Queensland Government Submission

to the

Queensland Parliament Transport and Resources Committee:
Inquiry into Vehicle Safety, Standards and Technology, including Engine Immobiliser Technology

<u>Background</u>

On 24 February 2021 the Legislative Assembly agreed to a motion that the Transport and Resources Committee (the Committee) inquire and report on vehicle safety, standards and technology, including engine immobiliser technology (the Inquiry). The terms of reference for the Inquiry are for the Committee to:

1)   inquire into and report to the Legislative Assembly on:

    (a)   options to reduce or prevent vehicles being used illegally or dangerously on Queensland roads, including vehicle engine immobilisation technology, non-technological options, operational considerations or other measures.

    (b)   lessons learned from other jurisdictions, particularly regarding the implementation of vehicle engine immobilisation technology to the existing vehicle fleet.

    (c)   the Commonwealth's role in relation to vehicle standards and safety, and measures the Commonwealth could take, including requiring all new vehicles to be fitted with engine immobilisation technology.

    (d)   the effectiveness of any proposed measures in improving road safety, preventing crime and assisting police in operational matters.

    (e)   a recommended framework for legislative, policy and operational implementation of any proposed measures.

    (f)   the benefit to and role of insurers in supporting any recommended measures.

    (g)   options to improve vehicle standards and safety in Queensland, including in relation to the:
        (i)   current Australian vehicle design rules
        (ii)   inspection regime for registered vehicles
        (iii)   pre-sale certification scheme, including measures to reduce fraud and improve consumer safety
        (iv)   management of written-off vehicles and 'rebirthing'
        (v)   after-market vehicle modification framework, including achieving consistency to ensure best alignment with other Australian jurisdictions, and

2)   report back to the Legislative Assembly within six-months.

The promotion of road safety and prevention of crime are pivotal roles of the Queensland Government. The Queensland Government welcomes the opportunity to provide a written submission to the Committee on the Inquiry. This submission is structured under general headings which are generally reflective of the Inquiry's terms of reference.

Impact of vehicle engine immobilisation technology on crime prevention

According to QPS data, in 2020, there were 15,066 'Unlawful Use of a Motor Vehicle' offences.[1] The best option to reduce or prevent stolen vehicles being used illegally or dangerously on Queensland roads, is to prevent a vehicle from being stolen in the first place.

From 2001 onward, new vehicles sold in Australia are required to be equipped with an engine immobiliser. An engine immobiliser is an electronic security device (a microchip) fitted to a motor vehicle that prevents the engine from running unless the correct key (transponder or smart key) is present. This prevents the vehicle from being 'hot-wired', bypassing a motor vehicle's ignition switch without a key after entry has been achieved, reducing theft. An immobiliser can be retrofitted to older vehicles that do not come equipped with factory installed immobilisers.

Interjurisdictional findings demonstrated the introduction of the immobiliser technology helped reduce car theft by an estimated 40%, accounting for both the protective effect on cars with the device, and the displacement effect on cars without the device.[2] These findings are confirmed locally by the Queensland Reported Offences data. In 2000, there were 20,214 'Unlawful Use of Motor Vehicles' offences, in 2001, 19,244. In 2005, the number dropped to 12,690.[3]

Nearly twenty years ago, as the immobiliser technology was rolling out, every 1 in 146 cars were stolen in Queensland. Last year, the number decreased to 1 in 279, displaying a reduction by half. Given the changes in motor technology, the majority of vehicles are now stolen using a key, a transponder that starts the motor deactivating the immobiliser. The impact of engine immobilisers in other jurisdictions has also shown that regulation can be successful in limiting opportunities for crime.

For young people, motor vehicle offences are often among their first interactions with the criminal justice system. In Europe, Svensson[4] (2002) found that half the chronic repeat offenders he studied had a motor vehicle offence as one of their first offences and he attributed a fall in other crimes in the UK to the fall in motor vehicle thefts. Svensson hypothesised that the decline in car theft due to engine immobilisers served to remove a steppingstone to other crime and chronic offending.

Controlling crime by blocking the opportunity to offend may therefore have more impact than increased penalties in changing offending behaviour.

---

[1] https://www.police.qld.gov.au/maps-and-statistics
[2] van Ours, Jan C.; Vollaard, Ben (1 June 2016). "The Engine Immobiliser: A Non-starter for Car Thieves". *The Economic Journal. 126* (593): 1264–1291. doi:10.1111/ecoj.12196
[3] https://www.police.qld.gov.au/maps-and-statistics
[4] Svensson, R (2002). *Strategic offences in the criminal career context*. The British Journal of Criminology, 42 (2): 395-411

Overview of current police operational practices

Within the QPS, the Road Policing Group (RPG), Road Policing Regional Support Command, provides a range of specialist traffic policing services to maximise effective road use management for the people of Queensland. The RPG also employ a variety of existing operational strategies to increase road safety and prevent crime, including vehicle intercepts, which involves a physical and tactical approach:

- Physical - such as deploying tyre deflation devices.[5]
    - Tyre deflation devices are designed to immobilise vehicles with minimum injury to all participants and damage to surrounding property. Tyre deflation devices are not used to stop motorcycles or similar vehicles.[6]
- Tactical - intervening with another vehicle or establishing a roadblock.

Vehicle pursuits are one of the highest-risk aspects of policing. In general, drivers fleeing from police are highly impulsive risk-takers, who inadvertently weaponise the vehicles they drive.

Joyriding is a common theme in youth vehicle theft. Joyriding is known as the act of driving at high speed in a stolen car to seek thrill and enjoyment; it is often opportunistic and unplanned.[7] It involves risk-taking elements as well as the ability to boost an offender's status with their peers.[8]

Given the unpredictability and potential volatility of the situation, before engaging in a pursuit of a vehicle, police consider alternatives such as:

- not pursuing the vehicle if the risk involved in pursuing is too high
- identifying and/or apprehending the offender a later time and using the evade police laws, and
- using PolAir helicopters to track the offending vehicle and to maintain electronic surveillance.

It is paramount in all three scenarios to protect the safety of the community, safety of police, and safety of the offender and others in the vehicle. Some approaches in other jurisdictions require aggressive driving by police and are not consistent with the QPS pursuits policy.

Road policing and emerging technologies

The QPS recognises technological advances (connected services, GPS) in the build of new model vehicles present opportunities to improve public safety. Various vehicle management technologies currently exist which rely on connectivity (mobile internet), including the theoretical capability to remotely immobilise a vehicle; these technologies are improving rapidly.

---

[5] OPM 14.30 - Relevant legislative authority to use a TDD is contained in ss. 21: 'General power to enter to arrest or detain someone or enforce warrant'; 52: 'Prevention of offences–general'; 614: 'Power to use force–exercise of certain powers'; s. 615: 'Power to use force against individuals', and s. 26: 'Roadblocks' of the PPRA.

[6] Note section 14.30 of the QPS OPM relating to the use of tyre deflation devices is available on the public facing OPM.

[7] Dawes, Glenn (2000). 'The culture of joyriding in Queensland: The offender's perspective', *Road Safety Research, Policing & Education Conference*, p. 2; Cunneen, Chris, White, Rob & Richards, Kelly (2013). *Juvenile Justice: Youth and Crime in Australia: Youth and Crime in Australia*. Oxford University Press, p. 55.

[8] McDonagh, E., Wortley, R. & Homel, R. (2002). Perceptions of physical, psychological, social and legal deterrents to joyriding. *Crime Prevention and Community Safety: An International Journal, 4*(1), p. 4.

For example, General Motors have been factory fitting their vehicles with OnStar - proprietary technology, since 1996. This technology allows for remote connectivity (including start and stop) in all vehicles (a subscription service). Holden, a GM-owned company, was set to offer this service in Australia in 2021, but GM has since changed its corporate strategy in favour of specialty vehicles and phased out Holden.[9]

Currently, the majority of higher-cost vehicles in Australia are equipped with factory installed GPS tracking systems. These enable manufacturers to locate stolen vehicles (as advertised on manufacturers' websites) through connected services. Police cannot access this information at present, nor does the QPS use remote vehicle engine immobilisation technology when intercepting a vehicle.

Any technological capability that allows for GPS tracking of a vehicle or the remote immobilisation of a vehicle whilst being driven, needs to be considered in the context of the vehicle owner and the manufacturer or, if added after market, the service provider. The Australia New Zealand Policing Advisory Agency (ANZPAA) report into Remote Engine Immobilisation explores this relationship further, see the next section of this submission. The involvement of police is evolving, and QPS is working to better understand a range of challenges and rapidly developing tools. Present challenges include understanding options to strengthening technologies to prevent vehicle theft, thereby negating risks and challenges around remote immobilisation, and building these options into crime prevention strategies.

Specific to policing functions, remote vehicle immobilisation may nevertheless be advantageous in three broad scenarios where the interception of a vehicle is required:

- stolen vehicles reported to police
- vehicles detected by police being driven in a dangerous manner (which may include stolen vehicles that have not yet been reported stolen), and
- where police are conducting a tactical interception of a vehicle as part of a planned enforcement activity.

The circumstances and the required level of authority under which police could direct the remote activation of an immobiliser to cause a vehicle to depower[10] and stop are complex. The situation where remote immobilisation is activated to ensure a stationary vehicle cannot be engaged is the preferred prevention strategy. In a scenario where a vehicle cannot be immobilised while stationary, ensuring a vehicle can be stopped in a safe location and in safe circumstances, is critical. This includes considering the safety of those who may alight from a vehicle and the surrounding community, once the vehicle is immobilised. In any circumstances, direct police involvement is required to monitor the evolving situation and mitigate damage, where possible.

It is therefore imperative the police are involved in any remote immobilisation protocols that may in time be developed. The legislative relationship between the operator of the remote immobiliser technology, the owner and police must be considered (the enabling platform). This includes the responsibility for any unintended consequences of remotely immobilising a vehicle (injury, damage) and privacy considerations, such as where the vehicle owner and

---

[9] Holden Australia and New Zealand Announcement https://www.holden.com.au/announcement
[10] Reducing vehicle power through remote engine immobilisation allows the driver to control direction and braking.

vehicle user are known to each other (for example, in a domestic and family violence scenario). Excluding police from the process may result in increased vigilante behaviour. For example, in a situation where the owner is able to require the manufacturer to immobilise a stolen vehicle, such as via a smartphone app, and engage in a pursuit.

While remote immobilisation under clearly mandated authorities in safe conditions is optimal, there will always be a need for less subtle methodologies for deployment in situations where network coverage is insufficient. Remote immobilisation is not a panacea; despite the best methodologies available, it will not always be possible to prevent critical outcomes.

ANZPAA report into Remote Engine Immobiliser Technology

We note one of the primary triggers for this inquiry was to investigate the potential use of remote engine immobiliser (REI) technology to prevent vehicles being used illegally or dangerously on Queensland Roads.

As detailed by the Department of Transport and Main Roads (TMR) at the departmental briefing to the Committee on Monday 22 March 2021, the Ministerial Council for Police and Emergency Management agreed in October 2018 to establish a working group to explore options related to the use of REIs as a means of reducing the risks to the public and police from vehicle related crime. Former Assistant Commissioner Mike Keating, from the Queensland Police Service (QPS), chaired the national working group administered by the Australia New Zealand Policing Advisory Agency (ANZPAA). TMR, the Commonwealth Department of Industry, Transport, Regional Development and Communication (DITRDC), the National Transport Commission (NTC) and technical experts joined police representatives from around Australia as part of the national working group.

In June 2019, the ANZPAA released their findings in a report titled "Remote Engine Immobiliser Reference Report". A copy of the report is available at **Attachment 1**.

The working group found that, while the technology already exists to immobilise certain vehicles (General Motors' OnStar for example, discussed in more detail previously), it is not yet feasible for such technology to be utilised across the entire Australian Fleet.

At the time the report was finalised (and TMR research has found no evidence to the contrary today), the working group found there had been no successful implementation of a mandated REI solution across a whole vehicle fleet anywhere in the world.

Mandating such technology would require both a single in-vehicle technology as well as the required enabling platform (system linking vehicle owner / system supplier / vehicle manufacturer and enforcement agency) to be successful, and neither option appears currently available in Australia or overseas. The role that the Commonwealth Government might play in mandating a new safety feature such as REI (when it is available) is discussed later in this submission.

The ANZPAA report also highlighted concerns that the use of REIs might have unintended safety consequences, and fleet saturation may take considerable time, even if mandated at some point in the future. Finally, the report notes system costs, privacy implications, and the possibility that future REI options will be superseded by other technological advances such as connected and autonomous vehicles.

Whilst the legislative framework for mandating such technology already exists, policy and operational options could be explored further once the technology became available. As acknowledged in the ANZPAA report, with continued technological developments, REI may become a feasible option in the future.

Whilst the technology / enabling platform may not be available at this point, TMR notes the Committee's interest in the benefit to and role of insurers in supporting any options that are / become available. It is recommended that the Committee seek advice from the Insurance Council of Australia to obtain this sort of guidance. The Queensland Government has no regulatory oversight of this area of interest.

Wider programs targeting motor vehicle related offending and unsafe driving

The Department of Children, Youth Justice and Multicultural Affairs (Youth Justice) has trialled the *Rethinking our Attitude to Driving* (ROAD) program for young people under youth justice supervision in five locations, replacing the previous *Motor Vehicle Offending Program*. The program is delivered by youth justice staff, with capacity to include information sessions from expert partner organisations.

This group-based program supports young people to:

- identify and explore motivations behind unsafe motor vehicle behaviours
- challenge thoughts and behaviours associated with unsafe motor vehicle related behaviours
- increase awareness of the impacts and consequences of unsafe motor vehicle related behaviours,
- understand what a motor vehicle offence is
- increase understanding of the impact on victims
- increase empathy for victims, and
- provide practical strategies to reduce harm.

More information about ROAD is available at **Attachment 2**.

Youth Justice is also partnering with Queensland Fire and Emergency Services to support young people, primarily in the Logan area, to access the *Road Attitude and Action Planning* (RAAP) psychoeducational program. This program supports young people to mitigate risks of motor vehicle incidents. Youth Justice clients are most commonly referred to the program as a restorative justice outcome, either as a component of a conference agreement or as an alternative diversion program. More information about RAAP is available at **Attachment 3**.

These programs are provided within the context of overarching case plans that provide young people with evidence-based interventions to address their individual assessed criminogenic needs and risk factors.

Programs targeting more general offending

Youth Justice provides a number of evidence-based programs and initiatives that reduce reoffending of all types by supporting young people to change the behaviours and attitudes

that contribute to their offending and to access the education, training, health and other support services needed to address issues that may be contributing to their offending. Some of these programs explicitly to address motor vehicle offending; others are generic, assisting to address the often-complex underlying causes, motivations, triggers and impacts of the young person's offending behaviour, including any motor vehicle offending.

Changing habits and reaching targets (CHART) is an offence focussed program with six core modules, and six discretionary modules that are delivered as required to address individual patterns of offending and assessed needs. The program aims to directly address the thinking and behaviours that lead to offending and identify new ways to think and act. The intervention focuses on targeting an individual's specific offences, motivating them to change, and developing strategies to reduce future offending.

CHART includes a discretionary motor vehicle offending module which provides a structured framework for working with young people who are committing motor vehicle offences and are resistant to engaging in other interventions and/or counselling. This module provides further opportunities to identify and address the young person's individual needs and motivations that drive their engagement in motor vehicle offending.

Aggression Replacement Training®[11] (ART) is a group-based program that targets young people with violent or aggressive behaviours and aims to work on cognitive restructuring and moral development through three components:

- Skill streaming (behavioural) - aims to teach effective communication and prosocial skills
- Anger control (affective) - recognising early signed and triggers of anger and strategies to reduce the level of aggression used when angry, and
- Moral reasoning (cognition/values) - aims to increase the level of concerns with the needs and rights of others.

ART aims to increase moral reasoning ability, such as perspective taking, and develop skills, such as consequential thinking and identifying the harm caused as a result of individual actions, that are likely to shift offending thinking and reduce offending behaviour.

Emotional Regulation and Impulse Control (ERIC) is a trans-diagnostic, modular intervention for substance misuse, mental health and offending behaviour that aims to address the underlying mechanisms of emotional regulation (ER) and impulse controls (IC). ERIC offers skills and processes to manage emotions, urges and decision making.

ERIC aims to support the development of skills such as decision making, self-regulation and perspective taking that enable attitudinal and behavioural change. Integrated Case Management provides high-risk young offenders and their families with intensive support to address issues that are contributing to their offending. Evaluation of this program has shown it is effective at reducing re-offending.

Restorative justice conferences bring young people face-to-face with the people they have harmed and support them to take responsibility and ownership for their actions and identify

---

[11] https://www.qld.gov.au/law/sentencing-prisons-and-probation/young-offenders-and-the-justice-system/youth-justice-community-programs-and-services/aggression-replacement-training-program

how they can make amends. In a 2017 survey, 89% of victims reported being satisfied with conferences they participated in. Evaluation shows reduced offending and severity of offending.

