NHVR
National Heavy Vehicle Regulator

13 February 2019

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Dear Mr Gutiérrez

Thank you for the opportunity to comment on the issues paper, titled *Developing technology-neutral road rules for driver distraction*.

I would like to take the opportunity to congratulate the NTC for taking on this important road safety concern and issuing the discussion paper for public comment.

As you are aware, the NHVR is Australia's peak independent regulator for all heavy vehicles. We were established in 2013 as an independent statutory authority pursuant to the *Heavy Vehicle National Law*. Our vision is to have: A safe, efficient and productive heavy vehicle industry serving the needs of Australia.

Whilst recognising the importance of driver distraction in road safety, the NHVR is not aware of empirical evidence showing that heavy vehicle driver distraction is the primary causal factor in crashes involving heavy vehicles.

Heavy vehicle driver distraction has not been reported as a significant contributor to heavy vehicle incidents in Australia. For example, within the NTI National Truck Accident Research Centre (NTARC) report *2017 Major Accident Investigation Report*, driver distraction was not reported as a factor in major heavy vehicle incidents/crashes in Australia.

Industry stakeholders have told the NHVR anecdotally that heavy vehicle drivers have been using communications technology in their vehicles for over 60 years. Many rely on in-cab communications as part of their safety management system and as a way of doing business.

Some stakeholders have also suggested that heavy vehicle drivers have better understanding of the risks caused by distraction and that heavy vehicle operators have developed policies and rules to minimize cognitive impacts of using technology while driving.

The NHVR also notes that heavy vehicle operators have been self-regulating driver distraction through investing in monitoring technology that provides both in-cab warnings and back-to-base reporting.

The cost for installing and maintaining monitoring technology is proportionally lower for heavy vehicle operators than for light vehicle operators.

Through the NHVR's Fatigue Monitoring Trial, the NHVR intends to investigate the capabilities of various fatigue/distraction detection technologies and the appropriate regulatory framework to improve safety performance within the heavy vehicle regulatory environment.

Given the low likelihood that heavy driver distraction contributes to heavy vehicle crashes and the availability of controls and countermeasures in heavy vehicle operations, the NHVR believes that the NTC should carefully consider the need to add to the already complex arrangement of prescriptive obligations for heavy vehicle drivers.

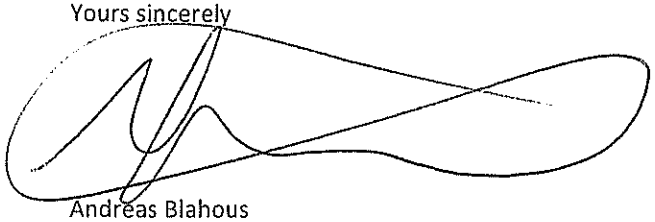
The NHVR is also concerned that the introduction of a general, technology agnostic offence of distracted driving will include subjective elements. This is of concern as offences that include subjective discretionary elements are generally not suitable for expiation.

Whilst the NHVR supports the legal rights of every driver to have allegations of non-compliance heard in court, we have also heard of the inconvenience that results from having to appear in court away from the driver's

home base or jurisdiction. Heavy vehicle drivers frequently work in multiple different jurisdictions. Should a breach be detected away from the driver's base, it is common for the matter to be held in absentia – thus undermining the effectiveness of drivers' capacity to defend themselves. In the absence of a *"jurisdiction of convenience"* arrangement, which allows drivers to request that matters be transferred to a nearer competent jurisdiction, mandatory court appearance will limit drivers defence.

Our detailed response to the questions posed in the NTC Issues Paper is contained within the attached NHVR document, titled *NHVR Response to Developing technology-neutral road rules for driver distraction*.

Yours sincerely



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NHVR Response

Developing technology neutral road rules for driver distraction

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1 Introduction

"In May, 2018, the Transport and Infrastructure Council directed the National Transport Commission (NTC) to review the Australian Road Rules that regulate driver distraction to determine whether they sufficiently address the key factors that cause driver distraction" (NTC, 2018, p.5). The NTC held a driver distraction workshop in Melbourne on the 1st November 2018 to elicit information from experts in the field and other relevant government, academic and community representatives regarding developing technology neutral road rules (general road users, not HVNL specific) for driver distraction. Following the workshop the NTC developed an Issues Paper to "summarise the current understanding of the factors that may cause driver distraction, the behaviours induced by those factors and their potential impacts on road safety" (NTC, 2018, p. 4). Following the NTC request for submissions regarding the issues contained within the Issues Paper, the National Heavy Vehicle Regulator (NHVR) has provided the following response to the questions outlined within the NTC Issues Paper.

2 Purpose / Rationale

The purpose of the NTC Issues Paper is to summarise the current understanding of the factors that may cause driver distraction, the behaviours induced by those factors and their potential impacts on the road. Specifically, the Issues Paper:

- Seeks to reach a common understanding of the problem;
- Identifies the factors associated with distraction and refers to evidence-based research regarding their impact on road safety;
- Reviews the Australian Road Rules in relation to driver distraction to determine whether they are fit for purpose in relation to their ability to regulate driver distraction regardless of the cause; and
- Provides an analysis of the key issues to consider prior to developing potential solutions.

