# Developing technology-neutral road rules for driver distraction

June 2019

## Consultation regulation impact statement

National Transport Commission

# Report outline

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| **Title** | Developing technology-neutral road rules for driver distraction |
| **Type of report** | Consultation regulation impact statement |
| **Purpose** | For public consultation |
| **Abstract** | The Australian Road Rules relating to driver distraction that regulate the use of specific technology devices are becoming quickly outdated.<br>In this consultation RIS, we assess four options to compare the current technology-based road rules with different technology-neutral approaches for regulating driver distraction. We are seeking feedback on how the preferred option proposes to address the problem, the identified impacts of policy options on industry, governments and the community, the methodology used for measuring these impacts and conclusions on the preferred solution to the problem. |
| **Submission details** | The NTC will accept submissions until 4 September 2019 online at **www.ntc.gov.au** or by mail to:<br>Luis Gutiérrez<br>National Transport Commission<br>Public submission – Developing technology-neutral road rules for driver distraction<br>Level 3, 600 Bourke Street<br>Melbourne VIC 3000 |
| **Attribution** | This work should be attributed as follows:<br>Source: National Transport Commission 2019*, Developing technology-neutral road rules for driver distraction: consultation regulation impact statement*, NTC, Melbourne.<br>If you have adapted, modified or transformed this work in anyway, please use the following:<br>Source: Based on National Transport Commission 2019, *Developing technology-neutral road rules for driver distraction: consultation regulation impact statement,* NTC, Melbourne. |
| **Key words** | Driver distraction, inattention, technology, technology-neutral, Australian Road Rules, road safety |
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# Have your say

## What to submit

The views of a broad range of stakeholders are crucial to guide any policy position. As such, we are asking stakeholders to consider the questions asked in this paper. However, those questions are provided as a guide only. Stakeholders are welcome to provide us with feedback on any aspect of this consultation regulation impact statement.

You may also wish to consider the following questions:

- Is the definition of the problem accurate?
- What are the likely costs and operational impacts of the problem for government bodies, businesses/operators and other organisations?
- What are the likely costs and operational impacts of the problem on the broader community?
- Is government action needed to solve the problem? If so, why?
- Are there other related issues you consider relevant?

## When to submit

We are seeking submissions on this consultation regulation impact statement by 4 September 2019.

## How to submit

Any individual or organisation can make a submission to the NTC.

### Making a submission

Visit **www.ntc.gov.au** and select 'Submissions' in the top navigation menu.

Send a hard copy to:

Luis Gutiérrez
National Transport Commission
Public submission – Developing technology-neutral road rules for driver distraction
Level 3, 600 Bourke Street
Melbourne VIC 3000.

Where possible, you should provide evidence, such as data and documents, to support the views in your submission.

### Publishing your submission

Unless you clearly ask us not to, we publish all the submissions we receive online. We will not publish submissions that contain defamatory or offensive content.

The *Freedom of Information Act 1982* (Cwlth) applies to the NTC.

# Contents

# Executive summary

The National Transport Commission (NTC) has reviewed the Australian Road Rules regulating driver distraction and determined that they do not sufficiently address the key factors that cause driver distraction.

During the previous stage of the project, we:

- reviewed the Australian Road Rules regulating driver distraction
- identified factors associated with distraction
- analysed key issues
- sought feedback and relevant evidence to support our understanding of those issues.

The project focuses on three rules within the Australian Road Rules – those that regulate proper control of a vehicle (rule 297), the use of television receivers and visual display units (rule 299) and the use of mobile phones (rule 300) by drivers.

The NTC has prepared this consultation regulation impact statement (RIS) to propose technology-neutral regulatory options for addressing driver distraction, analyse their potential impacts and present an evidence base for deciding on a preferred option.

This process seeks to gather evidence and facilitate consultation with stakeholders and the community. We conducted a qualitative cost benefit analysis employing indicative ranges of specific costs and benefits to inform recommendations to decision makers. This Consultation RIS seeks feedback on:

- how the preferred option proposes to address the problem
- the feasibility of the technology-neutral regulatory options to mitigate the safety risks associated with distraction
- the impacts of policy options on industry, governments and the community
- approaches to measuring these impacts
- conclusions on the most cost-effective solution to the identified problem.

## Context

Distraction is nationally recognised as a critical road safety risk that needs addressing. Each Australian state and territory has been undertaking its own program with varying outcomes on specific solutions without considering a whole-of-system approach.

In May 2018, the Transport and Infrastructure Council endorsed a business case highlighting that the Australian Road Rules relating to driver distraction only regulate the use of particular technology devices and are quickly becoming outdated.

In our issues paper released for consultation in December 2018, we identified issues we consider relevant for improving the current regulation of driver distraction. We discussed issues relevant to developing regulatory solutions to driver distraction as well as those we believe need to be considered to better understand the factors associated with driver distraction.

The issues that directly relate to regulating driver distraction are:

- the lack of clarity in the Australian Road Rules
- the advantages and disadvantages of prescriptive and performance-based approaches to regulation.

Other issues we analysed were:

- responsibility for distraction
- technologies that can assist with (and distract from) the driving task
- transition towards automation.

## Options

In this consultation RIS, we assess four options. One consists of the current technology-based road rules, and the others propose different technology-neutral approaches for regulating driver distraction. These options are:

1. Status quo: While this technology-based option does not align with the Transport and Infrastructure Council's request for a technology-neutral approach, we have included it as the baseline to which all other options will be compared. The *Guideline for Ministerial Councils and National Standard Setting Bodies* requires that the 'status quo' and effectiveness of existing regulations should be considered as an option for meeting the objectives (Council of Australian Governments, 2007).
2. Prescriptive: This technology-neutral option proposes new prescriptive offences deterring specific high-risk behaviours.
3. Performance-based: This technology-neutral option proposes to address distraction by outlining the outcome sought by legislation, which is the safe execution of the driving task.
4. Hybrid: A technology-neutral option that combines elements from the previous two options and seeks to provide the benefits from both approaches while minimising their disadvantages.

## Recommendations and next steps

Following our analysis of the four options through the qualitative cost-benefit assessment framework in Chapter 8, our preliminary view is that the hybrid option is the preferred option. This option employs a combined approach and would provide:

- a clear list of high-risk behaviours and interactions that drivers must avoid regardless of the technology involved or the source of distraction
- reduced uncertainty about 'proper control' to address both the observable causes and consequences of behaviours and interactions that can impair a driver's control of a vehicle.

The hybrid option results in an overall benefit relative to the status quo, with the likely improvement in safety risk reduction significantly exceeding any potential increase in compliance costs. We expect this option to provide the highest road safety benefits in terms of reducing the number of distraction-associated road crashes.

This option has similar economic impacts as the prescriptive option because it prescribes the manual entering of addresses into devices, even if they are mounted. This option would also enable rideshare operators to use driver applications for accepting ride requests.

## Next steps

We are inviting comments, data and evidence in response to the questions below and/or any other relevant issues by 4 September 2019.

We will use stakeholder feedback through this formal consultation process to develop a decision RIS for completion in November 2019.

## List of questions

# 1 About this project

**Key points**

- The objective of the project is to see if there is a better way to regulate the safe use of technology devices as part of the road rules.
- This consultation regulation impact statement proposes technology-neutral regulatory options for addressing driver distraction, analyses their potential impacts and presents an evidence base for deciding on a preferred option.
- This process seeks to gather evidence and facilitate consultation with stakeholders and the community.

The National Transport Commission (NTC) has prepared this consultation regulation impact statement (RIS) to propose technology-neutral regulatory options for addressing driver distraction, analyses their potential impacts and presents an evidence base for deciding on a preferred option.

This process seeks to gather evidence and facilitate consultation with stakeholders and the community. We use multi-criteria and benefit threshold testing in presenting results and informing recommendations to decision-makers. This consultation RIS seeks feedback on:

- how the preferred option addresses the problem
- the feasibility of the technology-neutral regulatory options to mitigate the safety risks associated with distraction
- the impacts of policy options on industry, governments and the community
- approaches to measuring these impacts
- conclusions on the most cost-effective solution to the identified problem.

