Submission No 1

DRIVERLESS VEHICLES AND ROAD SAFETY

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Driverless Vehicles and Road Safety in NSW
Submission to StaySafe Committee

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My submission addresses the second and third terms of reference (specifically, policy changes required by the introduction of driverless vehicles, and the preparedness of NSW road safety regulators to meet the challenges of driverless vehicles). However, it is also connected to the first term of reference (the capacity of driverless vehicles to deliver improved road safety).

Let me start by welcoming the introduction of autonomous vehicles onto our roads. Around one thousand people will die on the roads of Australia in the next year. Most of these accidents will be due to driver errors. Once we have autonomous vehicles, we can expect this accident rate to drop dramatically. However, we need to be careful about managing the introduction of autonomous vehicles, especially for the period of transition when we have a mixture of autonomous and human driven vehicles on our roads.

In 2015, Volvo ran a trial of autonomous cars on public roads on the Southern Expressway in Adelaide. This was the first such trial in the southern hemisphere. The law in South Australia was changed to permit the Transport Minister to approve such trials. But this change in the law didn't require autonomous vehicles to identify themselves apart from those driven by humans. I believe this is an oversight. This hasn't been much of a problem whilst the technology was big, bulky and easy to spot. But regular looking cars can now be driven autonomously. Indeed, if you have the latest Tesla S, you can simply update the software over the internet and turn it into an autonomous car, at least for highway driving.

I therefore propose that any autonomous vehicle needs to be easily identified to other road users. We already do this with learner drivers. And the fact that we are *trialing* driverless car technology means we are still in the learning phase.

There are a whole host of reasons why the general public should know that the vehicle in front is autonomous.

The Google cars driving autonomously around California have had around a dozen minor accidents. In all but one case, Google has argued that other human drivers were at fault. But many of those accidents were because the Google car stopped quickly, following the letter of the law too precisely when a human might just have driven on. The car behind might not have rear-ended the Google car if they had known that it was autonomous and would stop rapidly.

As another example, at a four way intersection, autonomous vehicles struggle to follow the subtle body language and eye contact that human drivers use to decide who has priority. Again, human drivers need to know what to expect from other cars that arrive at an intersection.

As a third example, at a construction site, an autonomous vehicle will not reliably follow hand signals from a construction worker. The construction worker and any drivers nearby need to know this.

As a fourth example, autonomous vehicles do not currently recognize signs that a truck makes wide turns. Other drivers on the road need to know this so they can adjust their driving to compensate.

Finally, one day in the future, computers will be far better drivers than humans and we'll want autonomous vehicles to be distinguished apart from those driven by humans.

There is, of course, useful historical precedent here. The UK Locomotive Act of 1865 required a person with a red flag to walk 60 yards in front of one of the new fangled "self propelled machines". This was perhaps a little too restrictive. But nevertheless, the intent was a good one: to protect society from a new technology, especially in a period of change.

Inspired by such historical precedents, I propose that we introduce laws to prevent autonomous vehicles from being mistaken for human driven vehicles. In recognition of Alan Turing's contributions to AI, I am calling this the Turing Red Flag law. At the very least, this would require autonomous vehicles to carry special plates (perhaps an "A" plate?). But it might also require them to have a flashing light. And we should also consider a law which mandates that any new V2V technologies require autonomous vehicles broadcast their presence and intentions.

Such a position is supported by other AI experts working on autonomous vehicles. For example, in an article published in Wired on 15th March 2016 ("Self-Driving Cars Won't Work Until We Change Our Roads—And Attitudes"), Andrew Ng (chief scientist at Baidu) and Yuanqing Lin (Director of Baidu's Institute of Deep Learning) wrote:

".. we should recognize that computer driven cars are different from human driven cars, and find novel ways to safely incorporate them into our lives… they will behave differently. That's why they should be visually distinctive and immediately recognizable, to help others know what to expect. At Baidu, we selected not the most beautiful design for our first autonomous vehicle, but the one we felt was most visually distinctive: white on top, red on bottom. It's like having a big "Student Driver" sign on a car—it signals to others that they should develop different expectations…"

I contest that laws so far introduced to trial autonomous vehicles in Australia, California and elsewhere have overlooked this important factor. I trust that NSW will adopt a sensible and safe position here.