3 Objectives

The objectives of this report is to provide an NHVR response to the questions (N = 10) outlined within the NTC's Issues Paper titled *"Developing technology-neutral road rules for driver distraction"*. The questions provided for comment include:

1. Does the proposed definition include all the key functions required to safely perform the driving task?
2. Does the proposed definition capture all the behaviours that lead to driver distraction and a reduction in driving performance?
3. How could a distinction between manageable and unmanageable levels of driver distraction be used to inform the way distraction is regulated? What evidence-based distinctions could be considered?
4. Should conventional and technology-based causes of distraction be treated equally in the Australian Road Rules? Why?
5. Can you provide examples of effective non-regulatory approaches to driver distraction that assist drivers to self-regulate their behaviour in a dynamic driving environment?
6. Can you provide examples of strategies successfully implemented by other international jurisdictions and industries (for example, aviation) that could be applicable to driver distraction?
7. Are there other parties besides the vehicle driver who can influence the risk of driver distraction? If so, are there mechanisms to ensure those parties are all that is reasonably practicable to ensure safety?
8. Can you provide examples of effective strategies for ensuring that new in-vehicle technology and mobile apps minimise driver distraction?
9. Can you provide examples of strategies to ensure that users of partially automated vehicles are fully informed about their responsibilities, and the limitations of their vehicle's technology?
10. What evidence is available in support of a performance-based approach or a prescriptive approach for managing the risks of driver distraction?

4 Content

4.1 Defining the driving task

The definition provided by the NTC for the purpose of this project outlines the tasks required from a human to safely operate a vehicle, including:

A complex, multi-task activity that involves the following functions:

- *Route finding*
- *Route following*
- *Lateral motion control*
- *Longitudinal motion control*
- *Monitoring the driving environment*
- *Manoeuvre planning*
- *Responding to objects or events*
- *Making other road users aware of the driver's presence; and*
- *Complying with road rules.*

Question 1: Does the proposed definition include all the key functions required to safely perform the driving task?

Driving is a complex instrumental activity of daily living. It involves a complex and rapidly repeating cycle that requires a level of skill and the ability to interact with both the vehicle and the external environment at the same time.

The Austroads publication "Assessing Fitness To Drive for commercial and private vehicle drivers" (2012) stated: "*the demands of the driving task can vary considerably depending on a range of factors including those related to the driver, the vehicle, the purpose of the driving task and the road environment. Information about the road environment is obtained via the visual and auditory senses. The information is operated on by many cognitive processes including short- and long-term memory and adjustment, which leads to decisions being made about driving. Decisions are put into effect via the musculoskeletal system, which acts on the steering, gears and brakes to alter the vehicle in relation to the road. This repeating sequence depends on: sensory input (e.g., vision, visuospatial perception, hearing), cognitive function (e.g., attention and concentration, comprehension, memory, insight, judgement, decision making, reaction time, sensation), and motor function (e.g., muscle power, coordination. Given these requirements, it follows that many body systems need to be functional in order to ensure safe and timely execution of the skills required for driving. The driver's sensory, motor and cognitive skills may require detailed assessment to determine the potential impact on driving*".

The above suggests that the driving task is a complex operation within a dynamic environment. In addition, the driving task is easily influenced by a multitude of factors, conditions or events; including the driver (e.g., experience, training, attitude, behaviour, fit to drive), the vehicle (e.g., fit for purpose, vehicle familiarisation including its controls/operation, vehicle performance, condition and maintenance), the road environment (e.g., signs, other road users, traffic characteristics and road layout); legal requirements (e.g., speed limits, distractive activities and blood alcohol concentration); the environmental conditions (e.g., night, extremes of weather and glare); personal/organisational requirements (e.g., trip purpose, destination, appointments and time pressures); and passengers and their potential to distract the driver.

In relation to commercial and heavy vehicle drivers there are a range of additional factors that affect the driving task (Austroads, 2012), including:

- Business requirements, such as, rosters (shifts), driver training and contractual demands;
- Work-related multitasking, including interacting with in-vehicle technologies such as a GPS, job display screens or other communication systems
- Legal requirements, for example, work diaries and licensing procedures;
- Vehicle issues, including size, stability and load distribution;
- Passenger requirements/issues, for example, duty of care, communication requirements and potential for occupational violence;
- Risks associated with carrying dangerous loads and/or goods;
- Additional skills required to drive/manage the commercial/heavy vehicle, including turning and braking; and
- Endurance/fatigue and vigilance demands associated with long periods spent on the road.

Consequently, there are many factors which impact or influence the driving task. Although within the NTC proposed definition, the point *"Responding to objects or events"* partly infers addressing additional factors, it is suggested that this

point could be confusing and may not sufficiently relay the importance of the multitude of influences that potentially impact on the driving task. For example, an initial suggestion: *Responding to objects or events and other influences that may affect the driving task.*

4.2 A common definition of driver distraction

For the purpose of this project, the NTC proposed the following definition for driver distraction:

Driver distraction is the voluntary or involuntary diverting of attention, in a visual, manual, auditory or cognitive sense, away from the driving task to focus on a competing secondary activity.

Question 2: Does the proposed definition capture all the behaviours that lead to driver distraction and a reduction in driving performance?