Transition to Success (T2S) provides young people in or at risk of entering the youth justice system with vocational education and support to develop life skills and job readiness. A recent evaluation found that two-thirds of young people who completed a T2S course did not offend within the next 12-months.

The Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships (DSDSATSIP) notes that the use of immobiliser technology may be of benefit in communities where Alcohol Management Plans (AMPs) are in place, particularly with respect to alcohol breaches relating to sly-grog (selling/supplying illicit alcohol) and/or the policing of sly grog. More broadly, this technology could assist in reducing unlawful use of motor vehicle (UMV) offences and assist with apprehending offenders in a significantly safer way.

Commonwealth's role in Vehicle Standards and Safety

The Australian light vehicle market is unique in two ways. Firstly, its comparative size, with Australian sales of new light vehicles representing approximately 1% of global sales. So comparatively ours is a very small market. Secondly, there are no longer any significant light vehicle manufacturers left in Australia. Almost all light vehicles sold in Australia are now manufactured overseas and built for other markets of significant size.

Increasingly, there is a stronger case now than ever before for the Australian national standards for road vehicles, known as Australian Design Rules (ADRs), to be harmonised with the international standards. This ensures Australian consumers have access to the broadest and safest range of light vehicles built for the international markets at the most competitive prices.

Imposition of any Australia-specific ADRs will adversely impact Australian consumers, either because manufacturers avoid offering certain models to the Australia market and/or the Australian consumers will be asked to pay more for the unique Australian requirements.

The first supply of new and used imported vehicles in Australia is administered by the Department of Industry, Transport, Regional Development and Communication (the Commonwealth) through the *Motor Vehicle Standards Act 1989* (Cth)*,* to be replaced by the *Road Vehicle Standards Act 2018* (Cth) from 1 July 2021. The Commonwealth legislation requires that light vehicles comply with the relevant ADRs as a prerequisite to first supply.

Successive Australian governments have adopted the practice of harmonising ADRs with the international United Nations Economic Commission for Europe (UN ECE) regulations for road vehicles where appropriate – and we are currently 90 to 95% harmonised.

The Committee will be interested to know that we are unaware of any Remote Engine Immobilisation UN ECE regulation in existence or under development, that would be suitable for use by an enforcement agency across the vehicle fleet.

Australia's current program of progressive ADR development is set out in the recently released consultation draft *National Road Safety Strategy 2021-2030* and the associated National Road Safety Actions Plans.

Best practice regulation protocols in Australia require that, before an international UN ECE regulation is adopted in this country, it be subjected to the domestic rule-making process, including a benefit-cost-analysis and the stakeholder consent through the Regulatory Impact Statement (RIS) process. To derive the maximum benefit from the new UN ECE regulations, it is desirable to adopt them in Australia as soon as possible.

Queensland has been active in advocating through the Commonwealth Government for the earliest adoption of key vehicle safety and emissions related UN ECE regulations. Advocacy from Queensland has positively influenced the earlier adoption of some important safety standards such as the Electronic Stability Control systems on heavy and light vehicles and Advanced Emergency Braking systems on heavy vehicles. Currently that advocacy extends to fast tracking Blind Spot Monitoring Information systems (to detect pedestrians and riders) for heavy vehicles, and Euro 6 emission control standards on light and heavy vehicles.

Vehicle emissions can have serious impacts to human health, and the Queensland Government recognises that adopting higher standards such as Euro 6/VI will deliver more efficient and safer vehicles. The benefits of promoting newer / greener vehicles is also discussed later in the submission.

Role of the States and Territories in Vehicle Standards and Safety

Once a vehicle is approved by the Commonwealth, meaning it meets all applicable ADRs, it is then able to be registered by the States and Territories. States and Territories administer vehicles once they become registered, also known as in-service vehicles. In-service vehicle standards are taken from model law, known as Australian Light Vehicle Standard Rules (ALVSRs), developed and maintained by the National Transport Commission (NTC) and adopted generally by all states and territories in a similar way. As a result, the in-service light vehicle standards are largely uniform across the country.

Australian Light Vehicle Standard Rules (or ALVSRs) cover such matters as general safety requirements, like steering, seating, window tinting, tyre treads, as well as more specific matters such as vehicle configuration and dimensions, lights, braking, and emissions.

Modification of In-Service Vehicles

In contrast to Australian Light Vehicle Standard Rules (or ALVSRs), rules around the modification of light vehicles are also necessary, especially given the appetite of the community to adapt their vehicles for a range of occupational and personal uses.

It must be stated at the outset that vehicle modifications need to reflect both sound engineering practices and vehicle safety on one hand, as well as the needs of the motor recreational community and aftermarket industry on the other. It is all about safe and responsible vehicle modifications, while ensuring we can all continue to enjoy the many rewards of recreational motoring activities.

The standards applicable to light vehicle modifications in Queensland are taken from the *National Code of Practice for Light Vehicle Construction and Modification*[12] (NCoP). The NCOP was developed jointly by all states and territories in 2013 as a framework for inter-jurisdictional harmonisation of in-service light vehicle modification standards.

Vehicles modified according to the NCOP are deemed to remain compliant with all relevant ADRs and in-service vehicle standards (ALVSRs). The NCOP can be considered more to be a prescriptive document that provides instruction about how to modify a vehicle, rather than as a collection of static standards and rules.

There is currently a national group known as the Single-Issue Working Group with representatives from all jurisdictions, which has as its function the ongoing maintenance of the NCOP. The group is chaired by a representative from the jurisdictions but has not always been successful in keeping NCOP up-to-date and providing a mechanism for jurisdictions to adopt NCOP uniformly. As a result, the requirements in NCOP have not always been implemented by States and Territories uniformly and some limited variations remain between jurisdictions.

While the provision of heavy vehicles is also administered by the Commonwealth, the in-service operation of and modifications to heavy vehicles is managed by the National Heavy Vehicle Regulator on behalf of the participating jurisdictions, including Queensland. The purpose, the range and the types of modifications performed to heavy vehicles is often quite different to those on light vehicles. Modification standards for heavy vehicles are the subject of a separate code of practice for modifications to NCOP.

Harmonisation of laws dealing with modification of in-service vehicles

While Queensland's oversight of in-service vehicle modifications is largely in accordance with the NCOP, at times there has also been the need for additional regulation to reflect such things as current gaps in the NCOP or to make allowance for regional or local differences. These variations are specified in the *Queensland Code of Practice: Vehicle Modifications* (QCoP)[13]. The major topic areas where in-service light vehicle modification requirements differ among the states (or consequentially when compared to the NCOP) are:

- Gross Combination Mass (GCM) upgrades
- Gross Vehicle Mass (GVM) increases
- Street rod certification
- Vehicle lifts, and
- Light trailer modifications.

Where there are minor differences in modification requirements, Queensland, like all other states, have mutual recognition in place. That means for example, a modified NSW registered vehicle can travel on Queensland roads regardless of whether the modifications meet Queensland modification requirements.

TMR actively collaborates with other Australian jurisdictions to progressively align vehicle modification requirements. TMR notes that there are some industry commentators that

---

[12] https://www.infrastructure.gov.au/vehicles/vehicle_regulation/bulletin/vsb_ncop.aspx
[13] https://www.tmr.qld.gov.au/Safety/Vehicle-standards-and-modifications/Vehicle-modifications/Light-vehicle-modifications#qcop

advocate for national harmonisation, but not if they lose any current freedoms or concession in any one state. National harmonisation may mean more generous vehicle modification laws than what now exists in some jurisdictions – but may also mean a tightening of current laws in certain areas in other jurisdictions. It is not about picking and choosing, in the absence of considering what might be safe and appropriate vehicle modifications.

As an example of Queensland's efforts to seek harmonisation, in March 2021, a consultation draft of a modification code that will permit an increase to a vehicle's Gross Combination Mass (GCM) was uniformly released to industry in Victoria, New South Wales and Queensland. The release of the draft code was the outcome of multiple jurisdictions working jointly and with industry.

Ultimately, TMR will be considering all feedback in collaboration with other regulators, and it is intended have the code endorsed and adopted nationally (in the NCoP) which will help ensure a consistent approach to the management of GCM modifications for light vehicles, regardless of the state in which it is modified. This cooperative cross jurisdictional approach can be progressively applied to the other topic areas where in-service light vehicle modification requirements currently differ among the states or with the NCOP.

TMR has considered how to otherwise expedite the national harmonisation of light vehicle modifications. Essentially, how can we move towards a single after-market vehicle modification rulebook for the nation sooner, and importantly maintain that rulebook on an ongoing basis. One option is the expansion of the role of the National Transport Commissions (NTC) to include the development of and maintenance of the NCOP.

It is proposed to put an agenda paper forwarded to the National *Infrastructure and Transport Ministers' Meeting* seeking commitment of Australian Ministers to national harmonisation of vehicle modification standards, and recommend that the NTC to take on a formal ongoing role in managing light vehicle modification requirements. This would however require the support of all jurisdictions. Regardless of the above proposal, TMR will continue to work with other jurisdictions to improve consistency in the areas where regulations differ.

The NTC has a proven track record of developing and managing model law framework for several aspects of road vehicle operations such as the Australian Road Rules, the Regulation of Dangerous Goods Codes, the Australian Light Vehicle Standards Rules and more recently, its work on developing a regulatory framework for the safe operation of autonomous vehicles. The NTC also has mature and proven practices for engagement and consultation with transport jurisdictions, industry and the community.

TMR is cognisant of the community and business benefits in achieving and maintaining a single vehicle modification regulatory framework. This will also be critical in the future as more complex safety and self-drive / autonomous technologies are embedded in new and imported vehicles.

Vehicle Roadworthiness

Approved Inspection Stations and Safety Inspections

TMR administers inspection and certification schemes to ensure vehicles meet minimum safety standards before being registered and used on a road. In Queensland, all vehicles

must have a safety certificate or certificate of inspection before a registered vehicle is offered for sale, or when registering an unregistered vehicle, and when transferring a vehicle from interstate. Vehicles such as taxis, buses and heavy vehicles are also subject to periodic inspections (every 6-12 months for example).

Vehicle inspections are conducted by TMR in some cases (for public passenger transport vehicles and heavy motor vehicles over 16 tonne and trailers over 10 tonne), but more frequently by a third party accredited by TMR. Under transport legislation [*Transport Operations (Road Use Management – Accreditation and Other Provisions) Regulation 2015*] TMR accredits Approved Examiners (AEs) at Approved Inspection Stations (AIS) to perform vehicle safety inspections on behalf of TMR.

A person applying to become an AE will be assessed by TMR based on their formal qualifications and their suitability to perform the duties of the role. They are required to provide evidence of identity, hold specified formal trade qualifications, outline relevant industry work experience within Australia, and undergo a national criminal history check. Applicants for approval to operate an AIS (including Nominees) are required to provide evidence of identity and to undergo suitability checks, including a national criminal history check. There are no qualification or industry experience requirements for an applicant for an AIS or nominee approval.

Under the AIS scheme, approval holders have responsibilities under the *Transport Operations (Road Use Management – Accreditation and Other Provisions) Regulation 2015*, the *Transport Operations (Road Use Management – Vehicle Standards and Safety) Regulation 2010*, the *Business Rules for Approved Inspection Stations* (the business rules), the *Code of Practice – Vehicle Inspection Guidelines*[14] (Light Vehicle Inspection Guidelines), and the *National Heavy Vehicle Inspection Manual*[15] (Heavy Vehicle Inspection Manual).

AEs conduct vehicle inspections at an AIS. An AIS may be a fixed premise or a fixed premise with one or more mobile AIS attached. A mobile AIS allows an AE employed by the AIS to travel to a location other than the fixed premise to conduct vehicle inspections. For example, a customer's residence.

An AIS approval holder must have a nominee approved by TMR in certain circumstances (if they are not present to supervise the day to day operations of the AIS or the AIS is not in their individual name for example).

There are currently 5,700 AEs employed at 3,200 AIS across Queensland. Of these AIS, 860 operate one or more mobile AIS, with a total of 1,330 mobile AIS currently approved by TMR to operate.

The vehicle inspection conducted by an AE covers the basic vehicle safety standards including tyres, brakes, steering, suspension, body rust or damage, windscreen and lights. The vehicle inspection is not a comprehensive mechanical inspection on the quality, or life expectancy of a vehicle.

---

[14] https://www.tmr.qld.gov.au/-/media/Safety/Vehicle-standards-and-modifications/Vehicle-modifications/Industry-codes-of-practice/cop-vig-0519.pdf?la=en
[15] https://www.nhvr.gov.au/files/202002-0821-nhvim-national-heavy-vehicle-inspection-manual.pdf

The vehicle inspection must be conducted in accordance with legislative requirements, which include provisions under the *Transport Operations (Road Use Management – Accreditation and Other Provisions) Regulation 2015*, the *Transport Operations (Road Use Management – Vehicle Standards and Safety) Regulation 2010* and either the *Light Vehicle Inspection Guidelines* or the *Heavy Vehicle Inspection Manual*, whichever is appropriate for the vehicle being inspected.

AIS approval holders are responsible for providing the required equipment that allows an AE to conduct a thorough inspection of a vehicle. This includes general tools and equipment such as light transmission meters and measuring equipment and gauges for testing brake components, equipment to check the vehicles underbody, equipment to check headlight aim and equipment to test a vehicle's brake system operations. These equipment requirements apply to inspections conducted at the fixed AIS premises and by mobile AIS.

If the AE reasonably believes the vehicle is free of defects, an Inspection Certificate may be completed using either a paper inspection certificate book or the online Inspection Certificates Online (ICO) system. The Inspection Certificate is then approved by the AIS or nominee approval holder by either signing the paper inspection certificate or approving the inspection certificate online using the ICO system.

Compliance with legislative responsibilities within the AIS Scheme is managed by TMR's Transport Inspectors who are located at regional compliance offices around Queensland. TMR Transport Inspectors currently conduct a confirmation audit of all AIS, within six-months of the AIS approval being granted. Scheduled audits of AIS are conducted randomly, at least once every four years. However, an AIS audit may also be triggered more frequently if intelligence is received as the result of Transport Inspector's on-road enforcement activities, via the QPS or through a customer complaint.

Approximately 80% of AIS currently use ICO to issue inspection certificates. TMR's Transport Inspectors review the information captured in ICO as part of their pre-audit assessment to inform their audit approach. ICO data is also used to identify high risk AIS and approved examiners behaviour to allow for better targeted compliance activity.

When TMR receives QPS intelligence or a customer complaint, these matters are managed locally by Transport Inspectors in the regions. Compliance actions resulting from an audit or an investigation may include education, corrective action requests, penalty infringement notices or action to amend, suspend or cancel the approval or accreditation.

In 2019 (the latest typical year, prior to COVID), TMR Transport Inspectors conducted 365 confirmation audits, 221 scheduled audits and 172 triggered audits of AIS. Transport Inspectors investigated 429 complaints relating to AIS the same year (some of which triggered audits).

As the result of a review of the AIS scheme that included state-wide consultation with AIS scheme members and Transport Inspectors, TMR is introducing a series of reforms including the introduction of training and assessment requirements for all new and existing AEs, AIS approval holders and their nominees.

New training and assessment requirements will ensure all entrants to the AIS scheme are fully aware of their legislative responsibilities and TMR's expectations of them. This will assist TMR to facilitate and encourage compliance from the point of entry into the schemes and is expected to be a cost-effective mechanism for ensuring compliance from most approval holders. Over time, the training and assessment will also be required for existing approval holders. Roll-out of the training and assessment is planned to commence during 2022.

New reform requirements will also be introduced to require all AEs to capture auditable evidence that they have conducted a dynamic brake test as part of the vehicle inspection. A vehicle's brake components are required to be inspected and a brake performance test conducted on-road by an AE. The peak and average performance of the vehicle's brakes is measured by a brake meter, or a decelerometer. Modern electronic decelerometers incorporate a GPS system enabling the GPS location of a test to be recorded.

All inspection certificates for vehicles fitted with brakes will be required to be accompanied by a copy of the brake test result, which includes the GPS location of where the test was conducted. This can be electronic, or a hard copy produced by a brake test device and must be stored with the AIS copy of the paper inspection certificate. If using the ICO system, the brake test result will be required to be uploaded to ICO prior to the AE being able to complete the inspection certificate online.

The requirement to provide brake test results will not only ensure that AEs conduct road tests and identify any safety issues with vehicles, but it will also allow transport inspectors to identify operators who are not complying with their obligations in relation to road tests.

All mobile AIS will additionally be required to use TMR's ICO system which provides for the electronic issue of inspection certificates. This will allow TMR Transport Inspectors to better monitor the activity and behaviour of AEs operating from a mobile AIS.

Annual or periodic inspections of light vehicles

One question that is asked from time to time is whether Queensland should introduce a requirement for periodic (annual for example) inspections of all in-service light vehicles.

