all new vehicles (e.g. AEB, lane guidance etc.) as a way for the public to become progressively comfortable with technology taking over aspects of the driving task

It is likely that a combination of these interim regulatory measures will be rolled out as DVT technology develops. DVT may be introduced incrementally as regulators and the public develop confidence in different systems.

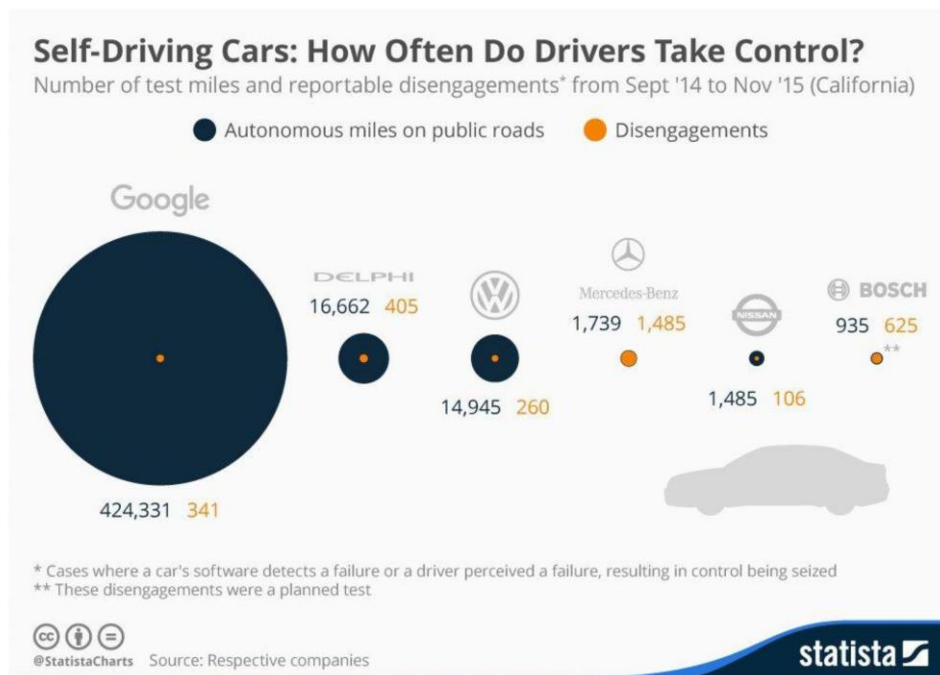


Figure 1. Statista graphic of test driver interventions in autonomous vehicle trials

Implications of DVT for bicycle users

There is a public interest in extending the safety dividends from DVT to vulnerable road users. This requires both *care* to ensure that the interests of vulnerable users are considered, and *commitment* to implement as many life-saving technologies as quickly as possible. Care and haste are conflicting but important demands. In the discussion below we highlight some areas where caution is required, and suggest some areas where we need to accelerate our actions to ensure lives are not needlessly lost or damaged.

Cautions

A significant concern is that designers of DVT will prioritise the safety of vehicle occupants ahead of non-occupant road users, including vulnerable road users. Vulnerable, unprotected road users are currently the

groups with high relative rates of road trauma – cyclists, motorcyclists and pedestrians. Figure 2 shows modelling of high threat to life injuries as a projection of 1999 data.⁴

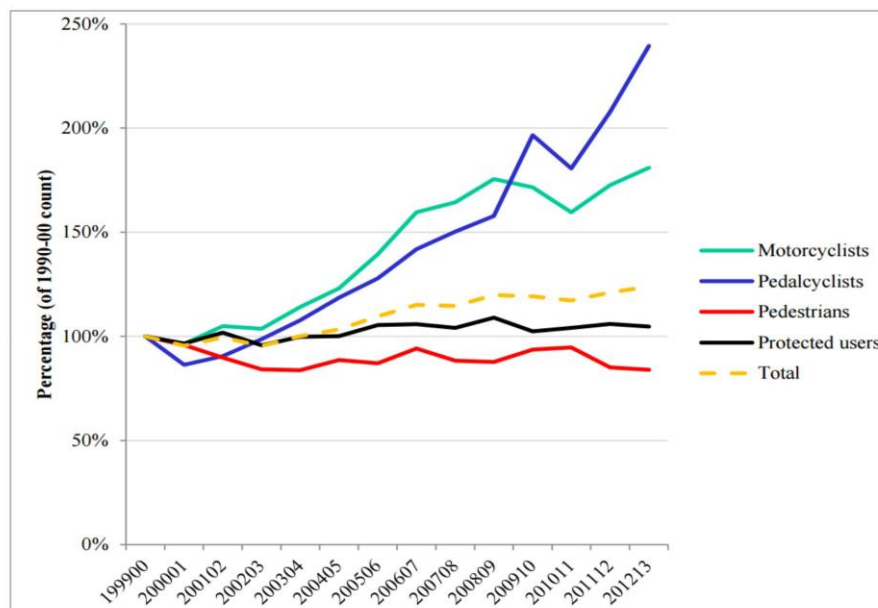


Figure 2: High Threat to Life Injuries traffic cases by user type: change 1999-2013 as a percentage of 1999 levels