Distraction is considered to be a major risk factor in driving incidents. However, the exact extent of driver distraction as causal factor in accident rates can be difficult to measure due to variations in definitions of driver distraction and data collection methods (Stevens & Minton, 2001; Beanland, Fitzharris, Young & Lenné, 2013). Due to various definitions of distraction being used historically, many studies are not comparable and confusion regarding whether studies are measuring driver distraction or inattention is common (Lee, Young & Regan, 2008). Although there are many and various definitions of distraction within the scientific literature, most are generally stating similar definitions of distraction with wording differences. However, the visual diverting of attention due to visual, manual, auditory and cognitive actions, identified within the NTC Issues Paper do encompass the primary behaviours or influences and are representative of the scientific literature associated with driver distraction.

Defining driver inattention has not received the same amount of scrutiny as defining driver distraction. This is possibly because it has often been confused with driver distraction. There has been debate regarding whether driver inattention and driver distraction are separate components, or whether driver distraction is a form of driver inattention (see Regan et al., 2011 for a summary of this debate). However, this debate will probably continue across national and international academic arenas.

The definition proposed by the NTC is believed to encompass the primary behaviours (etc) that lead to driver distraction and a reduction in driving performance.

4.3 Types of driver distraction

Recent years have seen the rapid convergence of media and technology with electronic devices increasingly integrated into every aspect of our lives. This trend is only set to continue as electronic devices become smaller, more user-friendly and adaptable. Consequently, it could be expected that electronic devices will become even more pervasive and generate further opportunities for driver distraction (e.g., in-car computers).

Drivers have access to a wide range of technologies in the vehicle cabin. They can be either specific to the driving task, such as a navigation system, or more general in purpose, such as a smartphone. Furthermore, these technologies can either be integrated into the vehicle, such as heads-up display (HUD) or a nomadic technology brought into the vehicle by the driver or a passenger, such as a music player. The availability of distracting technologies within the vehicle increases year-on-year. However, there is no clear evidence regarding whether drivers are experiencing more or less distraction today than they have historically. One may speculate that this may be due to improvements in the usability of technologies and increased driver awareness of the appropriate use of technologies, and/or that drivers are adapting their behaviour to the increased attentional demand required when engaging with technology.

Input is being sought into how a distinction can be drawn between manageable and unmanageable levels of driver distraction and how could this be used to inform regulation of driver distraction.

Question 3: How could a distinction between manageable and unmanageable levels of driver distraction be used to inform the way distraction is regulated? What evidence-based distinctions could be considered?

Humans have limited attentional capabilities to employ when performing the driving task. It is possible when driving to allocate attentional resources to activities that are not critical for safe driving; these activities may be driving or non-driving related. Technologies that are both driving and non-driving related may have motivational properties that can draw on a driver's attentional resources (e.g. emotional motivation to answer the phone or read a text, or motivation to re-route a satnav device to avoid congestion).

Experimental evidence suggests that where drivers engage in additional tasks, their driving performance is impaired (see NTC Issues Paper - section 2.1.4, 2018). There is some evidence to suggest that drivers adapt their behaviour to reduce demand when undertaking additional tasks, although this does not appear to negate the impairment completely and drivers are therefore likely to be at greater risk of being involved in a collision when the attentional demands exceed the resources required for the driver-vehicle-environment system.

The distinction between manageable and unmanageable levels of driver distraction could be viewed using the proposed NTC definition of driver distraction. For instance, manageable levels of driver distraction would involve voluntary actions (e.g., eating and drinking, mobile phone use, use/operation of other technological devices). Whereas unmanageable levels of driver distraction could imply involuntary actions (e.g., on road advertising, vehicle or technological safety device warnings, road noises/sirens/vehicle horns, road and environmental conditions). Generally, the driver has control in relation to the manageable levels of driver distraction and therefore these types of driver distraction are preventable (by the driver). From a regulatory perspective it is suggested that only the manageable levels of driver distraction could be regulated by road rules, especially within the current regulatory environment.

However, this poses an additional issue for those technological devices developed to detect driver distraction. Although developed to reduce the instances of driver distraction, warning systems could be considered as a distraction. Further research is required to determine if the safety benefits of driver distraction detection technologies outweigh any distractive influence due to warnings (e.g., auditory, vibration) provided by the driver distraction detection systems. The NHVR is funding and participating in a research project (2019-2020) aimed at assessing fatigue/distraction detection technologies in the heavy vehicle industry, which may include issues related to secondary driver distraction (e.g., warnings).

4.4 Clear and consistent approach in the Australian Road Rules

The current road rules have not kept pace with the development of mobile phones and other technology devices. They treat different types of driver distraction differently and are confusing. Legislation that addresses the issue of driver distraction as a whole could improve road safety and deter drivers from becoming distracted if effectively and consistently enforced.

Question 4: Should conventional and technology-based causes of distraction be treated equally in the Australian Road Rules? Why?

Consideration should be given to which driver distractions are manageable or unmanageable. For example, should a driver be fined or prosecuted for an incident involving driver distraction that was out of his/her control (e.g., a roadside flashing sign). In relation to manageable driver distractions using a mobile phone compared to eating or drinking while driving may have different levels of crash-related risk, however the effect is the same in the event of an incident due to the distractive influences of the operations. Therefore, conventional and technology-based causes of distraction that are manageable by drivers should be treated equally within the Australian Road Rules.

