**NTC response P412**

I am a automation and robotics expert, having worker across the globe on various projects and more recently back in Australia trying to establish a autonomous vehicle industry. I helped set up the Neerabup Automation and Robotics Precinct initiative in Western Australia and establish the Robotics Australia Group.

Paul Lucey

**Question 1:** What prescriptive duties under the general safety duty should be included in

the AVSL to manage in-service safety risks?

Autonomous vehicles are a sum of their functions, one I will use as an example in a number of responses is lane following and adaptive cruise control. This function is available on a number of vehicles for sale in Australia, even the Ford Ranger ute, it is a level 2 autonomous function on its own, if used with other functions it quickly becomes a level 3 autonomous function. A challenge with broadly defined duties such as *The ADSE must ensure, so far as is reasonably practicable, that systems are developed, used and maintained to carry out the general safety duty* is that under the current proposal as level 2, the adaptive cruise control would need to comply but as sum of its functions as a level 3 or 4, then it would. A list of functions would need to be developed as opposed to broad statements that are listed as examples.

**Question 2:** What matters relating to compliance with a general safety duty are better

suited to guidance than being prescribed in the AVSL? Should this guidance have

legislative force?

The case law in industry has already been to establish that guidelines are a minimum standard of compliance. Guidelines are best used for developing, new or emerging technologies where set standards are moving quickly. The levels of autonomy themselves are ill defined and ever moving and are a good example of guidelines. Guidelines are suited for describing activities ie. Lane following technology should always be used in conjunction with adaptive cruise control. An actual legislative standard would be that that lane following technology and adaptive cruise control will have an effective sensor range of 30 metres forward of the vehicle, 5 metres to the side of the vehicle and 20 metres to the rear of the vehicle. This deals with specific safety performance expected of the various manufacturers whilst the guidelines allow the evolution of how these systems can be used with other systems. Again, discrete functions fall into one bucket but how they are used in relation to other functions become guidelines until precedents are set. What is important here is a group is set to monitor these changes as they emerge. Guidelines may also cover how and where a technology function can be used. GM’s SuperCruise can only be used on certain hiways in the US and is backed up by GPS. The Tesla system can be used on any road and on the wrong side of the road. This is a good example of a need for a guideline.

**Question 3**: Are existing and proposed regulatory frameworks (state and territory laws, first -supply requirements and general safety duty obligations) sufficient to address third party interference with an ADS? If not, should interference with the safe operation of an ADS be a specific offence, and how should this offence be enforced?

In short no, the current process is unlikely to work. Car modders have been around since the automobile was invented and will continue into automation. There are many online tutorials on how to make a lane following device for your car for less than $1000 using a camera, a raspberry Pi and Python programming language. Anyone with this skill set will have the ability to get around some safety aspects of an ADS, which may only become apparent after an incident and the vehicle is inspected. Not so different to illegally modified mechanical adjustments today. Creating standard autonomy systems check points on roads is one way to over come this as well as V2X communication. It will be difficult to stop the worst offenders.

**Question 4**: Should the law provide a specific defence for Australian ADSE executive

officers who rely on information provided by others, like a parent company, when

discharging their due diligence duty?

There has been a great deal written about this topic but the precedents are all there. In the case of an incident, the cause will be broken down into components, functions, testing, maintenance and the law. If a vehicle with lane following technology side swiped a barrier then the investigator would look at of these. Was the sensors working correctly, when was it last tested, did the software work as designed. If a person was driving the vehicle would this have likely to have happened? If the fault is systemic, regardless of the specific failure point, then there is a corporate failure. If it was batch of faulty sensors, then probably not. We don’t need to be making new laws for this.

**Question 5:** Please provide your views on the transfer of responsibilities for an in-service

ADS from an ADSE to a new entity.

* Should an ADSE be able to transfer responsibility for an in-service ADS to a new entity?
* If so, what powers should the in-service safety regulator have for approving the transfer?

This is no different to any other example of a manufacture leaving a marketplace. When Holden left the market place, they were obliged to ensure they had the parts and network to service the current vehicles in circulation. It is unlikely a larger OEM will fail so the real test is for smaller players of after market providers. An autonomous system is a sum of it functions and parts. Sensors and other hardware will likely come from a manufacture, so the software is the challenge. If the company is brough out by another then of course their should be a transfer of responsibility, I am not sure there is a roll for the regulator here at all.

**Question 6**: If there is no new entity to take responsibility for an ADS when an ADSE

exits the market, are recall (including disengagement) under the RVSA and recourse

under the Australian Consumer Law appropriate measures? Is there any role for the in service regulator?