## 1.1 Project objectives

Australia's current road rules relating to driver distraction for technology devices:

- have not kept pace with the convergence of the mobile phone and new technology devices
- inconsistently treat the sources of distraction and safety risks associated with certain behaviours
- can be confusing for road users about what technology devices are legal and illegal to use when driving.

The Australian Road Rules relating to driver distraction focus on specific types of technology being used by drivers, rather than the function of such technologies. They prevent or limit the use of particular technology devices – mobile phones, visual display units and television receivers – while permitting their use as driver's aids. The current national rules date back to 1999, when texting and calling were the most common features of a mobile phone.

Driver distraction is a significant road safety risk that is not as well understood as other risk factors such as drink-driving and speeding. Research in this area is limited and relatively immature in comparison with other road safety risks. However, various studies have

consistently found that drivers are engaged in distracting activities a significant portion of their driving time.

In May 2018 the Transport and Infrastructure Council directed the NTC to:

- review the Australian Road Rules that regulate driver distraction to determine whether they sufficiently address the key factors that cause driver distraction
- consider developing a technology-neutral approach for regulating driver distraction.

This project seeks to ensure that the road rules achieve better outcomes for road users regardless of the technology used. The project will establish whether the current road rules manage the risks posed by all sources of distraction, including the use of technology devices. If required, the NTC will recommend what changes should be made to the Australian Road Rules.

Any proposed changes will consider their potential to change driver behaviour and enforceability while encouraging innovation and not prohibiting technology with the potential to improve road safety.

The potential benefits from the project include safety and regulatory efficiency.

## 1.2 Background

Distraction is nationally recognised as a critical road safety risk that needs addressing. Each Australian state and territory has been undertaking its own programs with a focus on regulating and educating drivers about the rules regarding mobile phone use.

In May 2018 the NTC presented a business case to the Transport and Infrastructure Council. In this business case, the NTC highlighted that the Australian Road Rules relating to driver distraction only regulate the use of particular technology devices and are becoming quickly outdated.

### 1.2.1 Linkages and related projects

**Queensland's Department of Transport and Main Roads project on distraction**

Since October 2017, Queensland's Department of Transport and Main Roads has led a national driver distraction research project. Stage 1 of the project (now completed) consisted of reviewing and analysing international literature and local data, engaging with leading academic researchers and consulting with drivers who admit to illegal mobile phone use to provide further insights about distraction.

The project found that driver distraction is the result of an implicit risk and reward assessment reinforced through an ecosystem of a wide range of elements.

Stage 2 of the project is ongoing and seeks to generate active involvement and collective responsibility from the stakeholder groups for generating technology-based solutions. Further detail on this project is provided in subsection 2.3.1.

### 1.2.2 International driver distraction regulation

Countries around the world are taking measures to address distracted driving. In some countries, general laws relating to safe driving are applicable to driver distraction. In the issues paper, we discussed how other countries have adopted specific legislation to address different sources of driver distraction, especially the use of mobile phones.

We demonstrated that different countries implement a broad range of approaches. The examples in the issues paper showed a lack of consistency in approaches to regulate driver distraction. This inconsistency could also be observed within countries with states or provinces adopting different approaches.

## 1.3 Approach

### 1.3.1 Project approach

The NTC uses a standard project management methodology. A summary of this is contained in NTC's work program 2017-21 (National Transport Commission, 2017). The deliverables are an Issues paper for public consultation, a Consultation Regulatory Impact Statement (RIS) for public consultation, a Decision RIS for targeted consultation and a final report with recommendations to the Council.

### 1.3.2 Project scope

The project scope includes:

- reviewing road rule 297 (the driver to have proper control of the vehicle), road rule 299 (television receivers and visual display units in motor vehicles) and road rule 300 (use of mobile phones)
- researching driver distraction and its road safety implications — this includes a literature as well as engaging with states, territories and experts to build on existing work on the sources of distraction
- identifying international driver distraction regulations and related guidelines or performance measures, and their potential application in Australia
- identifying potential issues relating to enforcing the proposed regulatory framework and any other limitations, and the regulations that may need to be changed to enforce new rules.

### 1.3.3 The National Driver Distraction Working Group

The project team established the National Driver Distraction Working Group to share knowledge among government and industry partners working to reduce driver distraction in Australia. The working group also supports the NTC in researching driver distraction and its road safety implications, providing feedback and testing the proposed regulatory options discussed in this document.

The working group membership includes representatives from:

- road and transport agencies and Police from states and territories
- Austroads
- the Federal Chamber of Automotive Industries and vehicle manufacturers
- the heavy vehicle and commercial passenger industry
- the Australian Automotive Association
- the Traffic Accident Commission
- the Royal Automobile Club of Victoria
- academics and experts specialising in driver distraction
- the Australian Road Research Board

- the Commonwealth Government.

### 1.3.4 Literature review

We commissioned the Australian Road Research Board to undertake an international literature review of the best research available to date on driver distraction. The review is available on **our website** and includes research findings on:

- distraction's impacts on driving performance
- crash risks associated to driver distraction
- the physiological symptoms and presentations of driver distraction
- guidelines for in-vehicle technologies developed to reduce negative impacts on driver performance.

### 1.3.5 Project milestones

#### 1. Issues paper

The first step was publishing an issues paper, with an invitation to interested bodies and persons to provide their input. We defined the problem and identified the key issues that required further analysis to establish the appropriate case for action for the project. This paper was released for public consultation on 11 December 2018.

The consultation period ended on 14 February 2019. We received submissions from a broad range of stakeholders. Their feedback on the issues identified in the paper informed the development of the proposed regulatory options discussed in this document.

#### 2. Consultation RIS

A RIS is required for all government decisions that are likely to have a measurable impact on businesses, community organisations or individuals. The Office of Best Practice Regulation (OBPR) advised the NTC that a Council of Australian Governments RIS will be required ahead of a Transport and Infrastructure Council's decision on the appropriate form of regulation for driver distraction.

This consultation RIS analyses the potential impacts of new regulatory options and presents an evidence base for deciding on a preferred option. This process seeks to gather evidence and facilitate consultation with stakeholders and the community. We use a multi criteria and benefit threshold testing in presenting results and informing recommendations to decision makers. This multi-criteria analysis approach is consistent with the OBPR's cost-benefit analysis guidelines (OBPR, 2007). The OBPR assessed this consultation RIS as compliant on 19 June 2019.

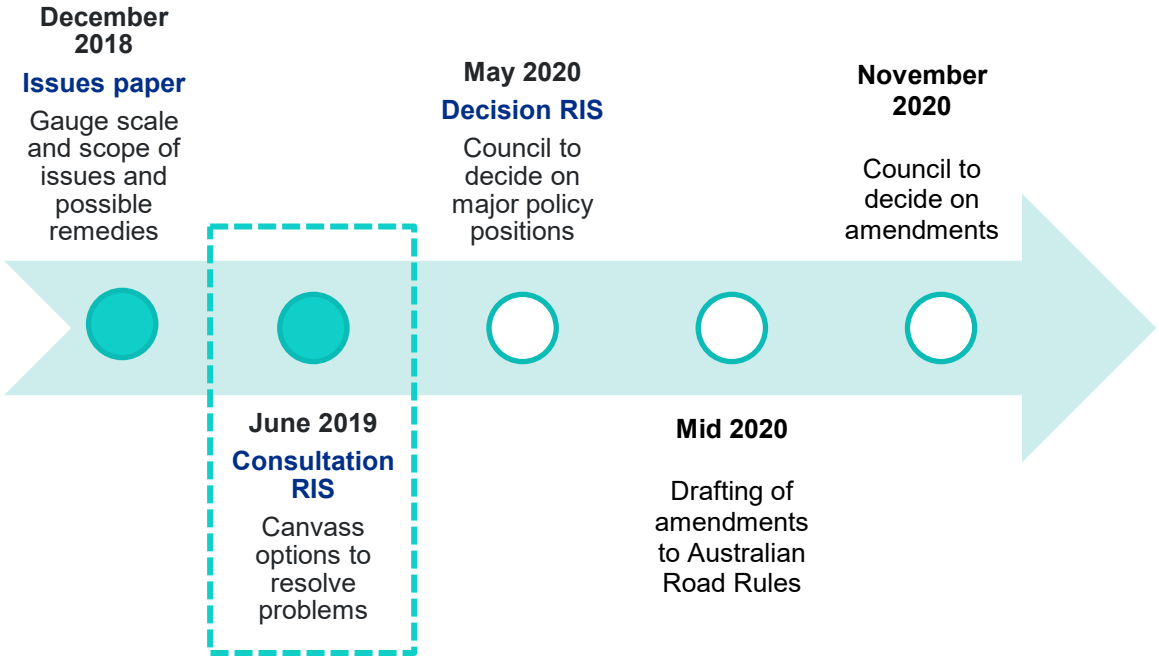
#### 3. Decision RIS

The evidence and views gathered from the public consultation for the consultation RIS will inform a decision RIS, with our final analysis of the options for technology-neutral road rules for driver distraction.