Furthermore, inconsistency of road rules across Australia potentially affects the efficiency and safety of our transport system. For example, many commercial operators (e.g., heavy vehicle industry) require drivers to travel across Australian states and in many cases multiple states. Inconsistencies in the road rules can cause confusion and lead to added pressure for drivers operating in multiple Australian States/Territories. It is recommended that road rules relating to driver distraction be consistent across all Australian States and Territories.

4.5 Responsibility for distraction

Currently, the focus of the Australian Road Rules legislation relating to driver distraction concerns the behaviour of drivers of vehicles. Although legislation can act as a tool for shaping behaviour and fostering a positive road safety culture (NTC, 2018; World Health Organization, 2011), there are examples of non-regulatory approaches that have improved road safety generally and could easily be transferred to the driver distraction issue.

Question 5: Can you provide examples of effective non-regulatory approaches to driver distraction that assist drivers to self-regulate their behaviour in a dynamic driving environment?

The adaptive behaviour of mobile phone distracted drivers has been a topic of much discussion in the recent literature, but the mechanisms of behavioural adaptation are still unclear (Oviedo-Trespalacios et al., 2019a). Research results suggested that tactical self-regulation is more common among distracted drivers followed by operational and strategic self-regulation (Oviedo-Trespalacios et al., 2019a). Personal beliefs regarding how safe it is to use the mobile phone for

texting/browsing while driving were predictors of self-regulation for all levels. Drivers were observed using a mobile phone more when the driving demands were low, e.g. while stopped at an intersection. This research suggested that distracted drivers engage in various levels of self-regulation. Therefore, increased levels of driver awareness of the risks and safety controls related to driver distraction may increase drivers' propensity for improved behavioural self-regulation. This may be accomplished by increasing driver education and training, such as government campaigns, school-based learning, learner driver training and organisational/company based training and operational tool box talks/discussions.

Industry organisations could also provide additional training for employees related to driver distraction. Considering driving a vehicle for work could be deemed a major safety hazard for most organisations (Rowland, 2018; Wishart, 2015), it makes good sense for organisations to address driving-related risk. In addition, Work Health and Safety Legislation in Australia is based upon managing associated risks (e.g., risk management) to safety and therefore industry organisations are obligated or have a duty of care to identify safety hazards, assess the risks, control the risks and continuously monitor and review safety risk and risk controls. This includes risks associated with driving a vehicle for work.

Consequently, driver distraction has already been identified as a major driving-related risk and also a considerable risk for industry-related organisations and drivers alike. Strategies utilised by organisations to regulate and improve road safety risk include: policy and procedures, training and education, inclusion in new employee inductions, performance reviews, work-related peer discussions (e.g., tool box talks), and targeting specific strategies to repeat offenders (etc). Industry organisations not only have a legislative requirement to address all safety-related risks, they can provide a valuable avenue for safety strategy development and implementation.

Furthermore, the NHVR recognises the influence of driver distraction within the heavy vehicle industry and are exploring potential strategies aimed at mitigating or minimising the risk; including training and education requirements, distraction detection technologies, and regulatory compliance. The NHVR also notes that heavy vehicle operators have been self-regulating driver distraction through investing in monitoring technology that provides both in-cab warnings and back-to-base reporting. Informal feedback from these companies suggests the technology holds considerable promise to support effective fatigue/distraction management to improve safety outcomes both for the heavy vehicle industry and the broader community. The cost for installing and maintaining monitoring technology is proportionally lower for heavy vehicle operators than for light vehicle operators.

The NHVR is funding and undertaking a research project to assess current and emerging fatigue/distraction detection technologies. Through the NHVR's Fatigue Monitoring Trial, the NHVR intends to investigate the capabilities of various fatigue/distraction detection technologies and the appropriate regulatory framework to improve safety performance within the heavy vehicle regulatory environment.

4.6 Shared responsibility

While individual road users are expected to be responsible for complying with traffic laws and behaving in a safe manner, it can no longer be assumed that the burden of road safety responsibility simply rests with the individual road user. Many organisations—the 'system managers'—have a primary responsibility to provide a safe operating environment for road users. They include the government and industry organisations that design, build, maintain and regulate roads and vehicles. These and a range of other parties which are involved in the performance of the road transport system and the way roads and roadsides are used, all have responsibility for ensuring that the system is forgiving when people make mistakes.

Road safety responsibilities also extend to various professional groups, as well as the broader community. For example: health professionals have a role in helping their clients to manage their safety on the roads; and parents contribute significantly to the road safety education of their children—not only through their direct supervision of learner drivers, but also by modelling their own driving and road user behaviour.

Responsibility for the road system is shared by everyone. Policy makers, planners, engineers, vehicle manufacturers, fleet managers/industry organisations, enforcement officers, road safety educators, health agencies and the media are accountable for the system's safety; while every road user, whether they drive, cycle or walk, is responsible for complying with the system's rules. A safe systems approach also aligns road safety management with broader ethical, social, economic and environmental goals. By creating partnerships where government or transport agencies work closely with other groups, safe systems not only addresses issues associated with road safety but also tackles other problems associated with road traffic, such as congestion, noise, and air pollution.

Question 6: Can you provide examples of strategies successfully implemented by other international jurisdictions and industries (for example, aviation) that could be applicable to driver distraction?