Other than NSW, all other states that were performing annual periodic vehicle inspections have ceased to do so after evaluation revealed that vehicle defects contribute to a small number of crashes and road trauma relative to the effects of driver behaviour and road design and condition.

There have been a range of studies that have found the benefits gained from the introduction of an annual inspection scheme for all light vehicles does not outweigh the costs[16],[17]. A study by the Road Safety Committee of the Parliament of Victoria investigated compulsory light vehicle inspections across Australian and New Zealand jurisdictions and found no compelling evidence, based on crash statistics, to support the introduction of annual inspections[18].

The common theme across the research is that the cost to the community of implementing a periodic inspection scheme for all light vehicles far outweighs the benefits to road safety.

---

[16] https://www.sciencedirect.com/science/article/pii/S0001457506001060?via%3Dihub
[17] https://www.transport.tas.gov.au/__data/assets/pdf_file/0011/111998/VEHICLE_INSPECTIONS_IN_TASMANIA.pdf
[18] Parliament of Victoria, Road Safety Committee, Report of the 'Inquiry into Victoria's Vehicle Roadworthiness System', 2001

It is considered that the investment is better directed to improving road and driver behaviour, which contribute to over 95% of road crashes.

It is not considered desirable to impose additional costs on the vast majority of Queenslanders who maintain their vehicles in good condition, instead of the current policy to target non-complying vehicle drivers through on-road enforcement. While Queensland does not have annual motor vehicle registration inspections for all vehicles, vehicles that are deemed to be in higher risk categories are subject to periodic inspection. These vehicles require inspection at scheduled periods ranging from six-months for passenger transport vehicles such as buses, and 12 months for tow trucks, taxis, booked hire vehicles and heavy vehicles over 4.5 tonne that are not in an approved maintenance accreditation scheme.

Regulation of In-service Vehicle Modifications / Approved Persons

TMR regulates the accreditation of Approved Persons (AP) to ensure that complex light and heavy vehicle modifications have been performed in accordance with the vehicle standards, guidelines and the relevant approved codes of practice. The approved codes of practice are:

- *Queensland Code of Practice: Vehicle Modifications*
- *National Code of Practice for Light Vehicle Construction and Modification* (VSB14)
- *National Code of Practice for Heavy Vehicle Modification* (VSB6), and
- *National Heavy Vehicle Regulator Code of Practice for the Approval of Heavy Modifications.*

When considering an application for accreditation as an AP, TMR assesses the applicant's qualifications, industry experience (that is, applicants must have a minimum of five years industry experience in the manufacture, maintenance and modification of vehicles relevant to the modification codes being applied for) as well as criminal and road transport offence history.

APs must conduct an inspection of the vehicle modification under the relevant approved codes of practice to determine whether the vehicle complies with the vehicle standards, including applicable Australian Design Rules, and in accordance with their legislative responsibilities under applicable legislation.

If the AP is satisfied that the modification complies with the relevant approved codes of practice, they may certify the modification by issuing a modification certificate to the customer and attach a modification plate to the vehicle.

In Queensland there are currently 1,300 APs accredited for specific modification codes within their range of qualification/s and experience.

Following the introduction of training and assessment for new and existing AIS scheme approval holders, TMR will consider the introduction of training and assessment for new and existing APs to improve awareness of and understanding of the vehicle standards, guidelines, relevant approved codes of practice and an AP's legislative responsibilities.

Written-Off Vehicle Inspections and Rebirthing

Queensland's Written-Off Vehicle (WOV) scheme was introduced as part of a *National Motor Vehicle Theft Reduction Council* (NMVTRC) initiative to combat the illegal use of vehicle identifiers and stop re-birthing of stolen vehicles. The WOV scheme applies to light motor vehicles that are damaged such that the cost of repair, combined with the salvage value, is greater than its market value. The scheme also applies to motorbikes, caravans and heavy trailers. Other than for heavy trailers, there is currently no heavy vehicle WOV scheme in Queensland.

At present in Queensland, a WOV can be classified as either a repairable write-off, making it eligible for repair and re-registration, or a statutory write-off, which is suitable only for parts or scrap metal. There is currently no provision in Queensland for classifying and recording the status of a heavy vehicle within the WOV scheme.

The determination of whether a vehicle is a repairable write-off, or a statutory write-off is based on nationally agreed *Damage Assessment Criteria for the Classification of Light Vehicle Statutory Write-Offs*[19]. Vehicles that are damaged to the extent that they cannot be safely repaired are classified as statutory write-offs.

Businesses (known in legislation as *Notifiers*) that assess, buy, sell or repair written-off vehicles are required by law to notify TMR when a vehicle has been assessed as a total economic loss (a notifiable vehicle). The majority of vehicle notifiers are vehicle insurers. If a vehicle is written-off, details of the vehicle are then uploaded into an online national written-off vehicle register.

In order to be allowed to be re-registered, all repairable write-offs must presently be repaired, pass a Queensland safety certificate inspection, and pass a Written off Vehicle Inspection (WOVI).

A WOVI refers to a comprehensive vehicle identity check, which applies to vehicles classified as repairable write-offs. TMR currently contracts the light vehicle WOVI process to Queensland Inspection Services (QIS). In other jurisdictions, the inspection is managed through a combination of both private industry and/or the transportation agencies. On average over the preceding four years, approximately 14,000 WOVIs have been conducted in Queensland annually.

For heavy vehicles, the previously named *Transport and Infrastructure Ministerial Council* noted in 2017, a plan by jurisdictions to develop and introduce a National Written-Off Heavy Vehicle (WOHV) scheme. The Northern Territory and NSW already have a WOHV scheme, with the balance of jurisdictions expected to follow.

TMR has recently undertaken a comprehensive review of the WOV Scheme in Queensland. TMR invited interstate jurisdictions, industry peak bodies, members of the vehicle repair community, inspection services providers, vehicle scrap merchants and parts recyclers, enforcement agencies and major insurance companies to participate in the consultation process and to provide feedback.

---

[19] https://austroads.com.au/publications/registration-and-licensing/ap-g89-19

The Minister for Transport and Main Roads announced changes to the scheme recently[20]. The objectives of the review were to (i) assess the health of, and look for ways to improve the operation of, the existing WOV scheme for light vehicles, and (ii) consider the adoption of a WOHV scheme in Queensland.

Consultation included face-to-face presentations and a mail-out to industry peak bodies, members of the vehicle repair community, inspection service providers, vehicles scrap merchants, enforcement agencies, and major insurance companies. All parties were asked to complete a *Get Involved* survey through the Queensland Government website.

The approved changes are <u>*first*</u> to categorise all light vehicles as statutory write-offs, with vehicles only permitted to be repaired and returned to the network where they meet specific exemption criteria. A vehicle may be exempted if it has no non-repairable damage and fits one of the following categories, which for the present purposes are not exhaustive:

- Hail damaged, where the individual applicant was the registered operator immediately before the hail event
- Inherited in a will or letters of administration, or
- Registered in the applicant's name for more than a specified time period before the damage that caused the vehicle to be written-off.

A Quality of Repair (QoR) process, identity inspection and safety certificate inspection would then be applied to vehicles. A QoR process would involve repairable write-off vehicles being inspected at additional stages during the repair process, instead of just prior to re-registration. The final QoR process may include an inspection prior to finishing repairs, keeping a repair diary with photographic evidence, retention of manufacturers' receipts of components, and evidence of manufacturers' repair methods being followed.

The <u>*second*</u> approved change is for Queensland to introduce a Written-Off Heavy Vehicle Register (WOHVR). Heavy vehicles are to be classified are repairable write-offs or statutory write-offs, dependant on the national damage assessment criteria. A QoR process, identity inspection and Certificate of Inspection would be required for repairable write-off heavy vehicles before they could be returned to the road network.

These changes flowing out of the WOV review are expected to deliver a number of benefits, including:

- enhancing the roadworthiness and safety of any vehicles that re returning to the Queensland road network
- further reducing the incidence of re-birthed vehicle activity
- increasing consistency with other jurisdictions while improving safety, efficiency and effectiveness, and
- better protecting consumers from substandard repairs and fraudulent activity.

The Queensland Government welcomes any further suggestions to improve the management of written-off vehicles and 'vehicle re-birthing' that might flow out of the current Inquiry.

---

[20] https://statements.qld.gov.au/statements/91737

Other topics indirectly related to the broader Terms of Reference

Regulation of Vehicle Noise

The Queensland Government recognises the effect of vehicle noise and disturbance upon the community by irresponsible road users with non-compliant vehicles.

All in-service or registered vehicle categories (heavy, light and motorcycles) must continue to meet *ADR83/00 Vehicle Standards (Australian Design Rule 83/00 – External Noise) 2005*, which specifies noise limits for a vehicle to be legal for use on Queensland roads. ADR83/00 applies to all vehicles manufactured from 2005 onwards.

Queensland, along with all other States and Territories, follows the approach in ADR83/00 and supporting NTC model law. ADR83/00 applies to all vehicles manufactured from 2005 onwards. ADR83/00 and the model law reflects or mirrors the UNECE regulation requirements. ADE83/00 applies to all vehicles manufactured from 2005 onwards.

If a vehicle exhaust system is modified or exchanged, the system must remain compliant to that same noise standard. Vehicle owners whose vehicles are modified contrary to these requirements are liable for prosecution.

QPS and TMR Transport Inspectors regularly undertake compliance and enforcement activities throughout Queensland and respond to noise issues on a regular basis. As part of the enforcement effort, QPS and TMR compliance officers undertake a Stationary Noise Test of in-service vehicles in accordance with the *National Transport Commission Stationary Noise Test Procedure for In-Service Motor Vehicles*[21].

Complaints about non-complying motor vehicles in Queensland, including excessive noise, should be reported to TMR's Compliance and Enforcement Unit, by ringing 13 23 80 or by visiting the TMR website and completing the online complaint form[22]. Another avenue for complaints about non-complying motor vehicles, including excessive noise or hooning is by ringing QPS Policelink on 131 444 or by visiting https://www.police.qld.gov.au/units/policelink-131-444.

It must however be recognised that there are many issues concerning safety and well-being of the community, and both QPS and TMR must prioritise these according to their importance. While it should be appreciated that loud exhausts cause community annoyance, QPS and TMR's response needs to be balanced across a wide range of community concerns. QPS and TMR continue to work co-operatively to manage community concerns, and to find new and innovative solutions to produce better outcomes into the future.

The Vehicle Inspection Guidelines for motorcycles and light vehicles does not expressly require a noise test to be conducted as part of a vehicle safety inspection on change of ownership, on registration of an unregistered second-had vehicle, and when vehicle registration is transferred to Queensland for another state.

---

[21] https://www.ntc.gov.au/sites/default/files/assets/files/National%20Stationary%20Noise%20Test%20Procedures%20For%20In-Service%20Motor%20Vehicles%20.pdf
[22] https://www.tmr.qld.gov.au/About-us/Contact-us/Compliments-and-complaints/Complaints-about-motor-vehicles-or-trailers

It does however require the Approved Examiner undertaking the vehicle inspection to check if:

- there are leaks or excessive noise from the exhaust system and joints during operations (excluding manufacturer's drain holes in mufflers)
- the engine emits sparks, flames, excessive gases, oil or fuel residue.
- when operating the engine of a motor vehicle emits visible emissions for a period of 10 seconds or more
- any noise reducing or absorbing equipment is missing, and
- crankcase gases escape into the atmosphere (applies to petrol engines fitted with positive crankcase ventilation only).

The Queensland Government, through TMR, is undertaking a number of activities to improve the regulation of vehicle noise in Queensland.

First, to assist with enforcement options against irresponsible road users, TMR is currently updating noise testing guidance material for enforcement officers, to streamline and clarify the correct way to undertake a stationary noise test.

Next, to further aid prosecution, it is intended to arrange authorised officers (Police Officers and Transport Inspectors) to be delegated authority through legislation to attest to the validity of test calibration certificates (thereby certifying the conditions and manner by which the noise measurement device was used).

Third, conduct a workshop with QPS, TMR Compliance and Prosecutions to ensure a shared understanding of vehicle noise regulation and compliance requirements. This can include production of a ready reckoner guide to aid a shared understanding of enforcement and prosecution steps.

Finally, improve the quality of communication materials for use by the public, AIS industry and aftermarket vehicle modification industry. Specifically, to deal with the requirements around vehicle noise, how vehicle owners can stay compliant, and to stress that QPS and TMR undertake enforcement activities for light vehicles and motorbikes.

Implementation of relevant road safety initiatives

The Queensland Government utilises a broad range of road safety measures to help ensure safe outcomes on Queensland roads. The current measures are set out in the *Queensland Road Safety Action Plan 2020-21*[23](QRSAP), which is the third and final action to be delivered under the *Safer Roads, Safer Queensland: Queensland Road Safety Strategy 2015-21.*

The action plan is delivered in partnership with QPS, with support from the Motor Accident Insurance Commission and Queensland Health. The plan and strategy outline a series of infrastructure, education, legislative and enforcement measures.

---

[23] https://www.tmr.qld.gov.au/-/media/Safety/roadsafety/Strategy-and-action-plans/Qld-Road-Safety-Action-Plan-202021.pdf?la=en

Example initiatives include:

Infrastructure

- The *Targeted Road Safety Program* is investing $1.18 billion over four years and includes interventions such as the Safer Roads Sooner Program, Black Spot Program, high-risk roads program and mass actions.

Communications and Education

- The *StreetSmarts* campaign focuses on key road safety issues such as the *Fatal 5* (drink driving, fatigue, distractions, speeding and drug driving) and also targets vulnerable road users, including young people, bicycle and motorbike riders, and pedestrians
- During August and September 2020, the *'Dangerous Driving Habits'* campaign ran focusing on tailgating, not giving way and running red lights
- The *'Regional Roads Aren't A Game'* online campaign was launched in November 2020 during National Road Safety Week. This campaign was the winning concept from the Co-Lab Youth Road Safety Challenge held in Rockhampton in March 2020. The campaign reminded young drivers to slow down and drive to the conditions on rural and regional roads, and
- The *'All Good, All Bad'* drink driving campaign launched on 9 December 2020, was run until the end of January 2021, and will be run at Easter and public holidays until the end of May 2021.

New Technology and Community Initiatives

- A review of the *Indigenous Driver Licensing Program* will guide the enhancement of road safety education and outcomes in remote and rural Aboriginal and Torres Strait Islander communities
- Implementation and evaluation of innovative road safety technology trails, such as 'Hold the Red', that present opportunities to further mitigate road trauma
- Delivery of the PrepL Supervisors course, which provides an online learning program designed to support supervisors of learner drivers
- Delivery in 2020 of the *Automatic Infringement Notification solution*, which sends electronic notifications to registered operators of vehicles about offences committed in their vehicles once the offence has been finalised
- Trialling camera technology to detect drivers using mobile phones illegally as well as front-seat occupants failing to wear seatbelts, with these cameras going live in the second half of 2021. This will be supported by an enhanced penalty regime through increased fines and demerit points, and
- The progression of significant reform agenda on drink driving through strengthening the current *Alcohol Ignition Interlock Program* (AIIP) and introducing new educational measures to assist offenders to separate drinking and driving.

Transition of Queensland's vehicle fleets to zero and low emission vehicles

The Queensland Government has set targets to reduce emissions by at least 30% below 2005 levels by 2030 and achieving zero net emissions by 2050.

The Department of Environment and Science (DES) has highlighted that transport is Queensland's third largest source of greenhouse gas emissions, and these emissions increased 26% between 2005 and 2018. One of the key emission reduction mechanisms for transport is the adoption of more stringent, mandatory greenhouse gas emission standards for cars and other vehicles.

TMR is the policy lead on the government's efforts to contribute to achieving these targets in the transport sector. This includes policy related to the sustainability of Queensland's vehicle fleet, and the need to transition the fleet to zero and low emission vehicles. DES is working in cooperation with TMR in delivering initiatives (some examples provide below) over the coming months as well as in developing the *Queensland Climate Action Plan 2020-2030*.

TMR recognises that without intervention, transport related emissions are expected to continue growing. The immediate challenge for the transport sector is to stop emissions growth and then begin reducing emissions. Once this occurs, the fall can be rapid as older vehicles exit the fleet and new travel patterns are established.

Therefore, policy initiatives aimed at increasing the use of zero emission vehicles in Queensland play a critical role to help transition to a low carbon economy, while maintaining individual mobility, economic growth and contributing to the sustainability of Queensland's vehicle fleet. As an example, the *Future is Electric: Queensland's Electric Vehicle Strategy*[24] was released in 2017 to help position Queensland for an increased uptake in electric vehicles. As committed to in action 2.5 of the *Queensland Climate Transition Strategy*[25], TMR is currently developing a Zero Net Emissions for Transport Roadmap to help guide the transport sector to a zero-carbon future.