In November 2019 the NTC is scheduled to prepare the decision RIS. Developing this document will involve targeted consultation with the states and territories and industry peak bodies. This paper will detail draft policy and regulatory recommendations. It will be presented to the Transport and Infrastructure Council in May 2020 for consideration.

The timeline for these activities is presented in Figure 1.

**Figure 1. Project milestones and timelines**



# 2 Context of issues

## 2.1 Overview of issues

In the issues paper released for consultation in December 2018, we identified issues considered relevant for improving the current regulation of driver distraction. One of the NTC's primary roles is to maintain and review the Australian Road Rules.

The Australian Road Rules are model law. They form the basis of road rules in each Australian state and territory. Also, there are provisions in the Australian Road Rules that specifically leave certain matters to state and territory governments to determine (for example, penalties).

The road rules of states and territories are:

- ACT: Road Transport (Road Rules) Regulation 2017
- NSW: Road Rules 2014
- NT: Traffic Regulations
- Qld.: Transport Operations (Road Use Management – Road Rules) Regulation 2009
- SA: Australian Road Rules
- Tas.: Road Rules 2009
- Vic.: Road Safety Road Rules 2017
- WA: Road Traffic Code 2000

The main outcome of this project is to determine whether a technology-neutral approach can be incorporated into the road rules that regulate distraction. This is why the options proposed in this paper were developed based on our analysis (and stakeholder recommendations) of the issues that are directly relevant to regulating driver distraction.

However, we are aware that regulation is only one part of the system that influences the incidence of the problem and the severity of its consequences. This is the reason why we also analysed those issues we believe need to be considered to better understand the factors associated with driver distraction.

The issues directly relevant to regulating driver distraction are:

- the lack of clarity in the Australian Road Rules
- the advantages and disadvantages of prescriptive and performance-based approaches to regulation.

Other issues we analysed are:

- responsibility for distraction
- technologies that can assist with (and distract from) the driving task; and
- transition towards automation.

## 2.2 Issues relevant to regulating driver distraction in the Australian Road Rules

### 2.2.1 Technology and the Australian Road Rules

As previously discussed in the issues paper, the NTC's analysis of the Australian regulatory framework found that current road rules related to driver distraction:

- have not kept pace with the arrival of the smartphone and modern technology devices (including those built into the vehicle)
- inconsistently treat the sources of distraction and safety risks associated with certain behaviours
- can be confusing for road users and enforcement agencies regarding what technology devices are legal and illegal to use when driving.

The current Australian Road Rules focus on specific types of technology. That is, they only address the use of mobile phones, visual display units and televisions. This creates a challenge for states and territories in deciding how the current rules apply to new devices and in-vehicle technologies such as smartwatches and software like Apple CarPlay and Android Auto.

New technologies are becoming more prevalent and complex. Similar functions on different devices are not treated equally. The fast pace of innovation makes it difficult to differentiate between functions that could distract drivers and functions that may improve safety outcomes (such as intelligent speed assist).

Enacting specific legislation could be a highly effective tool for reducing road trauma if enforcement is consistent, effective and sustained over time, acting as a deterrent. Legislation can also act as a tool for shaping behaviour and fostering a culture of road safety that results in sustained reductions in road traffic injuries (World Health Organization, 2011).

The lack of clear guidance on what compliance looks like for driver distraction could reduce the effectiveness of the Australian Road Rules in achieving the desired road safety outcomes.

Stakeholders unanimously agreed with exploring technology-neutral approaches as the best way to futureproof the road rules. A technology-neutral approach to regulation could address the behaviours that result from distracting activities regardless of the device or technology. Behaviours like taking eyes off the road and hands off the wheel are likely to affect driving performance regardless of the source of distraction. The options we propose in this document seek to regulate those behaviours and the way drivers interact with technology.

As we discussed in the issues paper, we consider that developing practical definitions of the driving task and driver distraction are the starting point in the process to develop technology-neutral road rules. The definitions we propose in Chapter 3 set the foundation for the principles and assumptions we used to develop some of the options discussed in this consultation RIS.

### 2.2.2 Prescriptive and performance-based approaches to regulation

The Australian Road Rules contain a mix of performance and prescriptive-based rules for regulating driver distraction.

**Rule 297: Driver to have proper control of a vehicle**

*(1) A driver must not drive a vehicle unless the driver has proper control of the vehicle.*

Rule 297(1) exemplifies the performance-based approach. Performance-based rules allow flexibility for future innovation and technology changes. But they can also create uncertainty about what acceptable compliance may look like (National Transport Commission, 2011).

**Rule 299: Television receivers and visual display units in motor vehicles**

*(1) A driver must not drive a vehicle that has a television receiver or visual display unit in or on the vehicle operating while the vehicle is moving, or is stationary but not parked, if any part of the image on the screen:*

*a. is visible to the driver from the normal driving position; or*

*b. is likely to distract another driver.*

**Rule 300: Use of mobile phones**

*(1) The driver of a vehicle must not use a mobile phone while the vehicle is moving, or is stationary but not parked, unless:*

*a. the phone is being used to make or receive an audio phone call and the body of the phone:*

*i. is secured in a mounting affixed to the vehicle while being so used; or*

*ii. is not secured in a mounting affixed to the vehicle and is not being held by the driver, and the use of the phone does not require the driver, at any time while using it, to press anything on the body of the phone or to otherwise manipulate any part of the body of the phone; or*

*b. the phone is being used as a driver's aid and:*

*i. the body of the phone is secured in a mounting affixed to the vehicle while being so used; and*

*ii. the use of the phone does not require the driver, at any time while using it, to press any thing on the body of the phone or otherwise to manipulate any part of the body of the phone; or*

c. *the vehicle is an emergency vehicle or a police vehicle; or*

d. *the driver is exempt from this rule under another law of this jurisdiction.*

Road rules 299 and 300 fit within the definition of a prescriptive rule. Prescriptive rules provide certainty, clarity and uniformity to drivers. They are also easier to enforce and thus preferred by enforcement officers. However, their disadvantages are their inflexibility, higher likelihood of becoming outdated, and potential to hinder innovation (National Transport Commission, 2011). In addition, changes to these rules may present implementation challenges given the public's limited change awareness.

In their submissions to our issues paper, stakeholders expressed their views on the merits of these approaches. We refer to these views in the sections describing our proposed options.

The options proposed in this Consultation RIS assess the benefits and constraints of performance-based and prescriptive rules for regulating distraction. We also developed a hybrid option seeking to benefit from the flexibility of performance-based road rules and the certainty and clarity of prescriptive rules.

## 2.3 Other issues

### 2.3.1 Responsibility for distraction

The public consultation process for our issues paper highlighted unanimous agreement among stakeholders regarding the vital role other parties in the road system play in minimising driver distraction. We agree with this view and consider that there are limits to what can realistically be achieved through regulation only.

The parties that can influence driver distraction (apart from drivers) include:

- transport system managers
- companies and other employers
- vehicle manufacturers
- telecommunications companies
- advertisers
- app developers
- in-vehicle technology providers; and
- professional groups and the broader community.