This makes no sense what so ever. Most ADS will function for many years with no issues, that is like saying that if Holden pulled out of Australia we should recall all their cars. There would be exceptions, like if the entity pulling out of the market recommended a recall on certain functions. There will also be likely third party providers who would step in to service the ADS. The answer is no.

**Question 7:** What should the role of the in-service regulator be for modifications made by

an ADSE to an in-service ADS that changes its ODD or the level of automation?

Well Tesla does this now in a completely unregulated manner, which of course is bad. Any modification to performance needs to be approved and meet what ever the rules are of the day. Just like the way mechanical modifications are managed today.

**Question 8:** How should in-service modifications made by parties other than an ADSE to

vehicles to make them automated vehicles be managed? Consider:

* vehicle manufacturers modifying vehicles to become automated vehicles while in service
* businesses that supply and install aftermarket ADSs
* individuals installing aftermarket ADS kits

Regardless of the various levels of automation, they are simply a sum of all their functions. There is no current approval for level 2, so if in the future there is a process for level 3 approval adjustment, using the examples listed. A level 2 operator would simply upgrade the function where as the level 3 provider would have to go through a process. It’s the functions that are important, not the overall ‘level’ of autonomy. There should be enough laws and guidelines in place to manage this over time, currently there is nothing, which is why Tesla sends out upgrades all the time with no oversight.

In terms of who can do that, this is pretty well covered by existing processes. If you are upgrading your brakes you will either go to the manufacture or a third party provider, there is no difference. Individuals will prove to be a challenge. A best the NTC may consider a licence or accreditation to work on AV functions. The back yard modders will be difficult to stop.

**Question 9:** Are there any gaps in the regulation and proposed regulation of in-service

modifications that the NTC has not identified? Are there other options that should be

considered?

Yes. There will never be a defined line between the levels of autonomy, so don’t try. The NTC will need to manage functions, testing and compliance to guidelines of the various functions. Otherwise we will end up with level 2 systems having greater functionality then level 3 by stealth. We are many years from a level 4 commercial vehicle but level functionality is already here.

**Question 10**: Do you agree that the additional functions the NTC has identified may need

to be undertaken by the regulator to ensure in-service safety?

* Reporting
* Crash investigations (for enforcement, with a specialist agency like the ATSB to
* undertake no-blame investigations)
* Accreditation
* Regulatory approvals

I have been in the automation space for 15 years and spent time in the US working with key people who now head up Ubers Advance Technology Group and Ford’s Argo. I have also investigated how autonomous vehicle process are set up in key US cities, such as Pittsburgh (6 AV companies) Boston (5 AV companies) Columbus (5 AV Companies) and San Francisco. They all have different approaches although similar goals. Currently there is no federal or even state approach in the US. I also investigated the incident in Arizona by Uber, except for the impact it had on post AV management, which seems to the missed by the NTC. Whilst the basics seem to be covered, two key elements are missing, public interest (by far the biggest outcome after the incident) and AV engagement. It is one thing to report but another to have the various AV providers meet on a regular basis. It was also determined that AV companies were quite often not working the publics interest, this has now changed in the above cities. In all cases the various bodies that have been set up have a background in mobility and focus on the entire ecosystem, not just AV’s.

**Question 11:** Accreditation provides an alternate pathway for an entity to enter the market.

Are there other purposes for which accreditation should be used in the in-service

framework?

There are currently no AV companies in Australia testing AV’s on the public road, its simply too hard, I have been trying for three years so nor does Australia want to be continuing to choke the industry will ill defined rules and guidelines. Any such industry must also ensure Australia becomes competitive in this space. Accreditation must allow for the development of technology as well address public interest.

**Question 12:** Do you agree with the functions the regulator is likely to perform in the initial

phase following commencement of the AVSL?

No, I do not. There is too much focus on technology that is too far away and not enough on current emerging functions, that care little for the various levels of autonomy. The current system in Australia has all but stifled any company from developing autonomous vehicles of which the NTC has never addressed. We actually need to have AV’s and a AV industry first before we build a regulator to regulate it. The other challenge is that in my dealings with state and federal bodies, including the NTC, they are filled with non technical people who have never worked in the AV space and usually not having a specific skill set that would assist in the development of process. In setting up any new regulator, this must be an absolute priority. I am concerned this group will comprise of career bureaucrats with limited actual understanding of AV’s and the future of mobility. There is also no mention of the supporting infrastructure such as V2X, traffic lights etc.

**Question 13:** Are the proposed compliance and enforcement powers proportionate to

meet the objective of safely operating automated vehicles in Australia?