Hydrogen is another clean renewable fuel that can be used in the transport industry (and a range of other industrial processes). The Queensland Government is supporting the development of a sustainable hydrogen industry in Queensland. To help do this, the Government released the *Queensland Hydrogen Industry Strategy 2019-2024*[26].As part of the strategy, the Queensland Government has also established the Hydrogen Industry Development Fund[27] to drive investment and accelerate development of hydrogen projects in Queensland. Applications for funding grants that support projects consistent with the objectives of the Queensland Hydrogen Industry Strategy are currently open. While the strategy is designed to increase supply of renewable hydrogen in Queensland, the transport sector is expected to also be a beneficiary.

One outcome of pursuing strategies such as the *Future is Electric: Queensland's Electric Vehicle Strategy* and the *Queensland Hydrogen Industry Strategy* is likely to be a decrease in the average age of the vehicle fleet. The Australian light vehicle fleet average age is currently around 10-11 and has remained relatively static in recent years.

There are of course benefits to Queensland to see newer vehicles on the road given new vehicles are fitted with more modern safety features that help avoid or at least reduce the

---

[24] https://www.publications.qld.gov.au/dataset/the-future-is-electric-queensland-s-electric-vehicle-strategy/resource/7e352dc9-9afa-47ed-acce-2052cecfec8a

[25] https://www.qld.gov.au/__data/assets/pdf_file/0026/67283/qld-climate-transition-strategy.pdf

[26] https://www.dsdmip.qld.gov.au/__data/assets/pdf_file/0018/12195/queensland-hydrogen-strategy.pdf

[27] https://www.statedevelopment.qld.gov.au/industry/priority-industries/hydrogen-industry-development/hydrogen-industry-development-fund-round-2

impact of a crash and are less harmful to the environment due to lower emissions as well as being more energy efficient.

The Queensland Government would like to thank the Committee for the opportunity to provide feedback on the broad range of topics that are of interest under the Terms of Reference.

ANZPAA
Australia
New Zealand
Policing Advisory
Agency

REMOTE
ENGINE IMMOBILISER
REFERENCE
REPORT
[2019]

Copyright Notice

© STATE OF VICTORIA 2019

Document Control

Version Number:	V1
Date Distributed:	2019
Endorsed by:	MCPEM
Status and Security:	OFFICIAL

Contents

EXECUTIVE SUMMARY

This report was commissioned in the wake of serious injury to Queensland Police Service Constable Peter McAulay who was hit by a stolen vehicle involved in a police pursuit. The premise underlying this work is that if remote engine immobiliser (REI) technology were available, the safety of the public, police officers and offenders would be enhanced. Safety, not vehicle crime is therefore the primary focus of this report.

REI technologies already exist and are in use throughout the world. However, these systems are:

- anti-theft focused and are predominantly used to prevent a vehicle from being re-started as opposed to stopping a moving vehicle.
- decentralised with system management the responsibility of car manufacturers or third party fleet managers.
- an opt-in service which rely on vehicle owners' consent.
- in operation on a much smaller scale than envisaged for Australian policing.

There are also issues unique to the Australian context that need to be considered when analysing the feasibility of a nationwide REI system:

- Australian Design Rules (ADRs) which govern the establishment of standards under the *Motor Vehicle Standards Act 1989*, require evidence of a clearly defined and tested safety benefit before a standard can be implemented. This is not available for REI's because no single in-vehicle REI technology with an enabling environment currently exists anywhere in the world.

- Almost all vehicle manufacturing is currently undertaken overseas. With Australia representing 1.2%[1] of the international vehicle market it will be challenging to influence manufacturers to include REI technology in all vehicles across the market.

- Making allowances for current vehicle age proportions in Australia, it would take approximately 16 years from the time REI technology becomes a standard inclusion for it to become available in approximately 80% of Australia's vehicle fleet.[2] An after-market solution is not deemed feasible for a range of reasons including technological and effectiveness.

---

[1] "Provisional Registrations or Sales of New Vehicles - All Types, 2017," International Organisation of Motor Vehicle Manufacturers, accessed January 22, 2019, http://www.oica.net/wp-content/uploads/Sales-all-vehicles-2017.pdf

[2] Projection assumes continued proportions of registered vehicles, grouped by year of manufacture. Data from "9309.0 – Motor Vehicle Census, Australia, 31 Jan 2018", Australia Bureau of Statistics, accessed January 22, 2019, http://www.abs.gov.au/ausstats/abs@.nsf/mf/9309.0.

In a perfect scenario, enabling the remote immobilisation of a vehicle would undoubtedly lead to better safety outcomes for the public, police officers and offenders. However, whether such a system is currently feasible is the more difficult question. This report examines that question with consideration given to:

Technical Considerations	▪ In vehicle technology
	▪ Enabling environment
Implementation Considerations	▪ Installation
	▪ Mandatory frameworks
	▪ Voluntary frameworks
Stakeholder Considerations	▪ Technology
	▪ Costs borne by industry
	▪ Privacy and consumer rights
Future Considerations	▪ Automated vehicles
	▪ Connected vehicles

Examination of the above has led to the following overall findings:

▪ While the technology already exists to immobilise certain vehicles, it is not yet feasible for such technology to be utilised across the entire Australian vehicle fleet.

▪ There has been no successful implementation of a mandated REI solution across a whole vehicle fleet anywhere in the world.

▪ At this time, there is no single in-vehicle technology available, nor is there the required enabling environment to support the use of REI technology. However, with continued technological development REI may be feasible in the future.

▪ While the technology is developing rapidly, it is likely to be superseded by connected and automated vehicles.

▪ Until connected vehicles have saturated the fleet, line of sight to identify the applicable vehicle would be required which may not mitigate the risk that currently exists with police pursuits.

▪ Until the process associated with timelines and deployment of an REI is addressed, such as vehicle verification, authorisation and connectivity, the safety impact of the technology may not be able to be realised.

▪ There are scenarios where there may be unintended safety consequences from deploying an REI on a moving vehicle.

▪ The costs of administering one interconnected REI system would be substantial, notwithstanding the costs will be borne largely by industry and passed onto consumers associated with research, development and production.

▪ GPS technology will also be integral to vehicle identification. This will raise issues of privacy and who owns the data that is collected.

▪ Fleet saturation of connected / autonomous vehicles is more likely (even probable) before fleet saturation of REIs (assuming it is possible for an ADR to standardise REI).

INTRODUCTION

Background

In response to a proposal by the Queensland Police Minister, following an incident where Constable Peter McAulay was hit by a stolen vehicle involved in a police pursuit, the Ministerial Council for Police and Emergency Management (MCPEM) agreed on 26 October 2018 to establish a national working group to explore issues related to police use of remote engine immobilisers or related technologies as a means of reducing the risks to the public and police from vehicle-related crime. The terms of reference (TOR) for the working group is at **Appendix A**.

The working group membership is outlined in **Appendix B**. Relevant technical experts, government departmental and organisational representatives and other stakeholders were consulted through various meetings with the working group to ensure a cross-sector consultation process.

Structure

This report addresses all aspects outlined in the TOR arising from the MCPEM meeting through exploring technological, implementation, stakeholder and future considerations. The report is supported by a number of Appendices, noting **Appendix C**, which maps the terms of reference to the relevant section of the report.

Rationale

Increasing Safety

Police are sometimes required to stop, or interdict, moving vehicles, as vehicles may be stolen or may be used in the commission of other offences. In these circumstances the safety of the public, police officers and offenders is paramount. The decision to stop moving vehicles safely or ensuring that stopped vehicles cannot be started, has to be made quickly and decisively, while continuously assessing risk and safety.

This report recognises that police officers already use various vehicle stopping tactics; acknowledging that these tactics generally require physical contact with target vehicles.[3] The purpose of this report is to assess the feasibility and practical impacts of Remote Engine Immobiliser (REI) technology that do not require physical contact with target vehicles and could be used to augment existing police vehicle stopping equipment and strategies. It focuses on the safety of the public, police officers and offenders and not on the police rationale for stopping moving vehicles or the intent of the vehicle operator.

REI could enhance safe outcomes in many road policing contexts, including where the operator of a vehicle disregards police direction to stop or, where police have cause to stop a vehicle without the operator's knowledge. Pursuits are the most obvious policing activity where REI could enhance safety, however, this report acknowledges that jurisdictional differences in categorising and reporting police follow and stop activities expands the range of road policing interactions which could utilise REIs.

The case of James Gargasoulas exemplifies the potential benefit of utilising REI technology. In January 2017, Gargasoulas killed six and injured 27 when he deliberately drove down Melbourne's Bourke St Mall targeting pedestrians. If REI technology was available, notwithstanding the age of the vehicle, police may have been able to immobilise the car as soon as it was reported stolen or at an appropriate time when under surveillance.

REI technology may also be able to stop dangerous road use that causes serious injury or death. In December 2012, a speeding BMW drove in the wrong direction on the Princes Highway in Victoria for 30km before crashing head-on into a vehicle containing six people.[4] Five people were killed instantly. Again, REI technology may have

---

[3] Noting that this report will not comment on the appropriateness of police pursuits or pursuit policy.
[4] Cameron Houston and Deborah Gough, "Wrong Way Leads to Sudden Tragedy," The Age, last modified December 8, 2012, https://www.theage.com.au/national/victoria/wrong-way-leads-to-sudden-tragedy-20121208-2b1u7.html.

been able to stop the vehicle, and potentially provide police and emergency services with an exact location of the vehicle.[5]

REI technology may also enhance the safety of offenders, the party most likely to be seriously injured or killed in police pursuits. In February 2018, 16-year-old Jack Patterson died after his car hit a tree in a police pursuit. Police twice called on Patterson to stop before a Stinger spike system was deployed. In attempting to avoid the Stinger, Patterson lost control of the vehicle and crashed into a tree.[6] As the vehicle was twice spotted by police and line of sight was established, it is reasonable to assume that REI technology may have contributed to a different outcome.

Preventing Crime

Anti-theft immobilisers have been compulsory in all vehicles entering the Australian market since 2001.[7] Since this time, it has been increasingly difficult to steal a vehicle without an authorisation device, such as a transponder in the key.[8] To overcome this, instead of 'hot-wiring' a vehicle, there has been an increase in thieves breaking into homes to obtain vehicle keys.[9]

During the 12 months to September 2018, there were 53,016 vehicles stolen in Australia.[10] Of these vehicle thefts, seven out of ten were stolen with the keys, the authorising key being the primary objective of house burglaries.[11] Additional disabling devices are being developed by manufacturers that assist in overcoming this method of theft, most notably General Motors (GM) OnStar™. Widespread introduction of REI technology may have additional benefits in enhancing vehicle anti-theft capability.

Promoting Adherence to Regulations

REI may further support adherence to regulations related to driving unregistered or unroadworthy vehicles. Linking REI technology to vehicle conditions designated as unsafe could operate similarly to how fleet management companies abroad are deploying REI technology to allow private fleet vehicles to be immobilised when agreements of use have been breached.[12]

OnStar™

OnStar is a subscription emergency service available in some countries. One of the services provided is Stolen Vehicle Assistance. When a vehicle is stolen OnStar operators provide GPS coordinates to local law enforcement who verify location by line-of-sight. In some contexts a stolen vehicle can be remotely slowed to a stop.

*Refer **Appendix E RelatedTechnology Glossary** for further information.*

[5] David McClure, Francesca Forestieri and Andy Rooke, "Achieving a Digital Single Market for Connected Cars: eCall—implementation status, learnings and policy recommendations," accessed January 11, 2019, https://www.vodafone.com/content/dam/vodafone-images/public-policy/policy-papers-and-news/ecall-report-final.pdf.

[6] "Tributes Paid to Teen Jack Patterson after Police Chase Ends in Fatal Perth Hills Crash," ABC News, last modified February 9, 2018, https://www.abc.net.au/news/2018-02-09/teen-jack-patterson-killedin-perth-crash-after-policechase/9417968.

[7] "Vehicle Standard (Australian Design Rule 82/00 ¬– Engine Immobilisers) 2006," Federal Register of Legislation, last modified August 8, 2006, https://www.legislation.gov.au/Details/F2006L02665; Joshua Dowling,"Disturbing New Figures Confirm Most Car Thieves Now Break Into Homes to Get Keys," news.com.au; last modified September 15, 2015, https://www.news.com.au/technology/innovation/motoring/disturbing-new-figuresconfirm-most-car-thieves-now-breakinto-homes-to-get-keys/news-story/fc-8deff8d0118bf6205d27c902a8e11a.

[8] Dowling, "Disturbing New Figures."

[9] Ibid.

[10] "Theft Watch – 12 months to September 2018," National Motor Vehicle Theft Reduction Council, last modified December, 2018, https://carsafe.com.au/theft-watch.

[11] Dowling, "Disturbing New Figures."

[12] Chris Baynes, "Finance Firms Fitting Kill Switches to Immobilise Customers' Cars if they Miss a Payment," The Independent, last modified July 15, 2017, https://www.independent.co.uk/news/business/news/finance-firms-fitting-kill-switches-immobilise-cars-miss-paymentlenders-poor-credit-a7842646.html.

SECTION 1│TECHNOLOGICAL CONSIDERATIONS

Engine immobilisers in the form of transponder-based immobilisers for anti-theft purposes have existed in Australia for some time.[13],[14] The term 'remote engine immobiliser' is used to describe a wide range of technologies with diverse purposes and operating systems. For the purpose of this report 'remote engine immobilisers' have been organised into the following categories:

Category I   Technologies and supporting systems that are installed in vehiclesthat can safely **terminate** the **operation of moving or static vehicles**.

Category II   Technologies and supporting systems that are installed in vehicles designedto **disable** the **operation of a vehicle after it has been stopped and turned off**. These technologies are used primarily to prevent theft of vehicles.

Category III   **Related technologies that are not installed in vehicles** but can provide a functionthat may support immobilisation of a vehicle.

The working group agreed that Category I REIs are the focus of this report as these technologies and related technologies support the objective of enabling an authorised police officer to remotely, electronically and safely restrict the operation of a vehicle.

The technological considerations in relation to Category I are visually presented below:

Diagram 1: Technological Considerations

---
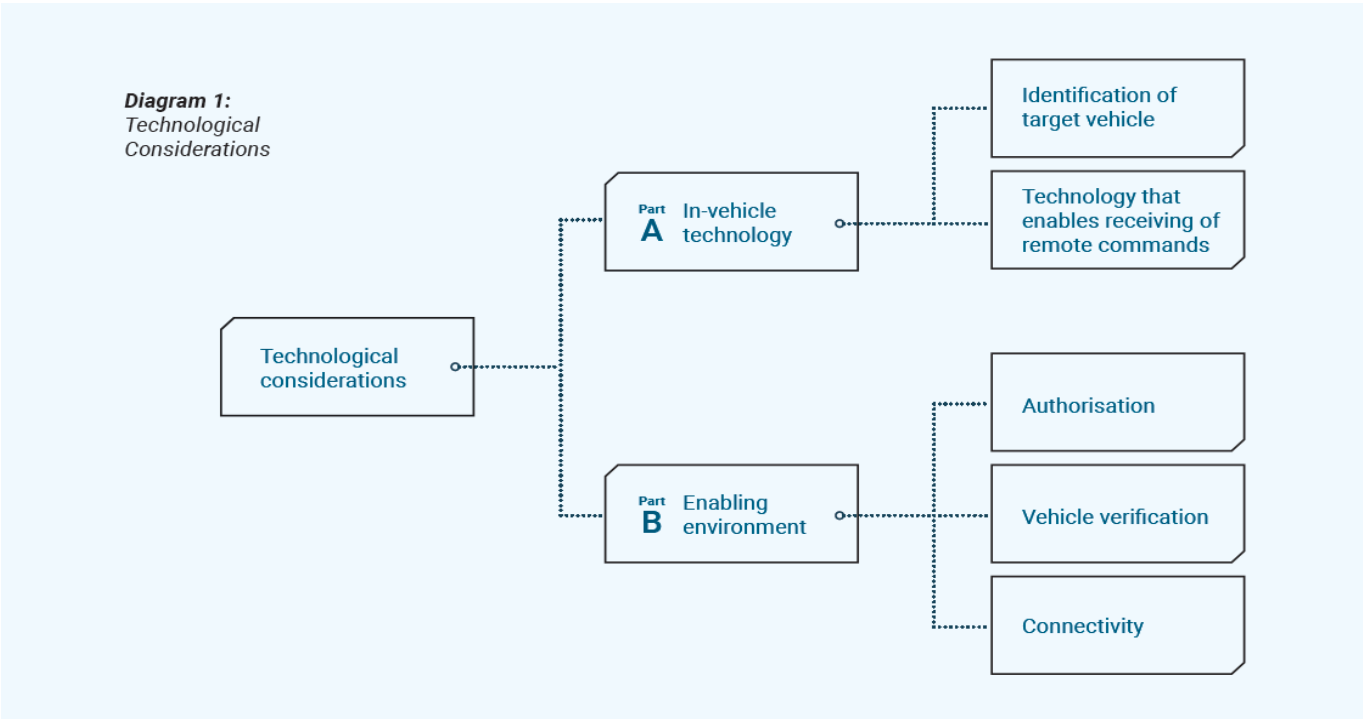
[13] "Australian Design Rule 82/00 – Engine Immobilisers."
[14] Noting that these are immobilisers that prevent the engine from running without the use of the correct transponder car key (or other token) present.