The Australian Road Rules relating to driver distraction focus on the behaviour of drivers of vehicles, regardless of whether other parties and events influence driver distraction. This limits the scope of our proposed options to focusing on the responsibility of drivers. However, there are ongoing and recently completed projects that address the role parties other than drivers can play on road safety.

As we noted in Chapter 1, the Queensland's Department of Transport and Main Roads is leading a national driver distraction project that investigates potential solutions across the full range of parties that can influence distraction. The project team has engaged with more than 70 stakeholders and has held several workshops seeking stakeholder feedback on potential solutions.

The project also includes:

- a request for information process to engage with the market to address the current problem of driver distraction from using technology devices (ongoing)
- a national summit to be hosted by the Queensland and Australian governments
- an assessment of current and emerging technology-based solutions for addressing driver distraction
- reviewing Queensland's penalty regime
- investigating the applicability of chain-of-responsibility principles on employers, vehicle manufacturers and device manufacturers.

The outcomes of these activities will inform an action plan for addressing driver distraction coupled with a roadmap for their implementation.

This project will provide a timely opportunity to consider a broader range of potential solutions that could be implemented across the wider road ecosystem.

In March 2019 the Heads of Workplace Safety Authorities endorsed a new work health and safety guide titled *Vehicles as a workplace* (Austroads, 2019). The guide was published jointly by Austroads and workplace health and safety regulators from Queensland, New South Wales, Tasmania, South Australia, the Northern Territory, the Australian Capital Territory and the Commonwealth.

This guide provides practical risk management for individuals and organisations that use vehicles on public roads for work. We consider this could be a valuable tool for supporting employers in minimising driver distraction (and other road safety risks) because it encourages organisations to adopt a systematic approach to managing risks where vehicles are used as a workplace.

Several stakeholders agreed on the benefits of educating the public about driver distraction as a key non-regulatory approach to counter unsafe attitudes. The National Heavy Vehicle Regulator (2019), Truck Industry Council (2019), Royal Automobile Club of Victoria (2019) and Australian Mobile Telecommunications Association (2019) agreed that driver education and training is an essential tool for mitigating risks associated with driver distraction.

A Queensland study evaluated the effectiveness of road safety intervention to alter drivers' attitudes towards hand-held mobile phone use while driving. The study found that merely being exposed to images of drivers using hand-held mobile phones led to safer attitudes and lesser intentions towards hand-held mobile phone use while driving (Kaye et al, 2018, cited in Royal Automobile Club of Victoria, 2019). We consider that this highlights the potential for nationwide interventions conveying a consistent message to challenge driver's current perceptions about the real risks of driver distraction, including drivers' self-control and multitasking capabilities.

### 2.3.2 Technologies can assist with (and distract from) the driving task

The issues paper discussed how the widespread adoption of smartphones and similar devices have introduced new factors for driver distraction. In a recent Commonwealth Government survey, 64 per cent of respondents reported using their mobile phone while driving, including 40 per cent who made calls while driving and 21 per cent who used their mobile phone for other activities such as browsing the internet and taking photos (Department of Infrastructure, Regional Development and Cities, 2018).

Automakers and driving app developers keep adding options to allow drivers to perform additional non-driving tasks such as using social media, emailing and texting. While the design of these new functionalities would be likely to include considerations for safety, some risks may not be identified before the products enter the market. In-vehicle technology is also becoming more complicated to use, with some vehicles now featuring multi-functional buttons on the steering wheel and dashboard, touch screens, voice commands, head-up displays on windshields and mirrors and computer-generated images.

While original equipment manufacturers have taken steps to ensure human factors principles are considered during the design phase, various countries have issued guidelines seeking to harmonise design principles and processes for in-vehicle information systems and devices. These guidelines are mainly based on traditional human factors theory and principles (Goodsell, Cunningham & Chevalier, 2019). However, stakeholders have noted that the

voluntary nature of these guidelines and the lack of consistency between them has resulted in the diversity of approaches adopted by manufacturers.

The NTC has been advised that VicRoads has partnered with the Australian Automobile Association (AAA) and successfully applied for a Federation Internationale de l'Automobile (FIA) Road Safety Transformation Grant to fund the next stage of its project into developing a draft distraction safety rating for in-vehicle technology. The next stage will undertake tests with a small number of vehicles in Australia to measure distractibility in Australian conditions. The University of New South Wales (UNSW) Research Centre for Integrated Transport Innovation will undertake the testing.

This initiative provides an opportunity to explore a non-regulatory solution to driver distraction. It builds on the successful experience publishing safety ratings for thousands of different vehicles, indicating the level of safety they provide in the event of a crash.

In addition, there are opportunities for exploring other non-regulatory solutions to address technology-related sources of distraction. In their submissions to the issues paper, road user advocacy groups noted the potential of voluntary smartphone applications (for example, Do-Not-Disturb-While-Driving app) to prevent driver distraction. One of those stakeholders proposed that those applications be set as default (opt-out) in new smartphones sold in Australia.

Recent research suggests that using app-based technology could reduce exposure to high-risk behaviours among motorists, particularly young drivers (Oviedo-Trespalacios et al., 2019). We consider there is potential for improved safety outcomes from exploring opportunities to enhance the effectiveness of these applications.

### 2.3.3 Transition towards automation

In the issues paper, we discussed the safety risks from the broad adoption of partially automated vehicles. Research suggests that a small workload on the driver during periods of automation could reduce driver vigilance, increasing braking and steering reaction times in the presence of a sudden critical event (Cunningham & Regan, 2018).

In our work looking into legislative reform to support automated vehicles, we discussed that the Australian Road Rules assume that drivers are always human. The road rules do not envisage a situation where an Automated Driving System, rather than a human driver, is in control of the dynamic driving task. This means that obligations relating to driving and road safety through complying with traffic laws are placed on a human driver (National Transport Commission, 2017a).

For this reason, any regulatory amendments resulting from this project will apply to drivers of vehicles with level 2 automation capabilities. The **NTC's automated vehicle program** is considering safety issues for levels 3, 4 and 5 and will develop an approach for managing human user responsibility for those levels of automation. The team responsible for this project will maintain close engagement with the automated vehicle program to ensure alignment between both projects.

## 2.4 Consultation

In December 2018, the NTC published *Developing technology-neutral road rules for driver distraction: issues paper*. This paper analysed the six issues discussed in this paper to inform our approach and posed 10 questions. The public consultation for the issues paper was between 11 December 2018 and 14 February 2019.

We received 42 submissions. Of these, 32 were public and are available on **the NTC website**. Ten submissions were made on a confidential basis. Submissions were received from a wide range of stakeholders including state and territory governments, local governments, police, academics, vehicle manufacturers, telecommunications industry peak bodies, motoring clubs, insurers, the heavy vehicle regulator and technology providers (see Figure 2).

Through this process we received substantial feedback on the issues we discussed in the paper, including:

- the definitions of driving task and driver distraction
- whether a distinction between manageable and unmanageable levels of distraction could inform regulation
- the treatment of conventional and technology-based causes of distraction in the Australian Road Rules
- responsible parties for distraction
- prescriptive and performance-based approaches to distraction.

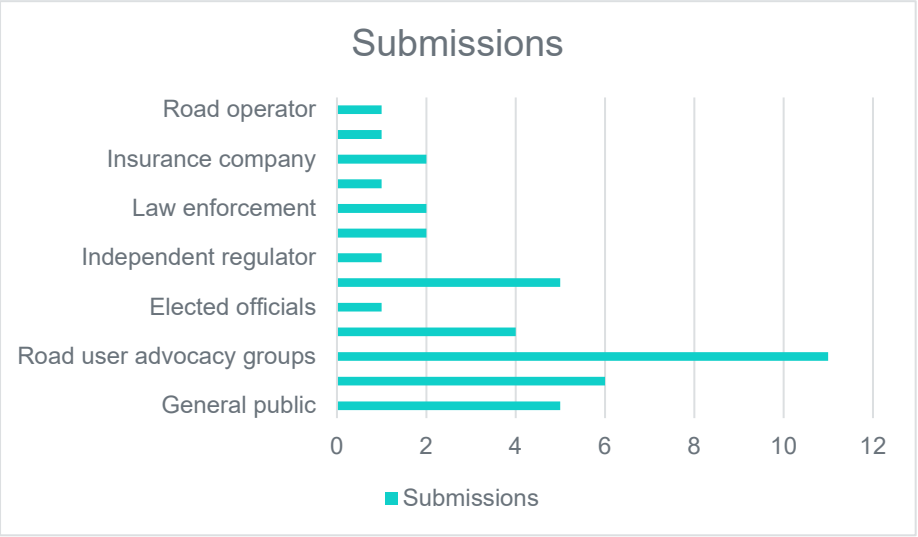
The feedback has helped us test or confirm our work, understand the issues that are important to stakeholders and shape the regulatory options proposed in this consultation RIS.