In terms of general safety, yes. AV’s have other challenges no yet addresses by the NTC that have become apparent in the US and are now being monitored. AV’s have behaviourally challenges, three AV’s could grid lock a city block or choke a freeway. They could run around empty as it is cheaper than parking, causing congestion. These challenges are not being addressed.

Question 14: Do you consider that the in-service regulator should have any of the

following powers?

* Recall powers
* Power to suspend the operation of an ADS until a safety issue is resolved by the ADSE
* Power to permanently suspend an ADSE from operating its ADS. In what circumstances
* would such a suspension be warranted?

These are pretty standard for any regulator.

**Question 15**: Do you consider that additional prescriptive requirements may be needed to

support a risk-based approach to compliance and enforcement under the AVSL? Please

provide examples.

In principle, but they need a lot of work and the new agency should look to examples from the US and Europe.

**Question 16:** Please share your views on the illustrative penalties set out in appendix B.74

They are pretty vague. After a time, it is likely that ADS will form its own set of rules that have nothing to with levels of autonomy. In this example I use the Australian Wiring Rules which lists all the functions and activities of an electrician. In time Australia may have a ADS Rules book.

**Question 17:** Has the NTC identified the additional powers that may be required by the in service regulator in addition to the baseline powers provided in the Regulatory Powers

(Standard Provisions) Act 2014 (Cwlth)? 78

I think current proposed method of management will cause legal challenges. It’s a bit like identifying the punishment without understanding the cause.

**Question 18:** Are there other roadside enforcement issues relating to automated vehicle

in-service safety that the NTC should consider?

Mining have been operating autonomous equipment for over twenty years and have pretty addressed a lot of the challenges identified here. Firstly, even in the US, responsibility currently sits with the operator of the vehicle, not the ADSE, no one, not even Waymo has a functioning level 4 vehicle. The location it does have and takes responsibility for is in a define area with a developed ecosystem – just like mining. long before we reach that in the public space here in Australia we will be relying on an increasingly complex set of functions that make driving easier and safer that creep towards full autonomy. Key to roadside enforcement is tech like V2X. rules will need to be put in place based on functions such as if you are using functions X,Y and Z then the V2X must be active and disengage if prompted by an enforcement agency.

**Question 19:** How should ADSEs advise on their ADS’s interaction with roadside

enforcement agencies? Should the AVSL require the ADSE to provide a law enforcement

interaction protocol to the in-service regulator and/or roadside enforcement agencies?

Yes, there should be a command to pull over a vehicle.

**Question 20:** Do you agree that when a breach of road traffic laws occurs and:

* the ADS is engaged, or
* a roadside enforcement agency forms a reasonable belief that the ADS was engaged at the time of the breach that the incident should be treated as a potential breach of the general safety duty and not handled through the infringement system for human drivers?

So we are talking about system that probably wont be in use for another five years at least. If you turn on your cruise control now, then you are responsible, this is true for level 3 and level 4 vehicles. It is the drivers responsibility to ensure the vehicle is travelling at the correct speed. If you are behind the wheel, you are responsible in the first order. Everything is programming, programming wont break the law unless there has been a change in the environment which is why there is level 3 and 4. Level 5 is at least a decade away. This would likely be tested in court.

**Question 21:** Do you agree that when a breach of a road traffic law occurs and a roadside

enforcement agency forms a reasonable belief that the remote driver was in control of the

vehicle at the time of the breach, that the incident should be referred to the in-service

regulator and not handled through the infringement system for human drivers?

So a level 3, the human is always in control and will always have responsibility. Level 4 is a bit more grey. In saying that it again comes back to the functions being operated at the time as opposed the ‘level’ of automation. For a ADS to go through a red light, it is not by choice, it is by a failure of sensors or programming and the ADSE will be responsible – to fix the issue, unless the owner had failed the service the vehicle correctly or had not had a known issue fixed. This is the same as if you brakes had failed and you went through light, it depends of what the cause of the brake failure. this could also be the infrastructure, the traffic light system may have also sent the wrong signal via the V2X, it could a faulty intersection. These would all be limited edge cases.

Question 22: Do you agree that when a breach of road traffic laws occurs and:

* it is unclear to a roadside enforcement agency which entity is in control of the vehicle at

the time of a road traffic law breach, or

* a road safety camera detects a road traffic law breach that the infringement notice be issued in the first instance to the human driver or registered owner/operator with a process to nominate the ADS or remote driver as the driver if

required?

Are there other approaches that should be considered?

In most cases it will be similar to using cruise control and speeding or brake failure, in the first instance the driver and the second the driver and or the manufacture. The same will be for the ADS. If the driver engaged a faulty ADS, they will be fault. If it is a level 3 system, they are going to be fault regardless. It will be virtually impossible for a human to determine if it was the driver or the ADS so the infringement will need to go to the driver. In a controlled intersection with V2X, the management system of the control intersection may be able to tell.