Due to increasing numbers of work-related driving incidents many organisations have adopted additional strategies aimed at improving work-related road safety. For example, due to increasing rates of vehicle incidents related to driver distraction some organisations have banned the use of mobile phones and other communication devices (including hands free mobile phones/devices) while driving a vehicle. This policy directive resulted in a reduction in vehicle incidents related to driver distraction and particularly mobile phone use (Wishart & Rowland, 2010; 2012). Although using a "hands free" mobile phone/device remains legal in Australia, research has found that there is little difference in crash risk for those drivers utilising a hands-free device compared to utilising a hand-held mobile phone (McEvoy et al., 2005).

Previously, the aviation industry has recognised the influence of distraction and inattention on flights crews as a serious safety issue. When flight crews are not concentrating their attention on the conduct of flight activities or are involved in actions that are totally unrelated to flying, critical information can be missed or misinterpreted. The situation can degenerate very rapidly. In order to prevent those consequences, the U.S. Federal Aviation Administration (FAA) enacted regulations in 1981 that prohibited crews from performing non-essential activities during taxiing, take-off and landing, and below 10,000 feet except in cruise flight. Known as the "sterile cockpit rule," the regulation helped to define clearly when the crew shall concentrate on the most important task: safely operating the aircraft.

Similarly, the rail industry has recognised the serious impact human factors can have on safety and have established a comprehensive approach to addressing human factors. The rail industry developed guidelines to assist the industry to better manage the influence of human factors (including distraction), titled: "Understanding Human Factors: A guide for the rail industry. The document suggests that if an organisation attends successfully to all human factors, the organisation and its people will get the best out of each other. In addition, the document states that the whole of the railway industry will only operate at its best if it attends to all the human factors that can affect its performance – that is, its safety and profitability.

4.7 The concept of chain of responsibility

Under the Chain of Responsibility (CoR), complying with transport law is a shared responsibility and all parties in the road transport supply chain are responsible for ensuring the safety of their transport activities. This approach recognises the effects of the actions, inactions and demands of off-the-road parties in the transport chain. If you hold influence or able to make decisions, your actions or inactions may affect road transport operations meaning you are in the chain. If your role in the business involves you handling goods, loading/receiving, planning, dispatching, etc., whether you're directly employed by the transport company or a third-party (such as the customer), you are liable.

The aim of the laws is to ensure everyone in the transport supply chain shares responsibility for ensuring breaches to the Heavy Vehicle National Law (HVNL) does not occur. The onus is no longer on the driver but anyone that holds influence. If you are involved in the chain and you exercise (or have the capability of exercising) control over any transport task, you have a responsibility to ensure compliance to the HVNL. The CoR laws recognise that more than one person is responsible for offences committed by the operator of the heavy-vehicle. A person may be a third-party in the supply chain and still be liable.

In practical terms, this primary duty represents an obligation to eliminate or minimise potential harm or loss (risk) by doing all that is reasonably practicable to ensure safety. As a party in the supply chain, the best way to do this is to have safety management systems and controls in place, such as business practices, training, procedures and review processes that:

- Identify, assess, evaluate and control risk.
- Manage compliance with speed, fatigue, mass, dimension, loading and vehicle standards requirements through identified best practice.
- Involve regular reporting, including to executive officers.
- Document or record actions taken to manage safety.

Question 7: Are there other parties besides the vehicle driver who can influence the risk of driver distraction? If so, are there mechanisms to ensure those parties are all that is reasonably practicable to ensure safety?

Although Chain of Responsibility laws were developed to ensure everyone in the transport supply chain has a shared responsibility for ensuring breaches to the HVNL do not occur, these laws are yet to be tested in relation to driver

distraction issues. Road safety is considered a responsibility for everyone, not just within the supply chain. Brief examples include:

- Governments (and associated regulatory organisations) are responsible for developing, implementing and regulating laws (including compliance) and rules related to road use, particularly driver distraction. In addition, governments provide awareness and information concerning safe driving.
- Organisations (operating work-related vehicle fleets) have a duty of care or obligation to ensure that their work-related fleet operations are safe and do not pose a risk to the safety of its workers/drivers and other road users. For instance, having within the safety management system strategies to minimise the risk of distraction.
- Clients/Customers (e.g., sites and operations) need to ensure that their sites and operations do not create additional risk to safety not only for their own personnel (and potentially members of the public) but others entering to deliver goods or provide services. For instance, reducing potential distractions and having a safe traffic management plan.
- Research/Academic Institutions provide the expertise and resources to research particular areas related to road safety, including driver distraction. This research would be utilised to inform both government and industry organisations in relation to compliance and risk management strategies.
- Educational institutions provide training, education and awareness associated with specific operational safe road use and compliance-related training.
- All road users (personal and work-related) have a responsibility to basically drive safely and follow the road rules.

4.8 Technologies that can assist with (and distract from) the driving task

Smartphones and other similar technological devices have introduced new factors relevant to driver distraction (NTC, 2018). Similarly, there are many technologies that have been developed that aim to detect driver inattentiveness and distraction. Subsequently, the development of these technologies are seemingly advancing faster than research can determine not only the value of these technologies to detect or reduce driver distraction but also potential secondary factors (e.g., warnings, noise, positioning) that may generate issues related to driver distraction.