The NTC incorporates views expressed by stakeholders into its analysis. To provide maximum transparency about our reasoning while protecting the rights of stakeholders to make confidential submissions, we refer to these views in our analysis by identifying the sector from which they came.

Since the start of the project, we have held ongoing engagement with a range of stakeholders. This has included meetings with states and territories for discussions with representatives of transport and road safety agencies and bodies. It has also included engagement with road and transport agencies and police, other government representatives who provided input included compulsory third-party insurers and international jurisdictions.

During this time, we also spoke with a variety of non-government stakeholders including the automotive industry representatives, road user advocacy groups, motoring clubs and local and international experts.

**Figure 2. Submissions by stakeholder type or sector**




**6**
**Industry groups**

**11**
**Road user advocacy**

**5**
**States and Territories**

**4**
**Research/Academia**

# 3 Options

**Key points**

- The Australian Road Rules relating to driver distraction do not clearly identify the distracting activities that affect driving performance and have not kept pace with technological development.
- The submissions to the issues paper and the best available research informed the four-step process for addressing the problem:
  - Develop guiding principles for our options.
  - Identify the key functions of the driving task.
  - Clarify proper control.
  - Define driver distraction and formulate common criteria for the options.
- The options resulting from this process are:
  - Status quo: the baseline against which all other options will be compared.
  - Prescriptive: consists of new prescriptive offences deterring specific high-risk behaviours.
  - Performance-based: addresses distraction by describing the outcome sought, which is the safe execution of the driving task.
  - Hybrid: combines elements from the two previous options to maximise their advantages.

## 3.1 Problem statement and the need for government intervention

Driver distraction is a significant road safety risk that is not as well understood as other risk factors. Despite the research limitations, various studies have consistently found that drivers are engaged in distracting activities a significant portion of their driving time. However, the Australian Road Rules relating to driver distraction do not clearly identify the distracting behaviours and have not kept pace with technological development.

Driver distraction consists of diverting attention away from activities that are critical for safe driving towards a competing activity (Regan, Hallett & Gordon, 2011). An Australian Naturalistic Driving Study found that drivers are engaged in a non-driving activity while at the wheel every 96 seconds (Young et al., 2018).

Distracted drivers' behaviour has been found to be at least as dangerous as drunk driving. A US study found that the impairments from using a mobile phone while driving can be as profound as those associated with driving with a blood-alcohol level of 0.08 per cent (Strayer et al., 2006). One major difference is that we are likely to be exposed to distracted drivers during most of the day. According to the National Highway Traffic Safety Administration in the US, two-thirds of road fatalities between midnight and 3 am involve alcohol-impaired driving, with fatal crashes four times higher at night than during the day (NHTSA, 2017, cited in Zendrive, 2019). In contrast, distracted drivers are on the road during most of the day, with the highest prevalence between 7 am and 6 pm (Zendrive, 2019).

Distraction can affect different drivers in different ways. For example, age and driving experience have been found to be a factor on the level of crash risk resulting from a distracting activity (Goodsell, Cunningham & Chevalier, 2019).

Studies suggest that young and less experienced drivers' lack of driving skills does not leave spare attentional capacity to allocate to a secondary non-driving task (Regan et al., 2011, cited in Goodsell, Cunningham & Chevalier, 2019). Data derived from a Naturalistic Driving Study confirms this, finding that the performance of a range of competing activities increased crash and near-crash risk for novice drivers, but not for more experienced drivers (Klauer et al., 2014, cited in Goodsell, Cunningham & Chevalier, 2019).

Other studies have found that older people also find it difficult to share attention between two simultaneous tasks. Their decreased visual and cognitive capacity makes them more susceptible to getting distracted when interacting with devices (Young & Regan, 2007).

Results of naturalistic driving studies indicate that distraction is not only a problem for regular drivers. Driver distraction is also prevalent in light vehicle and commercial vehicle operations (Olson et al., 2009).

In Australia, distraction has been found to be a factor in 16 per cent of crashes where a vehicle occupant was hospitalised for at least 24 hours (Beanland et al, 2013). The 2017 preliminary summary of fatalities on Western Australian roads found that 28 fatalities (17 per cent) in 2017 were from inattention related crashes, representing an increase of more than 100 per cent on the previous five-year average (Road Safety Commission, 2018).

While drivers may understand the risks associated with mobile phone use, they choose to engage with these types of distracting activities. A Commonwealth Government survey found that a significant number of drivers engage in distracting activities prohibited by road legislation while knowing that it could increase their risk of crashing. Approximately one in five drivers (21 per cent) admitted that they use their mobile phones for non-driving activities such as browsing the internet, texting, taking photos or using applications (Department of Infrastructure, Regional Development and Cities, 2018).

The findings in this survey align with research that has consistently found a poor causal relationship between drivers' attitudes and behaviour (Elliot, 1992; Tranter & Warn, 2008; Verschuur & Hurts, 2008; Watson, 1997). Extensive road safety research shows that the most powerful influences on crash risk are the behavioural choices that road users make (Ulleberg & Rundmo, 2003).

The mismatch between drivers' attitudes and behaviours can be partly explained by the subjective decisions they make to balance efficiency and safety during daily driving (Fuller, 2005 and Kinnear et al., 2013, cited in Ba et al., 2015). Research has found that those decisions are more influenced by their perceived rewards than by potential risks to themselves and others (Ba et al., 2015).

This mismatch is also observed in young drivers. Their risk taking has less to do with their skills and knowledge and more to do with their motivation, exposure and other psychological factors (Christie & Harrison, 2003; Isler, Starkey & Sheppard, 2011; Johnson & Jones, 2011; Twisk, 2007).

In addition, a large portion of drivers believe that diverting their attention to secondary tasks does not impair their own driving performance while admitting that it is a problem for other

drivers (Watson & Strayer, 2010). This belief is against evidence showing that 97.5 per cent of drivers experience a significant reduction in driving performance when executing a secondary task (Watson & Strayer, 2010).

A driver's decision to engage in distracting activities can have significant effects on passengers and other road users. These effects include hospital care, emergency services responses and the use of other public resources. A study in Victoria estimated fatality and serious injury costs to the community for in-vehicle technology distraction over a five-year period at about $1.2 billion (Fitzharris, Young & Bowman, 2012). The high cost to society from driver distraction could be reduced significantly if drivers considered those risks before engaging in secondary activities.

The NTC's analysis of the Australian Road Rules has found that the rules related to driver distraction:

- have not kept pace with the arrival of the smartphone and modern technology devices (including those built into the vehicle)
- inconsistently treat the sources of distraction and safety risks associated with certain behaviours
- can be confusing for road users and police regarding what technology devices are legal and illegal to use when driving.

The Australian Road Rules focus on specific types of technology that cause driver distraction rather than on distracted driving behaviours that are known to be most risky from a safety perspective. The current rules only preclude or limit the use of specific technology devices – mobile phones, visual display units and television receivers – while permitting their use as driver aids. The current national rules date back to 1999, when texting and calling were the most common features of a mobile phone.

Devices later introduced to the market are not explicitly addressed by the model legislation. States and territories have been required to interpret those rules based on similarities between new devices and mobile phones and visual display units to be able to regulate their use by drivers.

Software installation dictates the functions available in devices instead of the hardware. This means that our current prescriptive road rules (rules 299 and 300) cannot keep up with the growing number of functions available to drivers. Also, these rules treat similar functions differently because they are being used in different devices, regardless of their comparable safety risks.