OFFICIAL

This section of the report will examine the technological requirements and challenges associated with a **Category I** REI technology for use in two parts:

In-vehicle Technology:

PART

A

This section examines the requirements of technologies installed within vehicles (referred to hereafter as the 'on-board system') to enable the remote termination of both moving and static vehicles.

Enabling Environment:

PART

B

This section explores the infrastructure and systems architecture required to support connectivity between vehicles and operational coordination 'call' centres that send remote commands to enable the remote termination of both moving and static vehicles.

PART A: IN-VEHICLE TECHNOLOGY

Developing and installing an on-board system that would allow remote termination of an operating vehicle is challenging as these systems would be required to:

- *allow for the **identification** of a vehicle targeted for remote immobilisation*
- ***receive remote commands** to immobilide the operation of the target vehicle.*

At the time of drafting of this report, there is no on-board system that could satisfy the requirements listed in **Diagram 1: Part A**. This report examines each of the listed requirements, drawing on examples of related technologies that can approximate each functional requirement.

Identification of Target Vehicle

Identification of the target vehicle is fundamental to the effectiveness and utility of an REI. A remote command to immobilise a vehicle (allowing for the safe slowing down, stopping and/or immobilisation of a vehicle) must be sent to and received by the exact target vehicle. Where this technology is currently successfully utilised abroad is when the owner initiates identification process.[15] Any identification technology will need to align to number plate technology reform because if a vehicle has false plates policing will have conflicting identifiers of the target vehicle.

The on-board system will require unique identification features and secure processes. This would ensure that any remote command would be sent to the right on-board system. Related technologies, such as Global Positioning Systems (GPS) tracking, may support such identification.

Considerations and Risks

Accuracy of information

Practically, visual identification of a target vehicle would be based on a combination of identifiers, such as registration number, make, model and colour of the target vehicle. This is challenging as using physical identifiers may not provide unequivocal identification of the target vehicle. The inherent challenge of relying on such identifiers is that the target vehicle may share some of its attributes with many other vehicles. Some identifiers (such as colour and number plates) can also be changed or removed, further complicating identification. Identification would likely rely on the ability of individual police officers engaged in pursuit to accurately identify and describe a vehicle's location, registration number, make, model and colour.

Timeliness

Consideration should be given to how many identifiers would be required before police could be reasonably assured that the vehicle targeted for termination is the correct vehicle as this will impact on the effectiveness of the technology. The time taken to verify all necessary identifiers will increase the duration of the pursuit. The longer the duration of a pursuit, the more risk to the public, police officers and the offender. Target vehicle identification can also result in procedural challenges, e.g. further authorisation and risk assessment processes may be required where most but not all identifiers are verified.

---

[15] "Stolen Vehicle Assistance", OnStar Services, accessed February 19, 2019, https://www.onstar.com/us/en/services/safety-security/stolen-vehicle-assistance/.

Technology that Enables Receiving of Remote Commands

On-board systems will require the capability to receive a remote command to activate slow down, stop and/or immobilise. Remote activation will require a communications network that not only enables transmission for commands to be sent to the on-board system, but also allows for the on-board system to send override commands to a number of other in-vehicle control systems.

Such vehicle systems will need to be able to:

- slow down a moving vehicle to a stop, requiring control over brakes, throttle controls and transmission systems.

- immobilise vehicles by preventing them from being restarted, such as those that control the fuel pump, the ignition and/or starter motor.

Considerations and Risks

Technology that enables reception of remote commands through use of communication networks will require well-developed security infrastructure and technical capabilities.

Central to police use of remote commands is reliable security of transmitted information and the ability of a communication networks to protect data. Without robust and continually updated security, any information and data may be fabricated/intercepted or changed. Security vulnerabilities in some modern vehicles with wireless internet connectivity have already been identified. Hackers were able to develop software that exploited technologies such as wireless entertainment systems that allowed the hackers to take control of critical vehicle control systems (braking and steering).[16]

In the absence of an REI technology enabled with artificial intelligence capabilities, conducting a dynamic risk assessment will continue to be made by police officers engaged in pursuit.

---

[16] "Hackers Remotely Kill a Jeep on a Highway", WIRED, accessed February 19, 2019, https://www.youtube.com/watch?v=MK0SrxBC1xs.

PART B: ENABLING ENVIRONMENT

If REIs are to be implemented, an appropriate enabling environment will need to be established. This enabling environment will need to provide the systems architecture to facilitate the end-to-end process of remote termination of the target vehicle. Implementing the enabling environment will require clearly defined responsibilities as to who will establish, manage and be accountable for different parts of the systems and termination process.

Depending on consistency and design/standard for on-board systems, and responsibility for management of an REI enabling environment, termination commands may be processed in different ways (Diagram 2).

Diagram 2:
Options of different enabling environments

Option 1.
Direct connectivity between police and vehicle on-board system (automated request processing)

Option 2.
Communication through central operation call centre that then connects with vehicle on-board system (one stage request processing)

Option 3.
Communication through a police operation call centre to liaise with other call centres that provide access to connectivity with particular vehicle manufacturers' on-board systems (two stage request processing)

This could include police officers either having the capability to directly connect to the target vehicle's on-board system, or alternately channelling requests through one or more operation coordination centres.

An ideal enabling environment would allow operational police to connect directly with a target vehicle (Option 1, Diagram 2). However, this is not feasible at this time as there is no on-board system that can operate with different OBD-II port 'language'.

Due to the number of car manufacturers within the Australian market, it would be difficult for the police officer(s) on the ground to deal directly with a General Motors or Toyota for example, whilst also maintaining line of sight of the target vehicle. Therefore, it is envisioned that operational police would need to interface with manufacturers either through a centralised coordination centre (Option 2) or through a police coordination centre that contacts individual manufacturers (Option 3).

OBD-II port

Operation varies between manufacturers. These ports do not have interoperability because they are primarily a diagnostic interface that operates with numerous signal protocols.

A retrofitted solution utilising OBD-II port would need to be designed against a particular car which is very manufacturer specific.

If the solution is OBD-II port based it will be unlikely to reach complete fleet saturation.

Regardless of which enabling environment option is utilised, the process would still require:

- **Authorisation**: *police officers request authorisation for the operation of the target vehicle to be remotely terminated through slowing down, stopping and/or immobilisation.*

- **Vehicle verification**: *verifying the target vehicle would require pairing the unique identifier of the on-board system with other vehicle identifiers.*

- **Connectivity**: *linking remote commands sent through a communication network with a target vehicle's on-board system for actioning.*

Authorisation

Authorisation for the REI to be deployed would be provided by the operational police maintaining line of sight of the target vehicle. Line of sight would be critical to ensure the target vehicle was slowed and stopped safely. The national coordination centre would receive the termination request and action accordingly. This type of request processing is used in existing services such as StarChase™ and General Motor's OnStar™ (**Appendix E**).

Vehicle Verification

The identity of the target vehicle will need to be verified through a combination of pairing unique identifiers of the on-board system and physical vehicle identifiers such as number plate, make, model, colour and location. This will require both GPS monitoring and line of sight to be maintained throughout the verification process to ensure the termination of the correct target vehicle.

Connectivity

Telecommunications infrastructure is essential when receiving remote requests for termination and remotely actioning termination commands. The effectiveness of the entire enabling environment will rest on the capability and capacity of the network to provide reliable connectivity. Current communications infrastructure uses either short-range (peer-to-peer or one device connecting directly with another device) or long-range (peer-to-network or one device connecting through network infrastructure to other devices) capability. It is anticipated, partially through the rollout of 5G communication technology, that the use of 'mesh' networks could be more readily available allowing for the use of both long-range and short-range capability.

Considerations and Risks

Efficiency

Option 2 of Diagram 2 would be more efficient than Option 3 as every additional step will increase the time taken to deploy the REI. However, Option 2 is far more complex and would likely require greater time and money to establish. For the same reasons as Option 1 is not feasible, Option 2 may also prove difficult as it would require operation across all vehicle manufacturers to provide information to one coordination centre.

Management

Regardless of the preferred option, a 24/7 'coordination centre' capable of facilitating communication between parties involved in the termination process and connectivity with the target vehicle will be required. The establishment and maintenance of a national coordination centre raises the following considerations:

- What will it cost to establish and maintain the national coordination centre?
- Who (government or industry) will fund the national coordination centre?
- Who will be responsible for management and be accountable for the actions of the national co-ordination centre (government or industry)?

REI Specifications

There are a number of considerations relating to the specifications of on-board systems that will be a part of the enabling environment, including:

- Whether on-board systems will have one design or designed according to a standard?
- Will diverse on-board systems use different communication protocols?
- Whether the development and installation of on-board systems will be left to manufacturers' discretion?

Data Storage and Capture

The capture and storage of vehicle identifiers will require a database(s) that facilitates pairing unique identifiers of the on-board system with other vehicle identifiers. Questions arise as to who will be responsible for the development, maintenance and security of such a database(s). In the case of a factory fitted on-board system, if manufacturers elect to maintain separate databases, this will add to the complexity of the enabling environment and time from authorisation to effective actioning of the termination command.

Telecommunications Infrastructure

Current telecommunications infrastructure is used for commercial purposes and is maintained by privately owned telecommunications companies. Engagement with the telecommunications industry will be essential to ensure that additional loads will be planned for. The use of the telecommunications network raises considerations, including:

- communication security to prevent a termination command being intercepted, blocked or forged by non-policing actors.
- current coverage and reach of communication networks may mean mobile blackspots and low reception areas delay, or even prevent remote commands from reaching target vehicles.

SECTION 2│IMPLEMENTATION CONSIDERATIONS

If a technological solution is available, the implementation of the technology and its enabling environment will be required. Implementation considerations are addressed as follows:

Diagram 3:
Implementation Considerations

| Part A | Installation | ···· | Factory fitted |

| Part B | Mandatory Frameworks | ···· | Australian Design Rules |
| | | | Legislation |

| Part C | Voluntary Frameworks | ···· | Policy position |
| | | | Industry position |
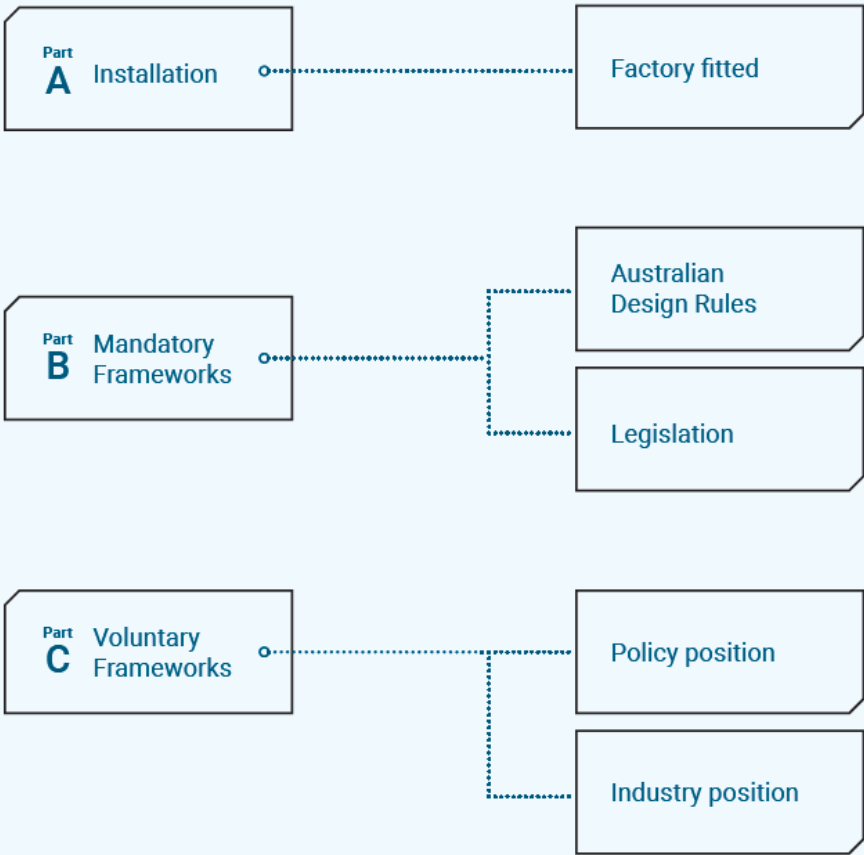
PART A: INSTALLATION

This part examines the means by which the on-board systems could be installed in a vehicle fleet to facilitate termination of the operation of a target vehicle. Historically, there are two installation approaches:

After market installation: *refers to retro-fitting an on-board system into existing vehicles.*

Factory fitted installation: *refers to manufacturers installing the on-board system into vehicles as part of the manufacturing process.*

Due to the technology required of the enabling environment, the solution cannot be a modular device that is retro-fitted to a vehicle but requires a whole of system solution. The feasible solution therefore is to have the capability factory-fitted at the time of vehicle build.

Factory-Fitted Installation

Factory-fitted installation would require manufacturers to install REI technology in all newly built vehicles. This would only apply to the future fleet of vehicles. A factory-fitted approach would circumvent some logistical challenges as vehicles would be imported with REI technology already fitted. This option would have significant timeframes for nationwide REI vehicle fleet saturation as new vehicles entering the Australian market replace decommissioned vehicles.

Considerations and Risks

Ability to influence international market and manufacturers

Light passenger vehicles (cars) are all manufactured abroad with only some commercial vehicles manufactured in Australia. With Australia representing 1.2% of the international vehicle market it will be challenging to influence international markets and manufacturers, resting primarily in China, the United States, Japan and the European Union (EU), to include REI technology in all vehicles.[17] Combined, these countries and the EU represent 65% of global vehicle manufacturing and 72% of global vehicle sales.[18] Australia may also find it challenging to influence international vehicle regulations and standards. Should Australian regulations and importation rules be changed to require the installation of REI technology, consideration must be given to the potential for a less competitive vehicle market resulting in less choice for consumers.

---

[17] "Provisional Registrations or Sales," International Organisation of Motor Vehicle Manufacturers.
[18] Ibid.

Market Saturation

Factory fitted installation only represents an approach for new vehicles entering the Australian market. Consideration would need to be given to the delays in usability for REI technology due to the lead-in time required to saturate the active vehicle fleet. Under current vehicle age proportions in Australia, it would take approximately 16 years from the time REI technology becomes a standard inclusion for it to become available in approximately 80% of Australia's vehicle fleet.[19] This would be in addition to the time associated with changing regulation or importation rules as well as the time required to develop REI technology and manufacturers to include it in their manufacturing processes.

---
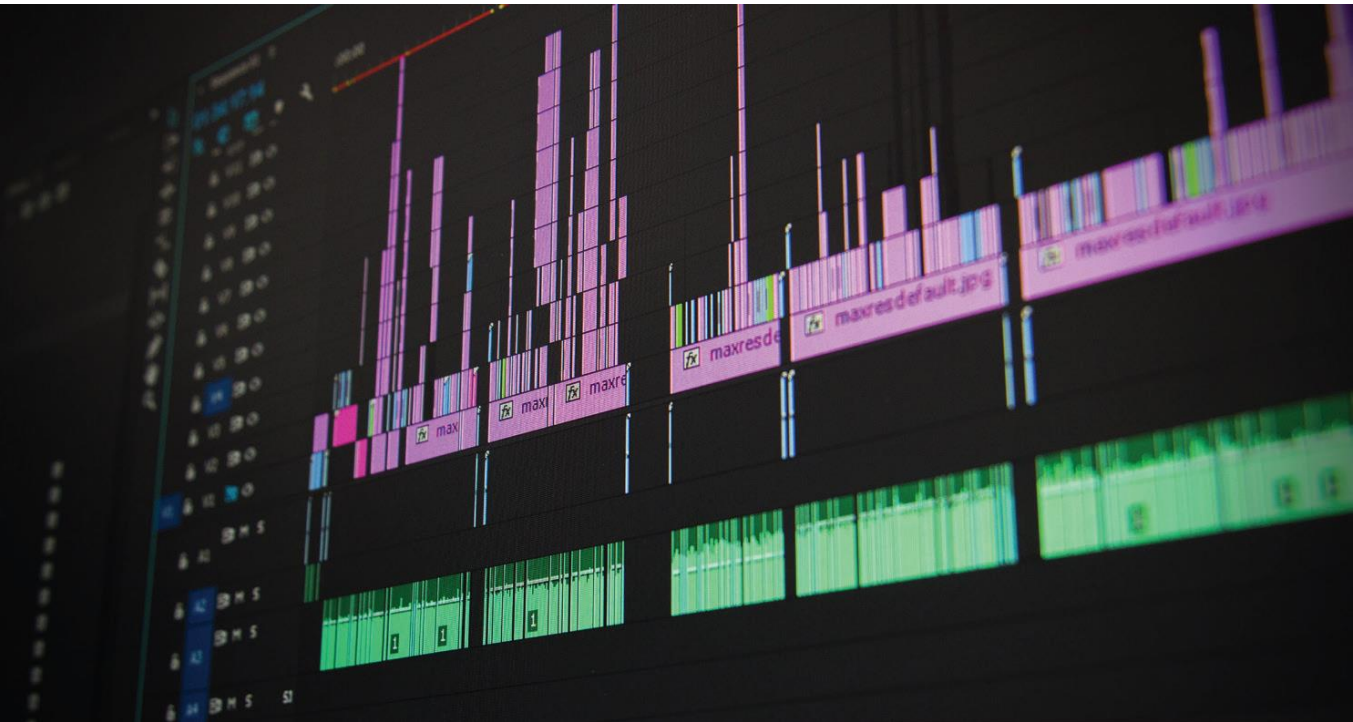
[19] Projection assumes continued proportions of registered vehicles, grouped by year of manufacture. Data from "Motor Vehicle Census," Australian Bureau of Statistics.

