6 February, 2017

Committee Secretary

Standing Committee on Industry, Innovation, Science and Resources

PO Box 6021

Parliament House

Canberra ACT 2600

Re: Submission on Social issues relating to land-based driverless vehicles in Australia

Volvo Car Australia appreciates the opportunity to make this submission to the Joint Standing Committee on social issues relating to the introduction in Australia of land-based driverless vehicles.

As a global leader in the development of active safety and autonomous driving technology, Volvo passionately believes this technology will benefit Australian drivers and society alike through reduced congestion and improved traffic safety and sustainability. Globally, over one million people die in car accidents every year. These are tragedies that self-driving technology can help reduce.

It is true that autonomous cars represent a radical shift in transport, so collaboration with federal, state and territory governments and transport bodies is essential to ensure that the technology provides maximum benefits to drivers and the Australian community.

Self-driving cars will revolutionise society, boost economies and transform the way people manage their time. Their arrival will be the biggest change to personal transport since the invention of the car nearly 130 years ago. The various attempts at realising this vision over the years have been limited by the technology available. However, rapid advances in technology means autonomous cars are a reality today.

In Australia Volvo has partnered with the ARRB Group to support its Driverless Vehicle Initiative which aims to explore the impacts, requirements and benefits of introducing this new technology in an Australian context. This partnership culminated in the first ever Australian driverless car trial using Volvo XC90s held in Adelaide in November, 2015.

Australians' acceptance of self-driving cars

The social acceptance of driverless cars by Australians is to some extent being hampered by public confusion about the technology. The term "driverless cars" is commonly used to describe cars equipped with autonomous technology. This is misleading and confusing for the Australian public. Volvo Car Australia believes a more accurate description of the technology is "autonomous driven cars" or "self-driving cars". An autonomous – or self-driving – car is one that can accelerate, brake and steer itself without intervention by the driver.

Public confusion is exacerbated by regular media reporting which describes a utopian world in which drivers are transported from home to office in fully driverless, 'hands-free' vehicles. Based on future technology advances this scenario is certainly achievable in Australia, but realistically it is probably some decades away. However, the average Australian is understandably worried about the public safety implications of such a scenario, and some even question the utility of the technology in their day-to-day lives.

Volvo believes that in the rush to deliver fully autonomous cars, many car makers are forgetting the most important ingredient: the people that will use them. To counter this, Volvo has adopted a distinctive approach to developing autonomous driven cars by defining the technology based on the role of the driver – not the other way around. By putting people first, Volvo believes there will be greater social acceptance of driverless technology and the benefits it can deliver for motorists and Australian society.

Putting people first: Volvo's *Drive Me* project

As part of this 'people first' approach, in late 2017 Volvo Cars will launch *Drive Me*, the world's most ambitious and advanced public autonomous driving experiment. The project will see up to 100 autonomous cars on the roads around Gothenburg, Sweden, driven by real people, in real traffic, during 2017.

The 'Drive Me' project is endorsed by the Swedish Government. The pilot will involve self-driving cars using approximately 50 kilometres of selected roads in and around Gothenburg. These roads are typical commuter arteries and include motorway conditions and frequent queues.

The aim of *Drive Me* is to focus on how autonomous driven cars can enhance people's lives and have a positive impact on society. To achieve this, Volvo is taking a holistic view, rather than a purely technical approach to its research and development processes.

The 'Drive Me' project will focus on a number of areas, such as:

- How autonomous vehicles bring societal and economic benefits by improving traffic efficiency, the traffic environment and road safety
- Infrastructure requirements for autonomous driving
- Typical traffic situations suitable for autonomous vehicles
- Customers' confidence in autonomous vehicles
- How surrounding drivers interact smoothly with a self-driving car

Volvo's people-first approach sets the *Drive Me* project apart from other autonomous driving experiments. Instead of relying purely on the research of its own engineers, Volvo aims to collect feedback and inputs from real customers who are using these autonomous cars in their everyday lives.

By adopting this approach, Volvo aims to further fine-tune its autonomous driving technologies and make its offering as relevant as possible to customers ahead of a commercial introduction in Australia around 2021. We firmly believe this approach will create broader social acceptance of the benefits of the technology.