Innovation has made it difficult to differentiate between functions that could distract drivers and functions that may improve safety outcomes. The Australian Road Rules do not distinguish between functions likely to cause distraction and those needed for the driving task (or where they can improve driving performance).

The lack of clarity in legislation means that drivers do not really know what does and does not conflict with the driving task, with multiple devices being used while operating vehicles (both in-vehicle and portable). While manufacturers sometimes provide instruction manuals with guidelines on appropriate use, these are often not read or are easily ignored by the end-user, meaning that the incentive to engage with technology is not balanced with knowledge of its distractive and safety consequences (Parnell, Stanton & Plant, 2017).

In the issues paper we discussed that automakers and driving app developers keep adding functions enabling drivers to perform additional non-driving tasks. For example, General Motors is developing a marketplace platform that will allow in-vehicle online shopping for goods and services (Business Insider Australia, 2017). While the design of these new functionalities would be likely to include considerations for safety, some risks may not be identified before the products enter the market.

The lack of clear guidance on what compliance looks like for driver distraction could reduce the effectiveness of the Australian Road Rules in achieving the desired road safety outcomes. The current rules make it difficult for:

- the public and enforcement agencies to identify the behaviours that could result in distraction
- government agencies to estimate the role of distraction in crashes and critical incidents (Regan, Hallett & Gordon, 2011).

**Question 1:** What other factors should be considered in the problem statement?

**Question 2:** Has the consultation RIS provided enough evidence to support the case for government intervention? What else should be considered and why?

## 3.2 Process for addressing the problem

As discussed in Chapter 1, the Transport and Infrastructure Council directed the NTC to develop technology-neutral road rules for driver distraction. Through the public consultation for the issues paper, we received substantial feedback that informed the process for preparing the regulatory options proposed in this consultation RIS.

We approached this process by looking into the behaviours associated with distracting activities instead of focusing on the causes of driver distraction. This will allow us to formulate road rules without referring to specific devices and thus making the rules less likely to become outdated when a new device enters the market.

The process followed four steps:

1. Develop guiding principles for our options.

   Identify the key functions of the driving task.
2. Clarify proper control.
3. Define driver distraction and formulate common criteria for the options.

Our work on developing technology-neutral regulatory options considered the need for rules that:

- focus on the behaviours associated with distraction that have a direct negative impact on driving performance
- apply to all drivers or riders of vehicles

- apply to all drivers of vehicles regardless of their age and the purpose of their trip
- apply to all vehicles in the driving fleet regardless of their age
- are capable of addressing diverse causes of distraction
- consider the best evidence available to ensure that the outcomes of the project are credible to the community
- maintain restrictions on unsafe interactions with mobile phones and visual display units.

In the issues paper, we discussed why it is necessary to identify the core functions of the driving task. It is a crucial first step for addressing the behaviours associated with distraction that could affect driving performance.

Once we identified these functions, we applied criteria to select the functions that would be the essential elements for including in examples of proper control in the road rules. Such examples could be useful in providing a performance-based framework for addressing driver behaviours associated with distracting activities that would be difficult or not feasible to target with prescriptive rules.

We also developed a definition of driver distraction for this project as the starting point to determine which distracting activities can feasibly be addressed by regulation and how to address them. This helped us formulate two common criteria for developing the options proposed in this consultation RIS.

The findings from several naturalistic driving studies helped us form the basis for the developing these technology-neutral approaches. To test the resulting approaches, we compiled a list of causes of distraction from several naturalistic driving studies below and matched them (and their associated risk levels) with our regulatory responses for each option. We provide a table contrasting the regulatory responses with the findings from the naturalistic driving studies (odds ratios,[1] PAR,[2] duration and prevalence) in Appendix A.

The following sub-sections explain this process.

### 3.2.1 Developing guiding principles for our options

The feedback received during public consultation on our issues paper and from our review of the available evidence on driver distraction provided us with useful information for deciding our approach. Our consideration of this information shaped the development of the following principles.

**Proposed amendments or changes to the road rules would focus on the behaviours associated with distraction that have a direct negative impact on driving performance**

As previously discussed, the Transport and Infrastructure Council directed the NTC to develop technology-neutral road rules. We implemented this mandate in developing the regulatory options, changing the focus on specific devices to the unsafe behaviours and

[1] The relative risk of a safety critical event occurring when driver engages in secondary tasks compared with baseline.

[2] This calculation produces an estimate of the percentage of crashes and near-crashes occurring in the population at-large that are attributable to the inattention-related activity. This is a useful metric since odds ratios estimate risk on a per-task (or drowsiness episode) basis while the population attributable risk percentage accounts for the frequency of occurrence.

interactions that result in a demonstrated detriment of driving performance. As the Australian Road Research Board noted in its submission to the issues paper, the behavioural responses to engage with the source of distraction (eyes off road, mind off road, hand(s) off wheel) are most likely the direct cause of driving performance impairment (Chevalier, Cunningham & Roberts, 2019). One submission by a law enforcement agency also supports this view.

Research indicates that visual manual interactions can significantly impair driving performance (Goodsell, Cunningham & Chevalier, 2019). A number of naturalistic driving studies demonstrate how visual activity away from the road and traffic ahead and a hand off the steering wheel, independent of the cause of distraction, increases the risk of a crash (Goodsell, Cunningham & Chevalier, 2019). For example, a study using data from 100 vehicles suggests that dialling a handheld phone is associated with a crash risk 12 times greater compared with undistracted driving (Dingus et al., 2016, cited in Goodsell, Cunningham & Chevalier, 2019). The same study also found that composing a text message on a handheld mobile phone could increase the crash risk six fold. Research demonstrates that visual manual interactions that take the driver's eyes off the road are especially dangerous for safe driving, confirming the significant visual component of driving (Goodsell, Cunningham & Chevalier, 2019).

Our approach will seek to target these behaviours and interactions regardless of the distracting activity that triggered them. This regulatory approach is a significant departure from the current road rules (and most regulatory approaches across the world) which focus on specific causes of distraction – such as mobile phones and visual display units in the case of the Australian Road Rules. Under a technology-neutral approach, the road rules would seek to discourage interactions that result in a driver's eyes off the road and/or hands off the wheel. For example, instead of drafting a rule that seeks to prevent drivers from sending text messages on a mobile phone, legislation would rather prevent drivers from entering text-based information on a screen or an input device. This way regulation would consistently target a behaviour that has been proven by research to decrease driving performance across all existing and future devices (portable or provided by vehicle manufacturers). A technology-neutral approach focuses on unsafe interactions as opposed to restricting the use of specific devices.

**Any new offences would apply to all drivers and riders of vehicles**

In the issues paper, we specified that this project would focus on the driver and the rider of a motor-vehicle as defined in the Australian Road Rules. This definition includes cars, buses, trucks and motor bikes.

Three submissions to our issues paper recommended that we broaden the project scope to include other road users.

Two state government road safety agencies recommended that we consider including cyclists and users of other vehicles in the project scope. They noted that one of the key objects of the Australian Road Rules is to provide uniform rules across Australia for all road users. This object is described in Part 1, section 3 of the Australian Road Rules. The objects of the law declare that the Australian Road Rules should identify uniform rules regardless of road user type.

The current road rules relating to driver distraction apply to all vehicles. Australian Road Rule 19 (Part 2, Division 2), establishes that references to driver includes rider unless otherwise expressly stated. The Australian Road Rules define rider as the person who is riding a motor-bike, bicycle, animal or animal-drawn vehicle. Road rules 297, 299 and 300 refer to drivers of vehicles without expressly exempting riders.

After considering this recommendation, we have decided that any changes or amendments proposed in the options considered in this consultation RIS should apply to drivers and cyclists. This would be in line with the object of the Australian Road Rules and would harmonise and simplify implementation of any proposed changes or amendments to the road rules. Our assessment of this matter is that the proposed amendments under each option would not result in any material change in safety risks or additional burden if applied to cyclists. As such, the options should apply to cyclists as well to ensure the principle of harmonised road rules is maintained.