Question 8: Can you provide examples of effective strategies for ensuring that new in-vehicle technology and mobile apps minimise driver distraction?

Research conducted at the Centre for Accident Research and Road Safety – Queensland (CARRS-Q) by Oviedo-Trespalacios et al. (2019) suggested that mobile phone use while driving is a pervasive problem that continues to increase, notwithstanding the large crash risk this behaviour constitutes. In addition, a number of phone applications have been developed with the intention of utilising the technology to prevent dangerous phone behaviours while driving. Despite the potential these applications have in preventing crashes associated with distracted driving, research is yet to fully explore these emergent applications. Therefore, this study provided a review of the current smartphone applications developed to prevent distracted driving. A content analysis was conducted to identify the smartphone applications targeted at stopping, preventing or reducing phone use behaviour while driving. Their functionality was determined based on the ecosystem of smartphone applications: application-mobile phone interaction, application-driver interaction, and application-context interaction. Oviedo-Trespalacios et al. (2019) further stated:

"A total of 29 relevant applications in English language were identified. Most of these applications focused on blocking specific phone functions (e.g. texting or calling) while allowing more desirable driving phone functions to be accessed (e.g. music applications and GPS functions). The specific functions which are blocked or allowed varied greatly between applications. Out of the different application interactions, the function which sends an automatic text message to a contact who texts the driver (associated with external communicator interactions) was the most common feature. A major limitation of the applications was their reliance on blocking specific phone functions as opposed to managing workload while driving or simplifying specific phone tasks to be more compatible with driving. Simply blocking phone functions may not be attractive to drivers who view their phone as a necessity. As such, these drivers are unlikely to use these voluntary applications at all while driving. Smartphone applications designed to prevent phone use while driving show potential for playing a large role in a systemic intervention to prevent mobile phone distracted driving, yet there is a substantial need for further development of these applications".

The above study highlights that mobile apps are available to reduce in-vehicle mobile phone use. However, the study also revealed a probable lack of uptake by drivers who view their phone as a necessity.

The introduction of in-vehicle technologies aimed at improving safety, productivity and fatigue-regulated regulatory compliance within the heavy vehicle industry, such as Electronic Work Diaries (EWD) like most in-vehicle technologies may be a possible risk of distraction. The NHVR have identified that certain EWD technology that are insufficiently developed/programmed and/or located within the vehicle cabin may be a distraction for the driver. To reduce this potential distraction risk the NHVR have developed procedures and documentation to inform technology providers of requirements related to safe installation and use of EWDs within heavy vehicles (see Appendix for section regarding distraction).

Although research related to the influence of fatigue on driver distraction is limited, evidence suggests that fatigue can increase driver inattentiveness (Regan et al., 2011; Victor et al., 2008) and therefore increase the likelihood of distraction-related driving incidents. The NHVR recognises that driver distraction is a major risk within the heavy vehicle industry with drivers constantly working/driving under competing demands. There are a variety of types of fatigue/distraction detection technologies currently either on the market or being developed. The ability of these technologies to detect fatigued/distracted drivers are promising however real-time driving research trials of these devices are limited or in its infancy. Currently, the NHVR is funding, participating in and/or supporting a number of research trials aimed at assessing fatigue/distraction technologies, including any potential secondary risk of distraction. Trials have commenced and will run over the 2019-2020 period.

4.9 Transition towards automation

Few people pay close attention to the traffic situation unfolding around them when they're travelling as a passenger in a car, even if they are in the front seat. This could make partially automated vehicles, operating on Australian roads, problematic (Cunningham & Regan, 2018).

Partially automated vehicles (also known as Level 2 automated vehicles) are capable of controlling steering, acceleration and deceleration. These automated vehicles, although designed to optimise driver comfort and safety, require a human driver to remain on standby when the vehicle is in autonomous mode. That means paying close attention to the driving environment, and taking back control of the vehicle if required.

There are two main reasons why people find it difficult to pay close attention to the driving environment, especially for extended periods of time, when a vehicle is driving itself (Cunningham & Regan, 2018). Firstly, people are prone to passive fatigue (Saxby, Matthews, Warm, Hitchcock & Neubauer, 2013). Driving conditions that don't require frequent use of vehicle controls, but do require constant vigilance for hazards, may paradoxically reduce driver alertness – even after only 10 minutes on the road (Greenlee, DeLucia & Newton, 2018). Such conditions may even put drivers to sleep (Vogelpohl, Kühn, Hummel & Vollrath, 2018). Vogelpohl et al. (2018) also stated that drivers were unable to stay alert during extended periods of automated driving without non-driving related tasks. Fatigued drivers could pose a serious hazard in complex take-over situations where situation awareness is required to prepare for threats. Driver fatigue monitoring or controllable distraction through non-driving tasks could be necessary to ensure alertness and availability during highly automated driving.

Secondly, prolonged periods of automated driving may become outright boring for some drivers left on standby. Bored drivers tend to engage spontaneously in distracting activities that stimulate them, such as using a phone, reading a magazine or newspaper, or watching a movie. This may be especially true if the driver feels a high level of trust in the automation. These by-products of automation have been demonstrated in both simulated (Carsten, Lai, Barnard, Jamson & Merat, 2012) and real-world (Llaneras, Salinger & Green, 2013) driving studies.