To assist the Standing Committee in its understanding of driverless cars, and how ordinary drivers interact with them, Volvo Car Australia will be pleased to facilitate a visit by committee members to Gothenburg, Sweden to observe the *Drive Me* trial.

Uber partnership to enhance social acceptance

Volvo believes broader social acceptance of autonomous cars by Australians will be enhanced by manufacturers partnering with leading technology companies to further develop and promote the technology. For example, Volvo Cars has recently partnered

with Uber, the world's leading ride-sharing company, to develop the next generation autonomous driving cars.

Volvo and Uber have established a joint project to develop new base vehicles that will be able to incorporate the latest developments in AD technologies, up to and including fully autonomous driverless cars. The base vehicles will be manufactured by Volvo Cars and then purchased from Volvo by Uber. Volvo Cars and Uber are contributing a combined $USD300M to the project.

Both Uber and Volvo will use the same base vehicle for the next stage of their own autonomous car strategies. This will involve Uber adding its own self-developed autonomous driving systems to the Volvo base vehicle. Volvo will use the same base vehicle for the next stage of its own autonomous car strategy, which will involve fully autonomous driving.

The Volvo-Uber project marks a significant step in the automotive business with a car manufacturer joining forces with a new Silicon Valley-based entrant to the car industry, underlining the way in which the global automotive industry is evolving in response to the advent of new technologies.

Passenger and non-passenger safety issues

Volvo believes autonomous driving technology has the potential to change the car safety landscape in Australia forever. Not only will it make driving more convenient and productive for Australia drivers, it will dramatically improve safety outcomes for pedestrians/non-passengers, reduce traffic accidents, and cut the national road toll.

Research conducted in the US highlights the value of cars equipped with safety features that would be standard in fully autonomous cars. The Insurance Institute for Highway Safety's (IIHS) 2016 survey found that that cars equipped with front crash prevention technology are much less likely to rear-end other vehicles.

In the first study of the feature's effectiveness using U.S. police-reported crash data, IIHS also found that cars with automatic braking reduce rear-end crashes by about 40 percent on average, while forward collision warning alone cuts them by 23 percent. The autobrake systems also greatly reduce injury crashes. The rate of rear-end crashes with injuries decreases by 42 percent with forward collision warning with autobrake.

IIHS concluded that If all vehicles had been equipped with autobrake that worked as well as the systems studied, there would have been at least 700,000 fewer police-reported rear-end crashes in 2013. That number represents 13 percent of police-reported crashes overall. Front crash prevention would be a standard safety feature incorporated into fully autonomous cars.

Volvo Cars currently incorporates this technology to create semi-autonomous cars like the XC90 and S90 that make journeys easier and safer, while leaving the driver fully in control in accordance with existing local road laws.

For example, in 2016 Volvo Car Australia launched the All-New Volvo S90 in Australia with Pilot Assist function. Pilot Assist permits the car to accelerate, brake and steer autonomously, maintaining a set distance from the car in front and in lane, at speeds up to 130 km/h. Technology like Pilot Assist will underpin fully autonomous Volvo cars on all Australian roads if existing road laws are changed.

Standard safety technology like Volvo City Safety will also be included in fully autonomous Volvo cars in future. City Safety detects other vehicles, cyclists, pedestrians and, in some cases, even large animals on the road ahead. It warns the driver of hazards and will brake the car if necessary to avoid or mitigate a collision.

Kangaroo detection capability

Volvo is currently conducting research to adapt its animal detection software for Australian conditions to detect kangaroos. As part of this research effort a team of Volvo technicians visited Tidbinbilla Nature Reserve near Canberra in 2015 to study the movement of kangaroos in the wild. Detection technology such as this would be incorporated into driverless Volvo cars built for the Australian market. Each year there are over 20,000 kangaroo strikes on Australian roads which result in over $75 million in insurance claims.