The Pedestrian Council of Australia (2019) also recommended that the project scope be broadened to include pedestrians. The current road rules relating to driver distraction do not apply to pedestrians and broadening our scope to include them could create significant implementation issues. There are clear differences in the way pedestrians and other road users are affected by distraction while on public roads and road-related areas.

We consider that a suitable approach for regulating driver distraction would not be appropriate for addressing pedestrian distraction.

**New or amended rules would apply to all drivers of vehicles regardless of their age/experience and the purpose of their trip**

As we discussed in the problem statement (see section 3.1), we recognise that distraction can affect different drivers in different ways. However, naturalistic driving studies show that activities that result in visual manual interactions significantly increase crash risk, regardless of the driver's age or driving experience and the purpose of the trip. For this reason, the options proposed in this consultation RIS do not make distinctions based on the type of driver.

This would not, however, impede states and territories from imposing restrictions or prohibitions on specific licence classes.

**The rules resulting from this project should apply to drivers of all vehicles in the driving fleet regardless of the vehicle's age**

By January 2018, the average age of all vehicles registered in Australia was 10.1 years. Tasmania reported the oldest average age at 12.8 years, while the Northern Territory and the Australian Capital Territory had the youngest fleet with an average age of 9.4 years.

Any changes to the road rules should apply to all vehicles regardless of their age and the level of technology provided by manufacturers. By focusing on high-risk behaviours, rather than technology, our project's approach eliminates the challenge of regulating driver interactions with both old and new technologies.

**The focus on high-risk behaviours associated with distracting activities means the rules should be able to address diverse causes of distraction**

The focus on high-risk behaviours that result from distracting activities leads us to conclude that any proposed changes to the road rules should also address non-technological causes of distraction. As we noted at the beginning of this sub-section, research demonstrates that visual manual interactions are especially dangerous when driving.

Not including non-technological sources of distraction that result in high-risk interactions in our approach would result in an inconsistent and differentiated treatment of similar behaviours. For example, one Naturalistic Driving Study found that reading and writing can result in a crash or near-crash risk over 62 per cent higher than the risk estimated for text

messaging risk (Dingus et al., 2016, cited in Goodsell, Cunningham & Chevalier, 2019). Developing a regulatory approach that only addresses text-based distracting activities from technology would treat similar interactions that result in the same type of distraction (visual manual) quite differently, even though they both carry similar risk.

In addition, the vast majority of submissions to the Issues paper agreed to treating all sources of distraction equally. For example, the Monash University Accident Research Centre considers that findings from their research highlight that conventional and technology-based tasks should be treated equally in developing distraction-based road rules (Young, Horberry & Charlton, 2019). Similarly, the Australian Road Research Board suggested that conventional and technology-based causes of distraction could be treated equally if the behavioural responses to engage with the source of distraction (eyes off road, mind off road, hand(s) off wheel) are the focus of regulation (Chevalier, Cunningham & Roberts, 2019). One submission by a law enforcement agency also recommended that our project ensures that rules are not restricted to devices because non-device-related distraction also carries road safety risks.

Conventional or non-technological sources of distraction that have been deemed as of high risk in the literature include writing, reading and reaching for an object. Further detail on the risk levels estimated for different sources of distraction is provided at Appendix B.

**Our regulatory approach will consider the best evidence available to ensure the outcomes of the project are credible to the community**

In his submission to our issues paper, the Member for Eastern Metropolitan Region (Parliament of Victoria) advocated for a zero-tolerance approach to technology use in vehicles (Barton, 2019). While the NTC acknowledges the terrible impact that distracted driving can have on road users and the community, we must also consider the available evidence from different sources of distraction to determine what can feasibly be achieved through regulation.

The significant impacts that visual manual driver interactions with technology have on driving performance have been consistently proven (Goodsell, Cunningham & Chevalier, 2019). However, research on the impacts of other types such as voice-based interactions is not conclusive. While some studies consider hands-free mobile use be detrimental to driving performance and of a similar impact to hand-held use (Caird et al., 2018, cited in Goodsell, Cunningham & Chevalier, 2019), a Naturalistic Driving Study on commercial vehicles found that talking on a hands-free mobile phone to carry a low risk (odds ratio lower than 1) and provided a significant protective effect (Olson et al. 2009). In addition, an analysis of 43 studies suggests using voice-controlled functions may be less detrimental to driving performance than visual manual interactions with technology (Simmons et al., 2017, cited in Goodsell, Cunningham & Chevalier, 2019).

An absolute ban of all technology use by drivers could be perceived as not evidence-based and affect public perception of the legitimacy of regulation. This perception of legitimacy could be a factor in the public's willingness to comply with any new or amended rules for driver distraction (Tyler, 2001, cited in Yagil, 2005). This factor is highly relevant given that the majority of Australian drivers (57 per cent) would be likely to oppose the introduction of a complete ban (Department of Infrastructure, Regional Development and Cities, 2018).

**Existing focus on visual and visual manual unsafe interactions with technology should be maintained**

Rules 299 and 300 regulate the use of mobile phones and visual display units by drivers. While these rules are outdated and their applicability is limited, we consider that the

legislator's intent is mostly in line with findings from Naturalistic Driving Studies. These studies confirm that visual and visual manual interactions with technology devices result in a significant crash risk. In its submission to our issues paper, the Research Centre for Integrated Transport Innovation at the University of New South Wales (rCITI) agreed with our views about the current emphasis in the Australian Road Rules on visual manual driver interactions with technology (Regan & Prabhakharan, 2019).

We will ensure that any proposed changes to the road rules maintain a similar treatment to unsafe visual manual interactions with technology.

### 3.2.2 Identifying the key functions of the driving task

In our issues paper, we proposed a definition for the driving task that drew elements from Brown's (1986) definitions, as well as elements from the Society of Automotive Engineers' work to define the driving task for automated vehicles. During the public consultation for the issues paper, stakeholders provided their views on the functions they consider essential for the driving task. Some of the functions proposed, while important, are more relevant to work-related tasks and therefore only applicable to specific types of drivers, for example:

- legal requirements such as work diaries and licensing procedures
- vehicle issues such as size, stability and load distribution
- complying with rules and regulations applicable to the type of vehicle
- passenger requirements/issues such as 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 commercial/heavy vehicles, including turning and braking; and endurance/fatigue and vigilance demands associated with long periods spent on the road.

In contrast, rCITI recommends focusing on the functions proposed by Brown (1986) because they better encompass, at a functional level, the hundreds of tasks required for driving (Regan & Prabhakharan, 2019). The list of functions proposed in Brown's definition of the driving task would be required to be executed by all drivers regardless of the type of vehicle.

After considering this feedback, we defined the driving task on the basis of the principle of developing rules that will apply to all drivers of vehicles without distinction. This means that the functions of the driving task we need to consider for this project should be applicable to all types of drivers. These functions should also have a direct connection with whether drivers are executing the driving task in a safe manner (for themselves and other road users).

We also considered the alignment of all these functions with the activities critical for safe driving. These are defined as those activities required for the control of safety margins (Engström et al., 2013). This definition refers to activities such as maintaining headway, keeping in the lane, visually scanning an intersection for oncoming vehicles, deciding whether to yield and interpreting safety-related traffic signs, but excludes those driving-related activities that are not directly related to safety margin control, such as navigation and route finding (Engström et al., 2013).

After applying these considerations to the list of functions of the driving task proposed in the issues paper, we end up with the following functions:

- lateral motion control
- longitudinal motion control

- monitoring the driving environment
- manoeuvre planning
- responding to objects, events or other road users
- making other road users aware of the driver's presence
- complying with road rules.

### 3.2.3 Clarifying proper control

In the issues paper, we discussed how rule 297(1) requires that drivers have proper control of their vehicles without providing any further information about what 'proper control' means. In that opportunity, we noted that this rule does not provide any clarity to drivers and police about what compliance looks like.

We have reviewed preliminary infringement figures for this rule in different jurisdictions over the past three years. While we found significant differences across jurisdictions, infringements for the offence in 297(1) were in all cases a small fraction of the number of infringements when compared with rule 300. This information is highly relevant because rule 291(1) is the only tool in the Australian Road Rules to address all sources of distraction not associated with the use of mobile phones and visual display units.