**Question 23**: Are the interactions between the in-service regulator and other regulators

and agencies accurately described?

True automation could be a decade or more away, the bulk of the heavy lifting is likely to occur with the current regulators. The impact of the in service regulator will be gradual as functionally improves. Most interaction would like occur in the first instant with the infrastructure departments and regulators such as Main Roads around traffic lights, controlled intersections, road works etc as well as the communication regulators for V2X or other such systems.

**Question 24**: Are there other agencies that the in-service regulator will need to interact

with?

Communications, infrastructure, Traffic management local Councils.

**Question 25:** Are there other information types, purposes or parties relevant to the in service regulator’s access to information?

In the US, most of this data is already captured by the regulators although no formal format has been established and nor has any system or process to suggest how the data is capture, stored and for period of time – kilometres travelled or time related. Traffic and congestion is also a key set of data, AV’s can cause congestion and as such may also need to be regulated.

**Question 26**: Have the key information flows that the in-service regulator needs to be a

party to been identified? Are there others that you suggest?

This needs a lot of work. This process will very grey for sometime with manufacturers slowly adding functions as opposed full ADS, leaving black holes of data gathering and reporting shortfalls. For example a manufacture with a set of automated functions would not fall into this systems as they would not need approval from the first supply regulator but a manufacture with a ‘level 3’ would and the two systems may provide very similar outputs.

**Question 27:** Do the proposed information access powers meet the objectives of the in service regulator? Are there other statutory powers for information access that the regulator will require to support its compliance and enforcement functions?

This again assumes that manufactures fall into nice categories such as level 2 or level 3 which us unlikely to the be case which mean the process flow will be disjointed at best and disconnected at worst. The mining industry has also been grappling with this exact same challenge for over ten years with automated equipment with the manufacturers fiercely fighting back against sharing ‘sensitive data’ with either the end user (mining company) or regulators. There are a range of freedom of information challenges of sharing data with government agencies as well as data leaks. The wrong approach will lead to manufacturers with holding data or fighting against sharing data. This will require more work.

**Question 28:** Do you agree that a specific power authorising collection, use and disclosure

of personal information is required in the national law and in state and territory

legislation?

The current wording is likely to deter entrants into the market and its pretty vague on the use of that data. ADS are likely to be just like a giant smart phone with all the data risk that go with it. People and companies will want some very specific rules around this. No one wants the data to be used for tracking locations or seeing where someone has been, retrospective fines for parking etc. I cant actually see a reason why personal information needs to be disclosed. Data should, at the most, be event based like the airline industry. This seems like an overreach. Again, this has been a challenge in the mining industry.

**Question 29**: What privacy protections may be needed around the collection, use and

disclosure of ADS-derived personal information?

Companies and most individuals don’t trust the government at the best of times with information. That last one *“unrelated to the original purpose of collection; for example, a law enforcement agency or road agency may seek to the use data collected at the roadside from an ADS as evidence to establish an unrelated criminal offence.”* From the work I have done with the general public is a red flag. Seriously, the emotion this brings up from the public in the public forums I have conducted in Australia can not be underestimated. An example is using the camara from a AV to track someone with an outstanding warrant with out their knowledge. I have plenty of examples. I have had people yell at me over this.

**Question 30:** Do you agree with the differences outlined between the legislative

implementation approaches? Which approach will best achieve the reform outcomes?

This is not that easy as quite often the road rules in each state is different, meaning a good proportion of offences are likely to manage in the particular state. The example used is an interesting one. In the event of detecting a porthole and the ADS not having a solution before handing over to the driver would be about 200ms at a maximum, similar to a humans reaction. The vehicle’s safety protocol maybe to hit the emergency brakes. If it was deemed that a human in a similar situation would not have resolved the issue, it becomes the fault of the agency responsible for the road. If it was found that the vehicle was not designed for handling potholes, this should have been made aware to the driver, then the driver should have been prepared to take over and both her and the agency responsible for the road are at fault. If it was indeed found by the regulator that the ADS did not have sufficient time to hand back control (highly unlikely) and it was indeed programmed to undertake a manoeuvre to avoid the pothole ie braking and failed to do so, and this was as result of not enough testing to identify a program failure, then the process can start. Firstly, the condition of the road was contributing factor, so that would need to be dealt with at a state level. Then was there a set of guidelines for testing that any reasonable provider would have conducted, if no, then they may be case to answer on. But this would an edge case and almost exactly as a ABS system glitch on a car now. I am not seeing a need for a special purpose process. Ultimately, case law will determine how this plays out.