Legal responsibility and insurance issues

Uncertainty over where liability belongs for vehicles involved in accidents is regarded as one of the biggest barriers to adoption of driverless cars. Currently, Australian car manufacturers are not responsible for accidents involving human-driven vehicles. These accidents are mostly caused by driver behaviour, not by faulty technology, and so liability is rightly placed on drivers and their insurance companies.

However, as control over vehicles is taken from drivers and transferred to autonomous technology, local manufacturers will have to assume more responsibility.

Volvo's public position on liability is very clear. Volvo will accept full liability for damages or injuries whenever one of its cars is in full autonomous mode. Volvo is confident that the redundant and back-up systems contained in our Autopilot and Pilot Assist technologies will bring a Volvo car to a safe stop. This accords with Volvo's 20-20 vison that no one will be killed or seriously injured in a Volvo car by 2020.

Volvo believes the Australian government should mandate that all manufacturers who sell fully driverless cars in Australia must accept liability for cars involved in accidents that were in full autonomous mode at the time of the accident.

Role of governments in facilitating self-driving cars

Volvo believes the major impediment to the future acceptance of self-driving cars in Australia is less about the technology—which is advancing at a rapid pace—and more about a lack of uniform regulations. Various state and territory governments around Australia have launched, or will soon launch, some form of autonomous/self-driving trials. However, at this stage we see little evidence of these jurisdictions focusing on the need for uniform regulations governing the trial and eventual introduction of self-driving cars.

Introducing fully autonomous cars onto specific Australian roads will require careful coordination and planning among state and territory jurisdictions, as well as changes to current road laws, to ensure the technology is fit for purpose.

To avoid a piecemeal approach, we urge the federal government and its relevant agencies to take the lead on working closely with car makers to resolve controversial issues, such as questions over legal liability in the event that a self-driving car is involved in a crash, or remote hacking by a criminal third party.

In the absence of a clear set of national rules, manufacturers like Volvo will be unable to conduct credible tests to develop cars that meet the different guidelines of each state and territory.

Other societal benefits

Volvo believes self-driving cars have the potential to transform the world we live in and deliver enormous benefits to society. In a fully driverless car future, autonomous technology will eradicate human errors, making driving safer for everyone. Self-driving cars can be programmed to obey traffic laws, which means there will be less possibility for irrational, emotional behaviour behind the wheel. The potential to reduce the

national road and reduce serious injuries is enormous. However, there are many other positive benefits, and some of these are detailed below.

Better traffic flows

In a fully self-driving environment autonomous cars will communicate with each other and the road network via the cloud. This will result in traffic flowing more smoothly, easing congestion on major roads and making these journeys more enjoyable and productive for the driver/occupants. Self-driving cars will be able to merge into traffic and plan ahead more efficiently than those with human drivers.

Less congestion, improved productivity

Connected technology and better all-round awareness means that autonomous cars will reduce congestion on Australian roads, saving millions of wasted hours on the road. Autonomous cars will allow drivers to use their time in the car as they choose – relaxing or working as desired. The car could become an extension of the office and allow commuters to arrive at work less stressed and better prepared.

Fewer costly accidents

By reducing human error and the likelihood of accidents, autonomous technology will drastically reduce the amount of money that is lost as a result of collisions. Traffic accidents which result in deaths and serious injuries cost the Australian economy millions of dollars each year in medical costs and lost productivity. The social impacts of these events are immeasurable.

New revenue streams

Australian drivers will able to relax and do other things in self-driving cars, making them a place of leisure and commerce. Online connectivity will allow those on board to shop

and enjoy media, opening up new retail and marketing opportunities for brands and services.

Better fuel economy, lower carbon emissions

Autonomous, connected cars will be able to drive more efficiently, reducing fuel consumption and harmful emissions. Better anticipation and communication with other cars will reduce stop/start traffic and heavy braking, and they will be able to form safe, tightly packed 'road trains' that reduce aerodynamic drag at speed.

Easier to go electric

Zero-emissions electric cars will be a viable option in future for more drivers thanks to autonomous technology. Self-driving electric cars will be able to get themselves to and from a charging point or battery swap station, so owners will no longer need a charging point at their home or workplace.

Volvo Car Australia thanks the Standing Committee for the opportunity to present this submission.

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