Designers and promoters of DVT may not intentionally seek to disadvantage these classes of road user. However, a real or perceived bias may exist as developers create technology with a purchaser in mind. Private purchasers of DVT have a primary interest in the safety of the occupants of vehicles – usually themselves or those close to them such as family members. There is therefore a moral hazard that technological bias will emerge in favour of vehicle occupants over, for example, those people not in vehicles, or even those not in vehicles produced by the particular developer.

There are several ways in which this hazard can be addressed:

- develop DVT under a single provider model that did not feature private ownership of vehicles
- regulate the system to correct for bias
- deploy technology that puts all road users on an equal footing

A single provider model for DVT is conceivable but unlikely. A centrally coordinated system of intelligent roads and compatible vehicles may offer some potential efficiency. The logical owner and manager of such a system would be the public sector, the National Broadband Network (NBN) is an example of a similar single provider model. Given the cost of implementing this type of solution and the rapid evolution of technology this solution is unlikely in the next several years. However, as we saw with the NBN, a government may want to step in to rationalise a system under some scenarios.

⁴ Harrison, J (2014). Serious injury of vulnerable road users. Research Centre for Injury Studies, Flinders University, https://infrastructure.gov.au/roads/safety/nrsf/2014/files/Session_5_James_Harrison.pdf

Given that a single provider model is unlikely in the near term, bias could be addressed through regulation. This could be by establishing standards or by attaching an appropriate regulatory regime. Importantly, as this is a NSW inquiry, this regulatory regime would properly be addressed by the State legislature.

Much of the focus for discussion of regulation of autonomous vehicles is about how to designate the role of driver. During the development phase of DVT it is anticipated that most vehicles will still have a human driver. These people are sometimes referred to as “Test drivers”, anticipating that their role will be redundant once testing is complete. There are real issues for government in identifying the training requirements for Test drivers, the responsibilities that they have, the monitoring that they need to perform etc. Much of this would need to be specified by government. During testing phases, it should be made a requirement that the vehicles are comprehensively tested with regard to their interactions with bicycle riders and pedestrians.

It is noteworthy that some of the major auto-makers (most notably Volvo) have indicated they would be prepared to assume the legal risks associated with crashes due to DVT. What this means in practice is uncertain. There is scope for the NSW government to formalise this and require bonds or guarantees from proponents of DVT systems. It is understood that other jurisdictions have insisted on guarantees and significant risk management procedures backed up by insurance.

The third option for deploying technology would involve equipping other vehicles, bicycle riders and pedestrians with devices to assist detection by autonomous vehicles. A smartphone app or some other technology, for example Radio Frequency Identification (RFID), might be suitable for bicycle riders and pedestrians. Consideration could be given to making these broadly available and standard on all new bicycles or shoes and requiring all DVT makers to ensure their technology is compatible. The government would then be faced with the task of ensuring all pedestrians and bicycle riders are equipped with this device when in a road environment.

Immediate action required

Some of the existing AEB systems already in the market have the ability to detect and respond to humans in their vicinity. AEB with pedestrian and cyclist detection needs to be deployed throughout the vehicle fleet as quickly as possible.

BITRE modelling of **AEB for vulnerable road user protection as standard on all new vehicles by 2018 has the potential to reduce vulnerable road user trauma by 30 percent by 2033.**⁵ Their forecast indicates a saving of 597 lives and 24,100 hospitalised injuries avoided across the nation with a large proportion expected to be in NSW. Although by 2033 we would hope to see many fully autonomous vehicles with an even better outcome.

The NSW government needs to send a clear message to DVT proponents that the safety of people outside the vehicle equipped with DVT needs to be at a level of priority equivalent to that of the occupants, and that this is appropriately regulated. The onus should be on proponents of DVT to identify features of relevant software and hardware designed to avoid crashes with bicycle riders and other vulnerable road users. Similarly, DVT proponents should set out how trauma is mitigated by their vehicles through passive safety measures if there is a crash.

⁵ BITRE (2014). Impact of road trauma and measures to improve outcomes.