Drivers who are inattentive to the driving environment when a partially automated vehicle is operating in autonomous mode may pose a significant safety risk to themselves and others. They may be less likely to anticipate critical events that spark a takeover request, and be ill-prepared to safely take back control if required (Zeeb, Buchner & Schrauf, 2015).

The tragic fatality in 2016 of a driver of one of Tesla's partially automated vehicles bears on this issue. The US National Transportation Safety Board's accident report (National Transportation Safety Board, 2017) notes that: "the probable cause of the Williston, Florida, crash was the truck driver's failure to yield the right of way to the car, combined with the car driver's inattention due to overreliance on vehicle automation, which resulted in the car driver's lack of reaction to the presence of the truck."

Question 9: Can you provide examples of strategies to ensure that users of partially automated vehicles are fully informed about their responsibilities, and the limitations of their vehicle's technology?

Autonomous vehicle manufacturers seem to be aware of this problem, and of the need to make the interaction between the driver and the automation safe. To compensate, they require drivers to keep a hand on the wheel when the vehicle is driving itself, or to periodically touch the steering wheel to signal that they remain vigilant. But it's unclear whether this

is an effective strategy to keep drivers attentive. Some drivers have devised some creative ways of circumventing the requirement to touch the steering wheel. For example, by placing a bottle of water on the steering wheel in lieu of their hand (The Drive Newsletter, 2016).

Even if a driver touches the wheel when requested, their eyes may be focused elsewhere, such as on a mobile phone display. And if their eyes are focused on the roadway at times when they touch the steering wheel, their minds may not be. There is evidence periods of prolonged automation can cause drivers' minds to wander (Körber, Cindel, Zimmermann & Bengler, 2015). Indeed, drivers may fail to attend to things on the roadway, even if they are physically looking at them. This calls into question whether partially automated vehicles can keep drivers attentive to the driving task during periods of autonomous driving. Researchers are actively trying to work out ways of improving this. A recent paper proposes a set of design principles for the human-machine interface – the technology built into the vehicle that allows it to communicate messages to the driver, and vice versa (Carsten & Martens, 2018). However, until vehicles become automated to the point there is no longer a requirement for drivers to pay attention to the driving environment, then driver inattention is likely to remain a road safety problem.

Consequently, road rules would need to extend to operators/users of partially automated vehicles as well as traditional non-automated vehicle drivers. In addition, further education and training regarding the risks associated with inattention/distraction for users of partially automated vehicles would be required. Further evidence of this requirement is the "tragic fatality in 2016 of a driver of one of Tesla's partially automated vehicles" where inattention due to the user's reliance on automation contributed to the incident.

4.10 Prescriptive and performance-based approach to regulation

Differences in the form of performance-based regulation arise in thinking about how to characterise performance outcomes, what constitutes desired achievements with respect to the outcomes, and how to measure the level of performance that is obtained (May, 2004). Regardless of the form that performance-based regulation takes, it cannot be considered as separate from the broader regulatory (prescriptive) system. As such, implementing performance-based regulation is as much about changes in regulatory regimes as it is about introduction of performance-based standards.

Question 10: What evidence is available in support of a performance-based approach or a prescriptive approach for managing the risks of driver distraction?

Due to the nature of driver distraction, including the many factors associated with driver distraction (e.g., eating, on road advertising, mobile phone use, etc), a combination of both prescriptive and performance-based approaches may be required. This would depend on regulating the various distraction factors. For example, prescriptive rules are more specific and easier to regulate, however these rules have a higher likelihood of becoming outdated (NTC, 2018). This poses problems in relation to the vehicle; including in-vehicle technologies; which are progressing rapidly. Prescriptive laws in this case could become outdated before they are even implemented.

Performance-based approaches addressing driver distraction potentially could be more productive or beneficial for reducing the incidence of many factors related to driver distraction albeit more difficult to implement and regulate. The risk management approach utilised across the safety arena and particularly as a regulatory compliance approach (Work Health and Safety legislation), is a form of performance-based approach to safety. All stakeholders within the workplace (e.g., employers, employees, and others) have an obligation or duty of care for workplace safety. This approach utilises the risk management framework as a basis for the identification of safety hazards, assessment and control of safety risks, and continuous and monitoring and review of the safety controls/risks. The risk management approach is also utilised as the primary approach related to workplace safety compliance. This type of approach requires all stakeholders to address safety issues and follow any specific rules/laws (including road safety) and is not directed solely towards the individual worker or road user.

The problem with the risk management approach would be how to introduce regulatory requirements relevant to the general road user population. For example, some of the advantages of risk-based regulations include proactiveness, promotion of a safety culture, and fostering of an open, fair, and predictable regulatory framework through the rationalisation of the regulatory process and favouring contacts between regulators and the industry (Lassagne, Pang & Vieira, 2001), or in the road safety context - the general road user population. Among the flaws of risk-based regulations include the difficulty of assessing compliance with regulation, uncertainties related to risk evaluation, and the need for regulators to be well scientifically and technologically well informed. However, different and even radicle changes to road use regulation may be required to continue to reduce road-related statistics. The viability of performance-based approaches or frameworks may be more viable and relevant to commercial fleets including the heavy vehicle industry.