PART B: MANDATORY FRAMEWORKS

Mandatory frameworks refer to options that would make the installation of REIs compulsory.

There are two options available to achieve this:

Australian Design Rules (ADR)	*through the adoption of an ADR mandating the inclusion of REI technology in all newly manufactured vehicles imported into Australia.*
Model Legislation	*through the development of legislation that could be adopted as model legislation allowing for State and Territories to mandate the inclusion of REI technology in vehicles as part of State and Territory vehicle registration requirements. Further legislation will be required to allow for policing to lawfully use REI technology in pursuit resolution.*

Australian Design Rules

The current Australian Design Rules (ADRs) are administered by the Australian Government under the *Motor Vehicle Standards Act 1989*. The ADRs are standards for vehicle safety, emission control and anti-theft protection. The Act requires all vehicles, whether they are newly manufactured in Australia or are imported as new or second hand vehicles, to comply with the relevant ADR before they can be made available for use.

The ADRs are harmonised with international vehicle regulations adopted by the United Nations (UN) World Forum for the Harmonisation of Vehicle Regulations. The harmonisation of the ADRs with the UN Regulations is important for Australian import market controls as it allows vehicles built in larger markets to be imported with little or no modification. Regulation that is based on internationally agreed standards provides consumers with access to the safest vehicles from the global market at the lowest possible cost (Refer **Appendix F: Legislative and Regulatory Models for Implementation** for further information).

Considerations and Risks

Capability, not Technology

The ADRs entrench capability, not a specific technology. This allows manufacturers to satisfy the requirements of an ADR, as a standard, but use different systems. For example, Toyota would use a different ABS system to BMW or Mercedes with each system complying to the ADR standard. This promotes innovation but may also add to the complexity of the enabling environment.

This may lead to challenges as distinct REI technology may have different tracking abilities, collect dissimilar data and have diverse mechanisms that slow down, stop or immobilise a vehicle.

Lead in Time

The lead-in time for a new ADR is up to 10 years. This takes into consideration the time to develop the regulation (one to five years) and then allow manufacturers time to implement (up to five years). This timeframe will be extended when adding the time it would take for market saturation. It is reasonable to assume that by the time a new ADR has been adopted and market saturation of 80% has been achieved, the technology will have been replaced by new innovations (such as autonomous and connected vehicles). This raises questions in relation to the benefits of mandating REI technology through an ADR versus cost and time.

Demonstrated Safety Value

Currently, development of an ADR is prioritised in accordance with the potential for the ADR to improve overall safety to the public and alignment with internationally agreed standards.[20] Consequently, evidence of a safety benefit must exist before the ADR can be established. As such, an ADR relating to REI technology would require evidence demonstrating a safety value in relation to the approximate lives saved through the adoption of the technology. Currently such evidence does not exist and preliminary claims of enhancement to safety is based on assumptions. The logistics, time and costs of undertaking research to prove such a safety benefit would require consideration.

Model Legislation

Model law may be developed by a 'host' jurisdiction enacting a model law in its jurisdiction (usually as a Schedule to an Act of Parliament and, in recent times, usually called a 'National Law') or the Commonwealth can enact a model law. Other States and Territories pass an Act (an 'application Act') that applies the model law in its jurisdictions.

In relation to vehicles, the Australian Light Vehicle Standards Rules (ALVSR) and the Australian Heavy Vehicle National Law (HVNL) are developed by the National Transport Commission that set out the model laws for vehicles operating on Australian roads. The ALVSR are based on the ADRs and also mandate requirements that may not be contained in ADRs. Other legislation may require review or development in relation to how policing may use and access REI technology balanced against the rights of ownership.

National Laws

There are a number of examples of model approaches to national law including the NTCs Heavy Vehicle National Law and the establishment of the Australian Quality Skills Authority for regulation over the Vocational Education and Training sector.

*Refer **Appendix F: Legislative and Regulatory Models for Implementation** for further information.*

---

[20] Internationally agreed standards through the United Nations World Forum for the Harmonization of Vehicle Regulations.

Considerations and Risks

Agreement Between States

The NTC develops national regulatory and operational reform and implementation strategies for Australian roads. The process for developing model legislation, reaching agreement and uptake by States and Territories will likely require significant time.

Legislation and Regulation

Should mandatory frameworks allow for multiple REI technology providers, consideration may be required in relation to supporting regulations over the production, importation and use of REI technology.

Privacy and Surveillance

It is reasonable to assume that REI technology may require the use of some sort of tracking through GPS or network data. To allow police to track vehicles in pursuits, amendments to current surveillance and privacy legislation may be required. This raises privacy considerations in relation to civil liberties as GPS and network data is likely to contain information that is considered private (e.g. routines and places visited). This may result in public pressure not to use REIs as has occurred internationally (**Appendix D**).

Cross-border Challenges

Consideration should be given to situations where States and Territories do not adopt, or do not adopt at the same time, model legislation. This may have an impact where a pursuit crosses into another jurisdiction.

PART C: VOLUNTARY FRAMEWORKS

Voluntary frameworks will require agreement between governments, manufacturers and consumers. Using a voluntary framework in the first instance to promote the installation of REI technology, and later transitioning to a mandatory framework, may provide a more workable solution.

There are two voluntary frameworks that could be considered. Both will still require support from consumers, regardless of whether the implementation is government or manufacturer led.

Policy Position:	*Development of a common policy position between the Federal, State and Territory governments to guide engagement and negotiation with manufacturers, consumers and other stakeholders may provide a phased approach. Promotion of a policy position could be achieved through various means, for example uptake may be encouraged through reductions in insurance premiums.*
Industry Position:	*Industry (including manufacturers, regulators, associations etc.) could develop an industry led approach as has been done in the past with great success, for example with the introduction of new technologies such as GPS systems in vehicles. Industry can drive a voluntary uptake and promote REI technology with consumers. An industry led position could influence manufacturing specifications when factory fitting REI technology.*

Considerations and Risks

Impact

A policy position that is not mandatory may have low uptake and support, resulting in lengthy adoption timelines. The lead time to adopt an industry position may be affected as agreement between different industry stakeholders, such as manufacturers and distributors, will be required. The different legislation and manufacturing requirements or standards of countries in which manufacturing is occurring may also impact how timely the update will be.

Offender/Owner

Under a voluntary framework consideration and agreement would be required from police and manufacturers as to what would occur were the manufacturer asked to deploy the REI without the consent of the owner. Current voluntary frameworks rely on the consent of the owner. However, there may be circumstances where the owner is driving the vehicle which police need to intercept and therefore consent would be problematic.

Collaboration

Support from the Federal, State and Territory governments as well as the motor vehicle industry (associations, manufacturers and distributors) will be required to support a policy position. Further collaboration and agreements will be required between police jurisdictions and relevant third parties who may provide the enabling environment.[21] For example, in the United States police jurisdictions work in collaboration with companies such as General Motors, in apprehending offenders and recovering stolen vehicles) using REI technology.[22]

---

[21] Relates to potential outsourcing of services to access REI technology as occurring in the United States where police work in collaboration with companies such as General Motors, in apprehending offenders and recovering stolen vehicles.
[22] Jeremy Laukkonen, "GM's OnStar Service Explained," Lifewire, last modified January 7, 2019, https://www.lifewire.com/gms-onstar-service-534811.

SECTION 3│STAKEHOLDER CONSIDERATIONS

Any attempt to develop and install REI technology will require engagement and commitment from a range of stakeholders.[23] The international experience demonstrates that without the cooperation of all stakeholders, any solution is likely to be unsuccessful.

In 2009, Brazil passed the 'Contran 245' legislation which required installation of tracking and immobilisation devices in all vehicles. The legislation was an attempt to mitigate a long-term vehicle theft crisis. However, the implementation of this mandate was delayed many times and suspended indefinitely in October 2015.

In 2013, the European Union (EU) established a working group to examine the potential roll-out of REI technology. The working group undertook a feasibility study to develop a technological immobilisation solution that could be built into all vehicles entering the European market. The study ultimately concluded that a scheme in the EU was not feasible.[24]

Many of the issues of concern to the motor vehicle industry have already been raised throughout the document. Here, the focus is on the three most significant issues of a mandated response evidence of which is derived from above two case studies in Brazil and the EU:

- *Technology*
- *Costs borne by industry*
- *Privacy and consumer rights.*

Technology

The information technology age has transformed the world in a generation. Within half a lifetime, computerisation has revolutionised vehicle manufacturing and how vehicles function. This challenges traditional views of vehicles as a solely human operated transport mode. With the rapid growth of technology and digitalisation, it is likely that REI technology will be overtaken and superseded by new technologies and innovations in short timeframes. It is likely that REI technology developed now may also lose its effectiveness in the near future. Evidence of this within the REI context is provided by the Brazil case study where evolving wireless network protocols made manufacturers' software obsolete during implementation delays.[25]

Another key consideration in the development of REI technology relates to whether there will be uniformity. Currently, while manufacturers meet safety and roadworthy standards internationally, many of the on-board vehicle components and systems vary between makes and models of vehicles. These differences are a result of (and create) market competition and are proprietary in nature. Seeking to affect manufacturers' different technologies may affect their competitive advantage.

---

[23] In accordance with the Terms of Reference of the working group, no consultation with industry has occurred, therefore, the considerations and constraints detailed in this report have been developed through secondary research and analysis only.

[24] Projection assumes continued proportions of registered vehicles, grouped by year of manufacture. Data from "Motor Vehicle Census," Australian Bureau of Statistics.

[25] Roger Lanctot, "A $100M Learning Experience from Brazil," Strategy Analytics, last modified October 22, 2015, https://www.strategyanalytics.com/strategy-analytics/blogs/infotainment-telematics/2015/10/22/a-$100m-learning-experience-from-brazil.

Costs

Inclusion of REI technology will likely result in additional costs associated with design, development and production. In Brazil, at the time the legislation was suspended, an estimated $100 million USD had been borne by industry for hardware, software and service development.[26]

There are also costs associated with management of the enabling environment. While a government body may have overall responsibility for the system, under the most likely scenario (Section 1, Part B) all manufacturers with fleets in Australia (no matter how small), would be required to operate a 24/7 call centre to service possible REI deployment requests.

Privacy and Consumer Rights

Current anti-theft kill switches developed by vehicle manufacturers use Global Positioning System (GPS) to locate stolen vehicles. While the REI technology being considered in this report does not necessarily require GPS functionality, it is likely this will nonetheless be included. The current opt-in practice for anti-theft kill switches means that consumers have agreed to have data concerning their locations and routines recorded and stored by manufacturers. A mandatory framework limits consumer choice and impinges on their rights to privacy and data rights. This may impact consumer purchasing decisions especially given the rise of rideshare and increasing urbanisation.

International benchmarking undertaken in regard to the European Union and Brazil exemplifies that attempts to mandate kill switches in vehicles for law enforcement purposes were met with consumer concerns over privacy of data. Before any findings were even made in the EU example, concerns were raised in relation to potential infringements on civil liberties.[27]

A number of surveys have been undertaken in recent years illustrating the privacy concerns of consumers in relation to data produced by their vehicle now and into the future.

Polling by the Australian Automobile Association found that:

- *85% of people surveyed believed that 'if the data is in my car it should be owned by me'.*

- *84% of people surveyed believed that 'if the data is in my car I should have the right to control access to it by third parties'.*

A 2016 survey by the Royal Automobile Club of Western Australia found 72% of people surveyed were concerned to extremely concerned (49%) as to who owns the information autonomous vehicles may collect about the trips users are making.

A 2018 'Member Panel' of the Royal Automobile Association of South Australia found 68% of people surveyed were concerned by data privacy issues related to their vehicles.

---

[26] Lanctot, "A $100M Learning Experience from Brazil."
[27] Antony Ingram, "EU Secret Plan Leaked –– Police to Remotely Stop Cars', Motor Authority, last modified February 3, 2014, https://www.motorauthority.com/news/1090088_eu-secret-planleaked--police-to-remotely-stopcars.

SECTION 4| FUTURE CONSIDERATIONS

Technological innovation continues to evolve enabling ever greater connectivity between people and devices through the Internet. Some emerging technologies of note include the Internet of Things (IoT) and automation, often make it easier to innovate, creating substantial disruption to existing industries.

There are two areas of technological development in the automotive industry that, over time, may impact the need for REI technology:

Automated Vehicles

Vehicles requiring decreasing degrees of human operation are expected to be available in commercial markets over the coming years. Estimates of their future market availability vary depending on the degree of automation. The NTC estimates that automated vehicles (AV) that do not require a human driver for some or part of the journey will become available after 2020. Volvo expect that fully driverless vehicles are achievable in Australia but are likely to be 'some decades away'.[28]

A notable recent event demonstrated that police are able to exploit safety control systems of semi-automated vehicles to slow and stop a target vehicle. A Tesla Model 3, travelling at speeds exceeding 110kmph, was safely stopped while the driver slept.[29] However, this example does not account for potentially deliberately erratic or unexpected manoeuvring by an offender once becoming aware of police in pursuit.

Many concerns raised in this report regarding REI technology (such as surveillance and privacy) also apply to AVs. There have already been indications that consumers may have data concerns, particularly in terms of the privacy of personal information and the vulnerability of data to cybersecurity threats. AVs' reliance on complex internet-connected software and advanced communication networks may also render them vulnerable to cyberattacks, this would be similar to REI technology.[30]

Public perception of data privacy and cybersecurity vulnerabilities are seen as barriers foradoption of AVs.[31] There would be similar concerns regarding REI technology.

---

[28] Volvo Car Australia, "Submission 11: Enquiry into the Social Issues Relating to Land-Based Driverless Vehicles in Australia" Parliament of Australia, accessed January 25, 2019, https://www.aph.gov.au/Parliamentary_Business/Committees/House/Industry_Innovation_Science_and_Resources/Driverless_vehicles/Submissions.

[29] Bryan Logan, "Police in the San Francisco Bay Area Took an Unusual Approach to Stop a Tesla Operating on Autopilot as a Drunk Driver Slept Behind the Wheel," Business Insider, last modified December 2, 2018, https://www.businessinsider.com.au/police-stopped-anautopilot-driven-tesla-withdrunk-driver-asleep-2018-11.

[30] Jill Bowles, "Autonomous Vehicles and the Threat of Hacking," CPO Magazine, last modified October 1, 2018, https://www.cpomagazine.com/cyber-security/autonomous-vehicles-and-the-threat-of-hacking.

[31] "Privacy Issues Raised on Driverless Cars," Flinders University, last modified January 11, 2018, https://news.flinders.edu.au/blog/2018/01/11/privacy-issues-raised-driverless-cars/.

Connected Vehicles

The introduction of internet connected sensors into transport infrastructure, also known as Cooperative Intelligent Transport Systems (C-ITS), enables vehicles to wirelessly communicate with other vehicles, infrastructure and other parts of the road network. Examples include collision avoidance systems through Vehicle-to-Vehicle connectivity or Vehicle-to-Infrastructure connectivity.

There are opportunities for policing to leverage from C-ITS to allow them to identify particular vehicles that may have had number plates switched. Opportunities to deploy C-ITS are also likely to expand following the introduction of a reliable and geographically-widespread 5G telecommunications network.

A combination of 5G and other dedicated short-range communication technologies may be sufficient to enable more widespread vehicle-to-vehicle and vehicle-to-infrastructure communication.[32]

It is possible that in the future, C-ITS could be leveraged to assist in or execute vehicle immobilisation, however given the early development phase of this technology, it is difficult to ascertain at present the process by which this might occur.

---

[32] "Costs and Benefits of Emerging Transport Technologies," Bureau of Infrastructure, Transport and Regional Economics, Department of Infrastructure and Regional Development, Research Report 146, last modified June, 2017, https://bitre.gov.au/publications/2017/files/research-report-146-emerging-road-transport-technologies.pdf.

FINDINGS

After careful consideration, the working group presents the following overall findings:

- While the technology already exists to immobilise certain vehicles, it is not yet feasible for such technology to be utilised across the entire Australian vehicle fleet.

