Submission No 7

DRIVERLESS VEHICLES AND ROAD SAFETY

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The Chair
Joint Committee on Road Safety
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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 future[1]. 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

[redacted]

Phoebe Dunn
Chief Executive Officer
Amy Gillett Foundation

[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.

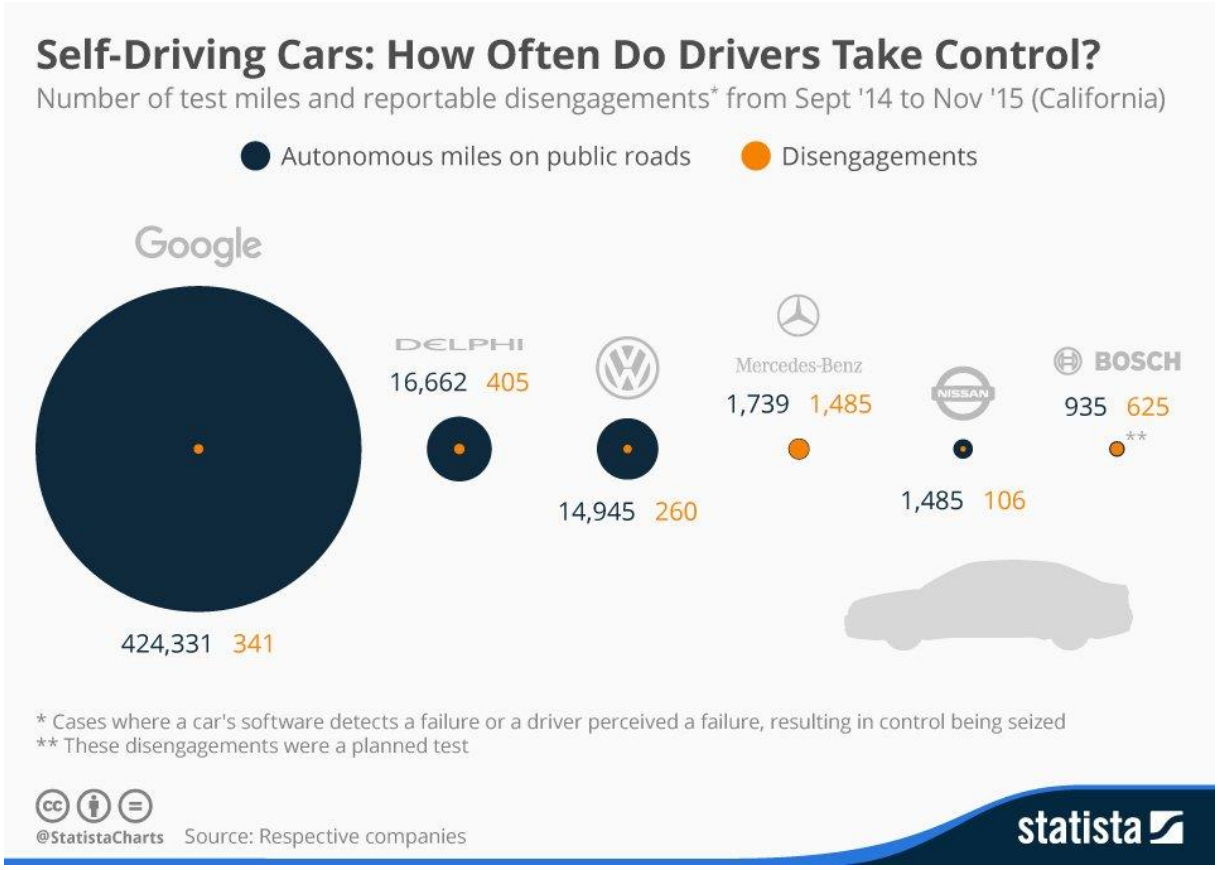

Figure 1. Statista graphic of test driver interventions in autonomous vehicle trials

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]

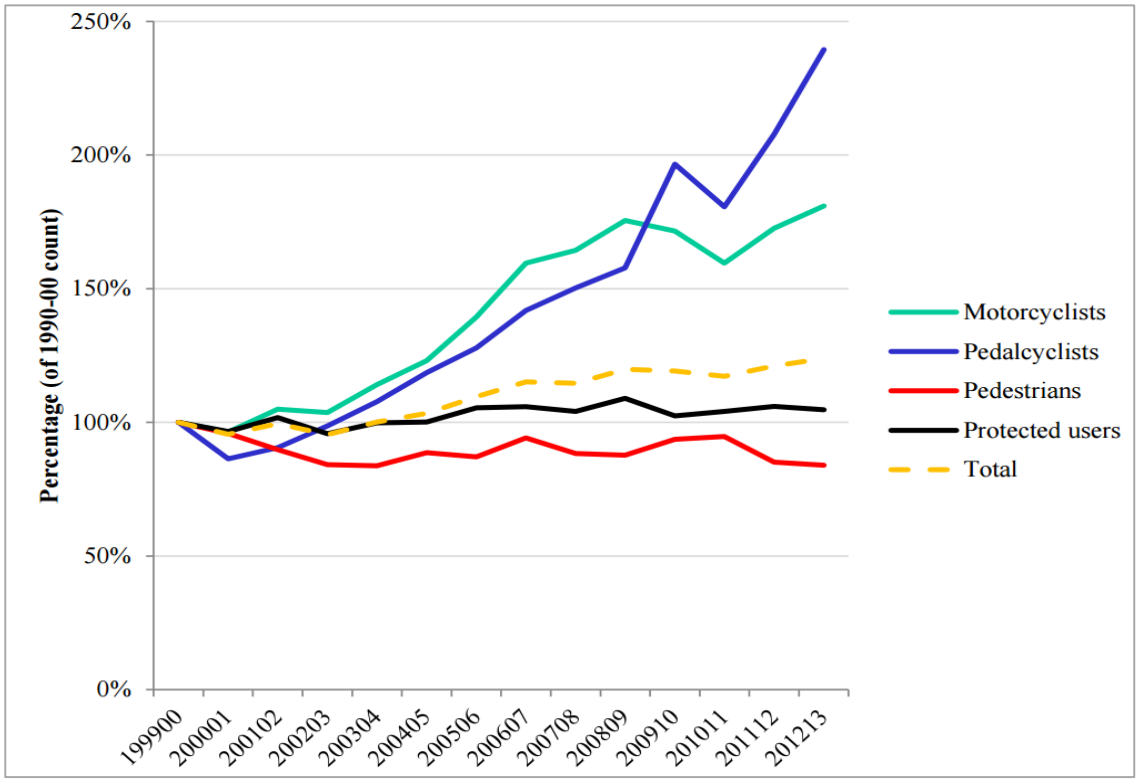

Figure 2: High Threat to Life Injuries traffic cases by user type: change 1999-2013 as a percentage of 1999 levels

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.