Given the low likelihood that heavy driver distraction contributes to heavy vehicle crashes and the availability of controls and countermeasures in heavy vehicle operations, the NHVR believes that the NTC should carefully consider the need to add to the already complex arrangement of prescriptive obligations for heavy vehicle drivers. The NHVR is also concerned that the introduction of a general, technology agnostic offence of distracted driving will include elements that rely on enforcement discretion. In relation to offences that include discretionary elements, the concern is that they are generally not suitable for expiation.

Whilst the NHVR supports the legal rights of every driver to have allegations of non-compliance heard in court, we have also heard of the inconvenience that results from having to appear in court away from the driver's home base or jurisdiction. Heavy vehicle drivers frequently work in multiple different jurisdictions. Should a breech be detected away from the driver's base, it is common for the matter to be held in absentia - undermining the effectiveness of drivers' capacity to defend themselves. In the absence of a *"jurisdiction of convenience"* arrangement, which allows drivers to request that matters be transferred to a nearer competent jurisdiction, mandatory court appearance will limit drivers defence.

5 Summary

Driver distraction has been reported as having a considerable influence on driving performance and is increasingly becoming recognised as a significant road safety problem not only in Australia but worldwide. In addition, in-vehicle driving distractions have become more prevalent in recent years due to the prolific amount of technology included and utilised within vehicles. This document provides a response from the NHVR to the 10 questions posed by the NTC Issues Paper "Developing technology – neutral road rules for driver distraction". The NHVR has identified the growing driver distraction issue and have taken steps to forward not only potential driver distraction regulatory issues but also research into technologies aimed at detecting and therefore reducing the instance and effect of driver distraction within the heavy vehicle industry.

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Appendix A: Avoiding Driver Distraction – EWD Application Toolkit

The section titled "Avoiding Driver Distraction" covers two pages within the complete document: "*The EWD Application Toolkit*" (e.g. pages 11-12 of 16). The *EWD Application Toolkit* is provided to technology providers who have registered a notice of intent with the NHVR.

NHVR
National Heavy Vehicle Regulator

EWD Application Toolkit

AVOIDING DRIVER DISTRACTION

This guide identifies the safety risks resulting from driver distraction and provides design considerations to minimise the risk of driver distraction resulting from operation of an EWD.[1]

Driver distraction

When a driver's attention is diverted away from activities that are critical for safe driving, the following could result:

- reduced situational awareness of hazards and surroundings
- slower reaction speeds
- dangerous vehicle behaviour such as lane wandering.

The role of technology providers in avoiding driver distraction

Technology providers should develop their candidate EWD in such a way as to ensure:

- compliance with relevant road rules
- that the operation of the EWD:
  - does not create road safety risks through driver distraction
  - is designed to be installed and operated in accordance with the Australian Road Rules (ARRs)
  - provides driver alerts in a way that does not create a safety risk to the driver or others
  - is minimally distracting (both visually and audibly).

Deployment, installation and use

Under the HVNL, and supported by Rule 299 of the ARRs, the EWD must be secured in a mounting affixed to the vehicle while the vehicle is being used.

The driver must not record work and rest entries in the EWD while the vehicle is moving.

IMPORTANT: Data entry of any kind while the vehicle is moving is a serious road safety risk due to driver distraction.

Driver alerts

The EWD will provide driver alerts, some of which will be provided while the vehicle is in motion (i.e. travelling greater than 0 km/h).

Alerts and warnings presented to the driver include:

- a calculation of potential non-compliance occurs when monitoring the work and rest changes against the work and rest option
- a malfunction or tamper event has occurred
- technology specific warnings that the technology provider identifies as critical to the EWD meeting the work diary requirements.

IMPORTANT: Excessive alerts may create serious road safety risks due to driver distraction.

Minimising driver distraction

Technology providers should design their candidate EWD to conform to the EWD Standards, the AARs and the Australian Design Rules (ADRs).

For additional best practice suggestions on minimising driver distraction please refer to the *Appendix – Minimising driver distraction (Best practice).*

[1]

Appendix – Minimising driver distraction (Best practice)

Alerts

Item	Comment
Minimised reading when in motion	The information the driver has to read should be minimised while the vehicle is in motion such that: • The text on the display should be short and unambiguous with concise information (words, numbers, abbreviations). • Internationally recognised/standardised symbols should be used in place of text where possible and should be easily understood. • Abbreviations should only be used if they are common, unambiguous and easily understood.
No display distractions	No automatically moving or scrolling text or images should be visible by the driver while the vehicle is in motion.
Quick glances	Viewing of the visual display should require drivers to make minimal, short glances at the display.
Auditory alerts	Auditory alerts should: • only contain relevant information and should be supplementary to the visual information • should be able to be silenced (muted) with one touch.
Minimal touches	Interacting with the system should only require minimal touches.

Data entry

Item	Comment
Disabled	All potentially distracting data entry should be disabled while the vehicle is moving.

EWD display interface

Item	Comment
Safe and secure	The EWD display interface should be located and mounted in the vehicle in a safe and secure fashion.
Mounted securely	The EWD display interface should be mounted securely to the vehicle.
Forward field of view	The EWD display interface must not obstruct the driver's forward field of view.
View of vehicle controls	The EWD display interface must not obstruct the driver's view of, or access to, vehicle controls.