- There has been no successful implementation of a mandated REI solution across a whole vehicle fleet anywhere in the world.

- At this time, there is no single in-vehicle technology available, nor is there the required enabling environment to support the use of REI technology. However, with continued technological development REI may be feasible in the future.

- While the technology is developing rapidly, it is likely to be superseded by connected and automated vehicles.

- Until connected vehicles have saturated the fleet, line of sight to identify the applicable vehicle would be required which may not mitigate the risk that currently exists with police pursuits.

- Until the process associated with timelines and deployment of an REI is addressed, such as vehicle verification, authorisation and connectivity, the safety impact of the technology may not be able to be realised.

- There are scenarios where there may be unintended safety consequences from deploying an REI on a moving vehicle.

- The costs of administering one interconnected REI system would be substantial, notwithstanding the costs borne largely by industry and passed onto consumers associated with research, development and production.

- GPS technology will also be integral to vehicle identification. This will raise issues of privacy and who owns the data that is collected.

- Fleet saturation of connected / autonomous vehicles is more likely (even probable) before fleet saturation of REIs (assuming it is possible for an ADR to standardise REI).

APPENDIX A: TERMS OF REFERENCE

POLICE USE OF REMOTE ENGINE IMMOBILSERS NATIONAL WORKING GROUP – TERMS OF REFERENCE

Chair:	The Chair will be the current Chair of ANZPAA's Road PolicingNetwork (ie Queensland).

Membership:
- the Head of Road Policing of each police jurisdiction in Australia and New Zealand;
- the Department of Home Affairs (DHA).

The working group is to draw on informal advice as necessary from:
- the Department of Infrastructure, Regional Development and Cities;
- the National Transport Commission;
- Austroads;
- the Australian Automobile Association; and
- each of the State and Territory road transport agencies.

Scope: In relation to the police use of remote engine immobilisers or related technology, the working group is to:
- examine: technical alternatives; operational considerations; legal constraints; and international police experience;
- quantify the potential benefits, in terms of safety and vehicle crime;
- analyse the impact such technology would have had on recent vehicle-related crime incidents that caused significant casualties;
- identify the framework any solution would have to use to allow it to be put in place;
- examine models for the development of national law and regulation;
- indicate likely issues in relation to the motor vehicle industry and options for their resolution;
- at this stage, not engage directly the motor vehicle industry

Meetings: The working group is to meet as required with secretariat support provided by ANZPAA.

Report: The working group is to deliver an initial report in time for consideration by the MCPEM Senior Officers' Group meeting that will typically take place four weeks in advance of the first meeting of MCPEM in 2019.

APPENDIX B: WORKING GROUP MEMBERSHIP

Working Group Organisations	ACT Department of Justice
	ACT Policing, Australian Federal Police
	Department of Home Affairs
	New South Wales Police Force
	New Zealand Police
	Northern Territory Police Fire and Emergency Services
	Queensland Police Service
	South Australia Police
	Tasmania Police
	Victoria Police
	Western Australia Police Force
	Australia New Zealand Policing Advisory Agency
Additional	Automobile Association of Australia
Attending Stakeholders	Austroads
	Department, Regional Development and Cities
	Department of Transport - NSW
	Department of Transport and Main Roads - QLD
	National Emergency Communications Working Group (NECWG)
	National Transport Commission
	Police Federation of Australia
	Qfree Technical Expert
	South Australia Department of Planning, Transport and Infrastructure

APPENDIX C: TERMS OF REFERENCE MAPPING

The Terms of Reference agreed by MCPEM are outlined below, with referencing to the relevant sections of the report.

Terms of Reference	Reference Report Section/Page no.
Examine:	
▪ technical alternative	Appendix E (p.34)
▪ operational considerations	Section 1, Part A (p.11) Section 1, Part B (p.13)
▪ legal constraints	Section 2, Part B (p.19) Section 2 Part C (p.22)
▪ international police experience	Appendix D (p. 31)
quantify the potential benefits, in terms of safety and vehicle crime	Introduction, Rationale (p.7)
analyse the impact such technology would have had on recent vehicle-related crime incidents that caused significant casualties;	Introduction, Rationale (p.7)
identify the framework any solution would have to use to allow it to be put in place;	Section 2, Part B (p.19) Section 2 Part C (p.22) Appendix F (p.36)
examine models for the development of national law and regulation	Appendix E (p.34)
indicate likely issues in relation to the motor vehicle industry and options for their resolution	Section 3 (p.23)

APPENDIX D: INTERNATIONAL BENCHMARKING

At the time of drafting of this report, there were no known international examples of mandatory, government regulated roll-out of REI technology that have been successfully implemented. As a result, a comparative study is challenging. This report draws on international examples of efforts to implement a mandatory, government regulated REI or related technology, including the European Network of Law Enforcement Technologies (ENLETS), the CONTRAN 245 legislation in Brazil and the eCall Emergency Management System in the European Union (EU).

Enlets
(European Network of Law Enforcement Technologies)

In 2013, the European Union established a working group to examine the potential roll-out of REI technology. The working group undertook a feasibility study to develop a technological immobilisation solution that could be built into all vehicles entering the European market. The primary aim of the police controlled technology was to end high-speed police pursuits.

Before any findings were made, the project plan was disclosed by a civil liberty monitoring group, StateWatch. This group raised concerns in relation to potential infringements on civil liberties. There was significant negative public reaction to the proposal and members of parliament of the United Kingdom issued concerns regarding attacks on personal and civil liberties.[33]

The study ultimately concluded that a scheme in the EU was not feasible. One of the contributing factors to this determination was that police pursuits were not a significantly widespread problem to rationalise the installation of mandatory remote engine immobilisers.[34]

Brazil
Contran 245 Legislation

In 2009 Brazil passed the 'Contran 245' legislation which required installation of tracking and immobilisation devices in all vehicles. The legislation was an attempt to mitigate a long-term vehicle theft crisis. However, the implementation of this mandate was delayed many times and suspended indefinitely in October 2015. Rationale for the suspension included:

- escalating costs. At the time the legislation was suspended an estimated $100 million USD had been borne by industry for hardware, software and service development.

- changing wireless network protocols during the implementation delays made obsolete developing software

- privacy concerns

- a lack of support from industry.[35]

---

[33] Ingram, "EU Secret Plan Leaked – Police to Remotely Stop Cars."
[34] Ibid.
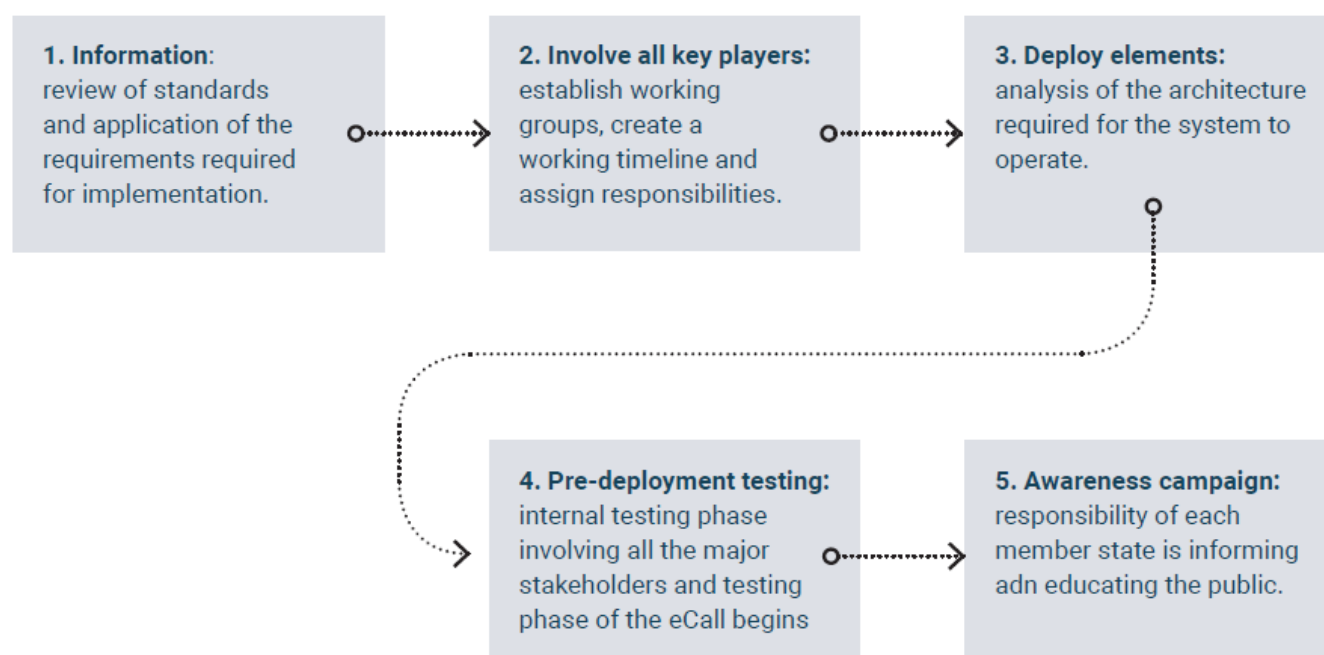[35] Lanctot, "A $100M Learning Experience from Brazil."

European Union
(eCall Emergency Management System)

While the eCall system is not related to REIs, it does provide a successful example of a mandated, wide-scale, implemented technology.

The European Union successfully implemented the eCall emergency management system from 1 May 2018. This system mandated that all new cars sold in the European Union must have an eCall system on board, after legislation was passed in 2014.[36]

The eCall system, in the case of an accident, automatically alerts and sends GPS coordinates to emergency services once the airbag has been released.[37] This system began as a Memorandum of Understanding (MOU) and included members such as the ACEA (European Automobile Manufacturer's Association).[38] The application of the system across the European Union demonstrates the shift from the ENLETS work to a publically accepted technology, focussing on safety. The system identifies the framework required to ensure a technology on this scale can be maintained, as technology rolled out on this scale in vehicles cannot operate on its own and requires stakeholder contribution, agreement, shared facilitation and allocated responsibilities.

The implementation of the eCall process involved the following five steps:[39]

1. Information: review of standards and application of the requirements required for implementation.

2. Involve all key players: establish working groups, create a working timeline and assign responsibilities.

3. Deploy elements: analysis of the architecture required for the system to operate.

4. Pre-deployment testing: internal testing phase involving all the major stakeholders and testing phase of the eCall begins

5. Awareness campaign: responsibility of each member state is informing adn educating the public.

---

[36] "Industry Welcomes Life-Saving eCall Proposal," European Automobile Manufacturers Association, last modified June 13, 2013, https://www.acea.be/press-releases/article/press_release_industry_welcomes_life-saving_ecall_proposal.

[37] Benjamin Uyttebroeck, "New Cars in Europe Need to be Equipped with eCall System from 1 May 2018," Fleet Europe, last modified February 27, 2018, https://www.fleeteurope.com/en/safety-environment/europe/features/new-cars-europeneed-be-equipped-ecallsystem-1-may-2018.

[38] "Industry Welcomes Life-Saving eCall Proposal', European Automobile Manufacturers Association.

[39] McClure, Forestieri and Rooke, "Achieving a Digital Single Market for Connected Cars."

Other key factors for the successful implementation of the eCall system were:

- *The legislation focussed on three stakeholder groups: Member states, OEMs (Original Equipment Manufacturer) and MNOs (Mobile Network Operators). Each group was tasked with separate responsibilities.*

- *A cross-stakeholder forum and interdisciplinary working group was convened involving public organisations, member states and network service providers.*

- *Cost-benefit analysis of the technology was completed and other forms of analysis.[40]*

---

[40] McClure, Forestieri and Rooke, "Achieving a Digital Single Market for Connected Cars."

APPENDIX E: RELATED TECHNOLOGIES GLOSSARY

Category [II] TECHNOLOGY

ANTI-THEFT SERVICES (ONSTAR)	A vehicle communication system using telematics owned by GM Motors. The system provides in-vehicle services such as navigation instructions, automatic crash response, roadside assistance and GPS tracking in the event of vehicle theft. The system installed in every vehicle obtains information from the vehicles on board diagnostics (OBD-II) system and built-in GPS, combined with the cellular network for transmitting this information to the centre.[41] In the event that a vehicle is stolen the system can be used to GPS track the location of the vehicle. Their process only allows police access to this information when the vehicle has been reported as stolen. Police have interacted with this technology mostly in the United States in situations where the vehicle is confirmed as stolen, police were in pursuit, then OnStar was able to slow down the vehicle.[42] For example, the technology was used to locate the Boston Bombers after they fled in a Mercedes Benz that had a similar telematics system. Police contacted the operation centre and were able to obtain the GPS coordinates of the vehicle.[43]
ANTI-THEFT IMMOBILISERS	Anti-theft immobilisers have been compulsory in Australian vehicles made from 1998. These relate to the use of a transponder key or fob to send an electronic code when a vehicle is being started. These are not remote activated and require proximity ot the vehicle to work.[44]
EMERGENCY MANAGEMENT SYSTEM (eCall)	An emergency assistance system deployed across the European Union which ensures that every vehicle sold in Europe must have an eCall device fitted. The device will automatically alert emergency services and send the GPS coordinates of a vehicle in the event of a serious accident for example when the airbag is deployed.[45]
GPS TRACKING	Global Positioning System that allows for the location monitoring (latitude and longitude) of a vehicle in real-time through a network.[46] This technology is used in most fleet management systems and, as an associate to remote engine immobilisers, is required in order to be able to safely slow down a vehicle and track where the vehicle could be apprehended.
TELEMATICS	Telematics (also known as GPS fleet tracking) is a way in which vehicles can be monitored using GPS and on-board diagnostics to record movements on

---

[41] Laukkonen, "GM's OnStar Service Explained."

[42] "Cops Use OnStar to Disable Suspect's Engine and End High-Speed Chase," South Bend Tribune, last modified January 21, 2016, https://www.southbendtribune.com/news/publicsafety/cops-use-onstar-todisable-suspect-s-engine-and-end/article_33029180-bfb7-11e5-9667-1f1e3bb2f345.html

[43] Jim Henry, "Luxury-Car Tech Helped Catch Boston Bombing Suspects; Your Chevy probably has it, too', Forbes, last modified April 30, 2013, https://www.forbes.com/sites/jimhenry/2013/04/30/the-mercedes-benz-technologythat-helped-catch-boston-bombing-suspects-is-probably-in-yourchevrolet-too/#112ca82c4869.

[44] "What is an Engine Immobilizer?" Toyota, accessed January 22, 2019, http://toyota.custhelp.com/ app/answers/detail/a_id/7732/~/what-is-an-engine-immobilizer%3F.

[45] "eCall Emergency Alert System Launched," European Global Navigation Satellite Systems Agency, last modified April 3, 2018, https://www.gsa.europa.eu/newsroom/news/ecall-emergencyalert-system-launched.

[46] "What is GPS Tracking?" Verizon Connect, accessed January 25, 2019, https://www.verizonconnect.com/au/glossary/what-is-gpstracking; Trevor A. Fischbach, Keo Hadsdy and Amanda McCall, "Pursuit Management: Fleeing vehicle tagging and tracking technology," National Criminal Justice Reference Service, US Department of Justice, last modified October 31, 2013, https://www.ncjrs.gov/pdffiles1/nij/grants/249156.pdf.

a computerised map.[47] The vehicle must be fitted with the following devices in order for these movements and in-vehicle diagnostics to be recorded:

- GPS receiver

- Engine interface

- Input/output interface

- Sim card

- Accelerometer

- Buzzer

In 2014, New York Police were able to activate and monitor the Sirius XM Satellite Radio device installed in a vehicle through asking SiriusXM to track the device for 10 days. The commercial radio and telematics company was able to do this through its Connected Vehicles Services technology.[48]

Category [III] TECHNOLOGY

RADIO FREQUENCY (RF) PULSE IMMOBILISER	This technology disables all electronic systems using high frequency RF pulses to disrupt electronic components, slowing down and/or stopping vehicles. For example, RF Safe-Stop is a 350kg emitter that can be integrated into SUV sized vehicles that can disable small vehicle electronics from up to 50 meters away.[49]
PURSUIT MANAGEMENT SYSTEM (STARCHASE™)	A pursuit management system which involves the shooting of a tracking device from a pursuing police vehicle. The device attaches to the target vehicle allowing police to track its location. Once the vehicle has slowed down or stopped police can safely intercept it.[50] StarChase™ data demonstrates that once the pursuing vehicle has been tagged and the pursuit ceased, the driver will generally slow down within two minutes, driving to a normal speed. Police will then rely on the GPS mapping to monitor the vehicle and apprehend once it is safe to do so. This has led to an 80% apprehension rate.[51]
GEO-FENCING	This technology refers to the implementation of a geographically demarcated virtual zone where the entry, speed and fuel supply of vehicles can be controlled digitally. It limits vehicle operation in geographical zones and would not apply to vehicles travelling outside that zone. The technology has been trialed in Stockholm Sweden, funded by Swedish Government departments and manufacturers including Veoneer, Scania, Volvo Cars and the Volvo Group.[52]

[47] Craig Michael, "What is Telematics?" GeoTab, last modified January 8, 2018, https://www.geotab.com/blog/what-is-telematics/.

[48] Thomas Brewster, "Cartapping: How Feds have spied on connected cars for 15 years," Forbes, last modified January 15, 2017, https://www.forbes.com/sites/thomasbrewster/2017/01/15/police-spying-on-car-conversations-location-siriusxm-gm-chevro-Page: 26 of 32 let-toyota-privacy/#177a8dc72ef8.

[49] Jason Forde, "Radio-beam Device Can Disable Car and Boat Engines from 50m," The Engineer, last modified October 16, 2013, https://www.theengineer.co.uk/radio-beamdevice-can-disable-car-and-boatengines-from-50m/.

[50] 'The pursuit ends here StarChase', accessed January 2019, https://www.starchase.com/StarChase_Brochure.pdf.

[51] Ibid.

[52] 'Autoliv's geofencing technology used in Swedish connected vehicles demonstration', traffic technology today, accessed November 2018, http://www.traffictechnologytoday.com/news.php?NewsID=91405.

APPENDIX F: LEGISLATIVE AND REGULATORY MODELS FOR IMPLEMENTATION

There are various models in Australia that could be drawn from when seeking to develop national law and or regulation. The following have been selected for this report as they respectively hold relevance to REI technology.

National Standard Model
Australian Design Rules

Background

The Australian Government administers the *Motor Vehicle Standards Act 1989*, which requires that all new road vehicles comply with national vehicle standards known as the Australian Design Rules (ADRs), before they can be offered to the market for use in transport. The ADRs are mostly performance-based standards for vehicle safety, emission control (noxious gases and external noise) and anti-theft protection.

The ADRs are being increasingly harmonised with international vehicle regulations adopted by the United Nations (UN) World Forum for the Harmonization of Vehicle Regulations. The harmonisation of the ADRs with the UN Regulations is important because vehicle sales in Australia represent approximately 1.2 per cent of the total world production of motor vehicles. Regulation that is based on internationally agreed standards provides consumers with access to the safest vehicles from the global market at the lowest possible cost.

Adoption of new a ADR

The adoption of new UN Regulations under the ADRs are prioritised according to the overall benefit expected, under the National Road Safety Strategy (NRSS) 2011-2020 and its associated action plans. The National Road Safety Action Plan (NRSAP) for the final three years (2018-2020) of the NRSS was agreed to by transport ministers in May 2018.

Both the NRSS and the NRSAP set out a number of agreed national goals and actions to improve road safety, many of which focus on increasing fitment of priority safety technologies to new vehicles. This includes a priority action to increase deployment of Autonomous Emergency Braking (AEB) in both heavy and light vehicles, and the review of Australia's occupant protection standards.

Implementation of these proposed actions will be subject to Australian Government Regulation Impact Statement (RIS) requirements. This consists of considering a range of regulatory and non-regulatory options, conducting a cost-benefit analysis comparing these options, and a public consultation on the options and any proposed regulation. The option with the greatest net benefits is required to be the recommended option in the final RIS. The cost burden of new regulation must be offset by reductions through regulatory reform and/or deregulation. This is being achieved without any impact on the safety or environmental performance of vehicles.

National Laws Model
Applied Law, Referral of Powers and Regulatory Review

Background

In July 2009, the Council of Australian Governments (COAG) agreed to implement a national system of laws for heavy vehicles surpassing 4.5 tonnes with the laws being administered by one independent national regulator, the National Heavy Vehicle Regulator (NHVR).[53] Examples of the actions taken to enact this legislation included the following:

- A Regulatory Impact Statement

- Benefit costs analysis

- Industry Forum with representatives providing comments

- Stakeholder input and public release processes

- Independent expert panel to provide assistance where jurisdictions had difficulty in reaching agreement or changes to industry were to be made.

Following these actions, some sections of the legislation was drafted initially as a guide for States and Territories to adopt or change where necessary.[54]

Applied law

The HVNL is an applied law scheme that consists of:

- a 'host' jurisdiction (in this instance Queensland) enacts a model law in its jurisdiction (usually as a Schedule to an Act of Parliament and, in recent times, usually called a 'National Law').

- other States and Territories pass an Act (an 'application Act') that applies the National Law in thie jurisdictions.

The HVNL is managed by the NHVR and commenced on the 10 February 2014 in five States and the ACT.[55] Each State and Territory either adopted the national law in its entirety or duplicated its contents with some changes and passes as a State/Territory governed law.[56] Although the HVNL has not commenced in Western Australia or the Northern Territory, it still applies to vehicles when they cross into one of the States or Territories that have adopted the HVNL applies.[57]

---

[53] 'Public release of the draft heavy vehicle national law and regulatory impact statement cover note', accessed January 2019, https://www.ntc.gov.au/Media/Reports/(0EDB8FE7-CF74-5C35-0964-B4F648E6B05F).pdf.
[54] Ibid.
[55] 'Heavy Vehicle National Law and Regulations', NHVR, accessed January 2019, https://www.nhvr.gov.au/law-policies/heavy-vehicle-national-law-and-regulations.
[56] Ibid.
[57] Ibid.

Referral of Powers
Vocational Education and Training (VET) Regulation

Background

In 2011 the Australian Skills Quality Authority (ASQA) became the regulatory body for the VET sector in all but two of the States and Territories. ASQA's regulation of the VET sector was supported by establishing legislation and standards.

Referral of Powers

The establishing legislation for ASQA was developed through a referral of powers by the participating States and Territories to the Commonwealth Government to pass applicable legislation. ASQA eastablished on 1 July 2011 through the following Commonwealth Acts:

- *National Vocational Education and Training Regulator Act 2011*
- *National Vocational Education and Training Regulator (Consequential Amendments) Act 2011*
- *National Vocational Education and Training Regulator (Transitional Provisions) Act 2011*.

ASQA is further suppoted by a set of national standards for regulating the VET sector encompassed within the VET Quality Framework that includes:

- **Australian Qualifications Framework**: The national policy for regulated qualifications in Australia.

- Standards for Registered Training Organisations 2015: Standards to ensure nationally consistent training and assessment across Australia's VET providers.

- Fit and Proper Person Requirements: Requirements for people in control or influence over the operation of registered training organisations.

- Financial Viability Risk Assessment Requirements 2011: Requirement for registered training organisations to meet financial viability requirements

- Data Provision Requirements 2011: Requirements for providers to supply ASQA with data upon request, and to submit quality indicator data annually.

Regulatory Review Model
Drone Regulation

Background

The Civil Aviation Safety Authority manage the Civil Aviation Safety Regulations (CASR). CASR Part 101 (promulgated in 2002), relates to unmanned aircraft or drones. Similar to REI technology, drones are a relatively new technology undergoing constant change and development due to the changing nature of its use. As such, various reviews and amendments have been undertaken since 2002 to keep up with the ever changing nature of the technology.

Similar constraints present for drones as with REI technology, for example the connectivity and storage of GPS and network data. These factors are important in terms of privacy and surveillance risks, particularly as they are largely manufactured overseas.

Referral of Powers

One example of a review which led to regulatory change in the CASR was Project OS 11/20 'Review of Regulations and Guidance Material relating to Unmanned Aircraft Systems (UAS)'. The project spanned 6 years, being approved in July 2011 and completed in August 2017.

The process for writing a CASR Part included the following stages:

Writing a Civil Aviation Safety Regulation Part

Initiation and Planning	A CASA project team with a project sponsor writes the initial terms of reference and a project plan.
Initial Consultation	Research is conducted, the aviation community are consulted and all interested parties are involved in the process. This includes aviation community meetings, distribution of information on the CASA website, advertisements in the aviation press and initial consultation through representative bodies. A discussion paper is drafted to present ideas and possible options for industry to consider and provide input into before a regulation or policy is drafted.
Formal Consultation	The Aviation Safety Advisory Panel (ASAP) considers the discussion paper before tasking a technical working group to provide views on the safety of the change. A summary of consultation is produced for public consideration through CASA's Hub.
	The draft regulation is released for public comment.
	CASA's systems and the education and training needs of both the aviation community and CASA staff also needs to be considered.
Legal Drafting	The legislative drafting instructions produced out of the consultation process go to the Attorney-General's Department to ensure they meet the Government's standards for Australian Legislation.
Regulatory Best Practice	All Australian Government agencies are required to apply 'regulatory best practice' to the development of all new or amended legislation. This means that CASA must follow the 'Best Practice Regulation Handbook' published by the Office of Best Practice Regulation (OBPR), which is part of the Department of Finance.
	The Handbook requires CASA to undertake an analytical process to ensure that regulations are effective in achieving policy objectives. In addition to extensive consultation, this may involve documentation of the development process in the form of a Preliminary Impact Assessment, Business Cost Calculator Report, or Regulation Impact Statement (RIS).
	CASA is required to discuss all regulatory amendments with the OBPR which examines the proposals and determines whether a RIS is required to be prepared.
Legislative Approval	The legislation in its final form is cleared by the Department of Infrastructure, Regional Development and Cities (the Department) and EXCO (Executive Council) secretariat.
	The legislative package is approved by CASA's Executive and sent to the Department for the Minister's approval, before being tabled in Parliament.
Implementaion	CASA sets up the procedures, authorisations, delegations, fees and other internal systems and changes needed to be ready for the new regulations.
	There may be a transition period to allow industry to move to the new regulations or they may commence in full from day one.
Project Closeout and Review	The entire process from initial planning to implementation is reviewed to see how it can be improved.

Policy Position Model
Guide for Managing Work Health and Safety in Australian Policing

Background

In 2011, Safe Work Australia established a model law to be implemented by jurisdictions across Australia, aimed at ensuring consistency and harmonisation in the health and safety of workers and workplaces.[58] This law was developed as a Model Law and allowed jurisdictions to adopt themselves. A key challenge within policing has been balancing the hazards associated with operational policing with ensuring the health and safety of their workforces. To support this, the *Guide for Managing Work Health and Safety in Australian Policing* (Guide) was developed to support a cross-jurisdictional policy position in relation to meeting police's responsibilities under the Work Health and Safety Model Law.

Policy Position

The purpose of the Guide is to provide practical information to support duty holders in Australia's Commonwealth, State and Territory jurisdictions in fulfilling their duties in accordance with Model Work Health and Safety (WHS) laws.[59] It aims to provide jurisdictions and police officers with a guide to understanding the potential health and safety implications of their duties, and how risks can be managed in each unique working environment, including consultation and issue resolution.

The Guide was developed in 2013 through consultation with subject matter representatives from each police jurisdiction and Safe Work Australia. Once developed, the Guide was reviewed and approved by the Commissioners of all police jurisdictions across Australia in April 2014.

Industry Position Model
Alarm Activation Response Guidelines

Background

The development of a National Police Alarm Activation Response Guideline to harmonise jurisdictional police response to alarms and alarm activations.[60] These guidelines were enacted on July 1 2018. The guideline was developed by the National Emergency Communications Working Group- Australia and New Zealand with the Australian Security Industry Association Limited.[61]

Industry Position

Due to the nature of the way in which corporations were selling their security systems and promises in relation to response behavior by police. There was an increase in the responses required by police to the activation of alarm systems, most of which were not actual activations.[62]

The following steps were taken in implementing a national police guideline:

- each police jurisdiction provided information on their policies
- a comparative analysis and review of all policies was undertaken to decipher where the majority of these were in alignment
- guidelines were developed to support police responses while allowing for discretion in their application in reach jurisdiction.

The processes included in the Guidelines were in relation to police responses to alarm activations, identifying the types of alarms police could not respond to and defining the parameters for the genuine alarm activations.[63]

---

[58] 'Model WHS laws', safe work Australia, accessed January 2019, https://www.safeworkaustralia.gov.au/law-and-regulation/model-whs-laws.
[59] At the time of the review, all jurisdictions except Western Australia and Victoria had adopted the Model Work Health and Safety laws.
[60] 'National Police Alarm Activation Response Guidelines', https://www.asial.com.au/documents/item/1588.
[61] Ibid.
[62] 'National Police Alarm Activation Response Guidelines for Industry Use', http://necwg-anz.org/wp-content/uploads/2018/06/National-Police-Alarm-Activation-Response-Guidelines-For-Industry-Use.pdf.
[63] Ibid.

Photo Credits:

Mehrshad-rajabi via Unsplash
Tim Kabel via Unsplash
Kaique Rocha via Pexels
Luis Quintero via Pexels
AMIROO HOSSEINI via Pixybay
Pexels via Pixybay
SpaceX-Imagery via Pixybay

Rethinking Our Attitude to Driving (ROAD)

The Rethinking Our Attitude to Driving (ROAD) program is a group based program that aims to encourage young people to explore their thoughts, feelings and behaviours in relation to their motor vehicle offending and the impact on their victims, themselves, their family and their community.

ROAD is the next iteration of the current Motor Vehicle Offending Program. It has been developed in response to a growing need for a consistent state-wide programmatic response that is evidence-informed and aligned to the research to address motor vehicle offending. The ROAD program builds on concepts of victim empathy, emotional literacy and connections between thoughts and actions. ROAD has been developed with continual input and review from experienced Youth Justice program staff across the state.

ROAD is delivered over 6 sessions for a minimum of two hours per session. Using experiential activities, group discussions and activity-based learning, the ROAD program aims to:
- identify and explore motivations behind unsafe motor vehicle behaviours
- challenge thoughts and behaviours associated with unsafe motor vehicle related behaviours
- increase awareness of the impacts and consequences of unsafe motor vehicle related behaviours
- understand what a motor vehicle offence is
- increase understanding of the impact on victims
- increase empathy for victims
- provide practical strategies to reduce harm.

The ROAD program is also designed to provide a realistic context for motor vehicle offenders with options to include family members or survivors of motor vehicle accidents, accident sites and/or emergency service providers.

ROAD is a flexible and responsive program and is able to incorporate information sessions delivered by other providers such as RACQ, the Queensland Police Service (QPS) Forensic Crash Unit or Queensland Fire and Emergency Services (QFES).

Given the complexities surrounding motor vehicle offending, ROAD is recommended to be delivered as part of a multi-faceted approach to delivering change-oriented interventions to young people. ROAD should be part of a range of evidence-based interventions such as Changing Habits And Reaching Targets (CHART) and Emotional Regulation and Impulse Control (ERIC) to ensure that underlying causes, triggers and impacts are further explored.

In December 2020 to January 2021, ROAD was trialled across the state with five locations delivering ROAD and providing feedback to strengthen and improve the program. Ongoing monitoring is also planned for ROAD and all other Youth Justice core interventions to ensure continuous improvement and enable evaluation and reporting of outcomes and benefits.

Road Attitude and Action Planning (RAAP) – delivered by Queensland Fire and Emergency Services.

The Road Attitude and Action Planning (RAAP) program is a psychoeducational program that is a Queensland Fire and Emergency Services (QFES) initiative. RAAP commenced delivery in a school environment, led by operational firefighters who had experience with the trauma involved in vehicle crashes. It is designed as a preventative strategy to provide information to young people about road safety so that they can make an informed decision to mitigate risks and consequence by planning ahead[1].

QFES commenced engaging Youth Justice clients in the RAAP program in late 2017, primarily in the Logan area, commencing initially with one-on-one engagement, expanding to small group presentations based on need.

Through the delivery of an informative and educational PowerPoint, by trained operational firefighters, RAAP aims to engage young people in conversation and discussion to increase their awareness of:

- the 'fatal 5': speeding, driving under the influence of substances (drugs and/or alcohol), not wearing a seatbelt, driving while fatigued and driving while distracted (e.g., using mobile devices)
- the risks and impacts to themselves and others
- the likelihood of negative consequences and that this risk increases in the teenage age group
- strategies that they can use to reduce the risk of motor vehicle incidents
- who is impacted by road fatalities and the ripple effects of this impact
- the impact of the fight/flight instinct that takes over when drivers are involved in accident
- the impacts of unsafe driving (i.e., death, disability, etc).

RAAP further aims to:

- increase young people's confidence to speak up and take action when in a car with an unsafe driver
- increase young people's ability to plan ahead to mitigate being in a car with an unsafe driver
- leave the young person with a better understanding of the impact of unsafe driving practices and considering this within their own context.

RAAP provides a good introduction to young people in relation to safe driving, the impacts of unsafe safe driving and the impacts of unsafe driving on others.

In order to address antisocial thinking and behaviour seen within a Youth Justice cohort, a program such as RAAP should be considered as one component of an overarching intervention plan that includes delivery of more intensive change-oriented programs. RAAP should be delivered before a more intensive change-oriented program in order to build commitment and motivation to participate in a program that directly addresses the antisocial thoughts and feelings that are behind motor vehicle offending.

---

[1] https://www.qfes.qld.gov.au/community-safety/freeprograms/Pages/raap.aspx

Queensland
Government