In its submission to the issues paper, the Monash University Accident Research Centre discussed findings from a range of studies that reveal that drivers engage in conventional, or non-technology-based, tasks more frequently than technology-based tasks (Young, Horberry & Charlton, 2019). The same submission also cited studies showing that some conventional tasks can be just as risky, or even more risky, than technology-based tasks. This aligns with a study that revealed that that a larger proportion of drivers involved in accidents are distracted by eating or drinking (1.7 per cent) than by talking on a mobile phone (1.5 per cent) (Stutts et al, 2001, cited in Young & Regan, 2003).

For these reasons, we consider that our project provides an opportunity to find a way to reduce uncertainty about what compliance looks like under this rule. A submission to our issues paper by a law enforcement agency suggested that uncertainty may be addressed in performance-based approaches by providing adequate supporting information such as definitions, descriptions or examples of the thresholds and behaviours that may be a result of distraction.

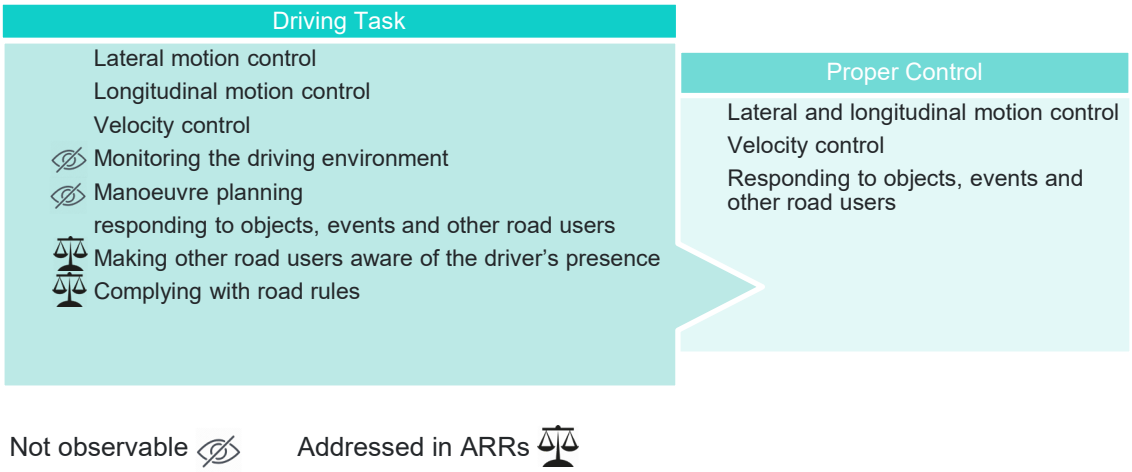
Identifying the essential functions of the driving task could provide more clarity to the public and police about what compliance could look like.

After identifying the key functions for the driving task in the previous sub-section, we applied the following criteria to highlight the essential elements of the driving task that would be required for maintaining proper control of a vehicle:

- Execution of functions need to have observable or identifiable safety consequences
- Execution of functions must not be already addressed in another section of the Australian Road Rules.

Figure 3 illustrates this part of the process, showing the resulting elements we that will form the basis for examples of proper control in the road rules.

**Figure 3. From the driving task to proper control**




Therefore, to have proper control drivers should avoid any activities that would compromise their ability to:

- have lateral and longitudinal motion control
- have velocity control
- appropriately and safely respond to objects, events and other road users.

These elements align with literature on the observed consequences of driver engagement in distracted activities. Driving at reduced, inconsistent speed and poor lane keeping have been consistently associated with driver engagement in distracting activities (Young & Lenné, 2012).

In some of the options for this consultation RIS, we are proposing that rule 297(1) be amended to include examples of proper control that include the elements listed above. Examples are provided throughout the Australian Road Rules, sometimes by explanation and sometimes by diagrams. They are not exhaustive, which would maintain a level of flexibility for police and drivers to exercise their judgement about what acceptable compliance looks like.

If we adopt this amendment in the road rules, examples of proper control would include:

- having directional control
- having acceleration and speed control
- detecting and safely responding to objects, events and other road users.

### 3.2.4 Defining driver distraction

During the public consultation process, various stakeholders proposed amendments to our proposed definition of driver distraction in the issues paper. We have considered those suggestions and analysed them from the perspective of the principles in subsection 3.2.1.

rCITI's submission proposed a definition for driver distraction that assumes a driving- or non-driving-related competing activity that distracts as the source of distraction (Regan & Prabhakharan, 2019). rCITI considers that its definition is more workable and operational than the definitions proposed in the issues paper (Regan & Prabhakharan, 2019). The definition proposed by rCITI is as follows:

*"Driver distraction is the diversion of attention away from activities critical for safe driving toward a competing activity, which may result in insufficient or no attention to activities critical for safe driving" (Regan, Hallett & Gordon, 2011)*

We agree with rCITI's assessment and consider that the proposed definition aligns with the principles we developed in subsection 3.2.1. We adapted that definition to include the concepts the logic of this project is based on.

For the purpose of this project, we define driver distraction as:

*"The diversion of attention away from activities critical for the safe execution of the driving task towards a competing activity, which may diminish the driver's proper control of the vehicle." - Adapted from Regan, Hallett and Gordon (2011)*

The benefits of using this definition in developing the options proposed in this consultation RIS include:

- driver engagement in distracting activities can be driving or non-driving-related
- activities (especially for a prescriptive approach) associated with distraction are executed by the driver and not caused by external factors
- it shares common elements with a definition endorsed by international experts (consistency).

This definition for distraction informed the following criteria that guided the development of the prescriptive approach included in some of the options proposed in this consultation RIS.

**Options will focus on behaviour resulting from distracting activities**

The focus on behaviours resulting from competing activities (driving or non-driving-related) that diminish the driver's proper control of the vehicle rules out other forms of inattention that are more difficult to observe and, therefore, to enforce. This focus also excludes involuntary and external causes of distraction, which could be difficult to regulate (especially through prescriptive rules).

**Options will focus on behaviours performed by drivers**

Only those distracting activities that take place in the vehicle or with the driver can be addressed by the Australian Road Rules. The road rules only apply to vehicles and road users on a road or road related area (road rule 11). Therefore, the options proposed in this document will only focus on high-risk behaviours performed by drivers.

**Question 3:** Are there issues relevant to developing technology-neutral road rules for driver distraction not covered by the process for addressing the problem?

**Question 4:** Can you provide evidence that would support a different treatment for cyclist distraction?

**Question 5:** Do the proposed examples for proper control reduce the uncertainty about compliance with the offence in road rule 297(1)? What other elements do you think could be incorporated?

## 3.3 Options

In this consultation RIS, we assess four options to compare the current technology-based road rules with different technology-neutral approaches for regulating driver distraction. These options allow us to assess the merits of performance-based and prescriptive rules for regulating distraction.

In the issues paper, we discussed the mix of performance and prescriptive-based provisions for regulating driver distraction in the Australian Road Rules. We also discussed the pros and cons of both approaches to regulation. In their submissions, most of our stakeholders agreed with our analysis of these approaches and recommended that any changes should strive for a balance between them.

The proposed options seek to address this issue by allowing us to compare and assess these approaches. These options are:

1. Status quo: While this technology-based option does not align with the Transport and Infrastructure Council ministers' request for a technology-neutral approach, we have included it as the baseline against which all other options will be compared. The *Guideline for Ministerial Councils and National Standard Setting Bodies* requires that the 'status quo' and effectiveness of existing regulations should be considered as an option for meeting the objectives (Council of Australian Governments, 2007).
2. Prescriptive: This technology-neutral option proposes prescriptive regulatory responses to causes of distraction that align with the principles discussed at sub-section 3.2.4.
3. Performance-based: This technology-neutral option proposes a fully outcomes-based regulatory approach to a broad range of causes of distraction, both technology- and non-technology-based.
4. Hybrid: A technology-neutral option that combines elements from the previous two options and seeks to provide the benefits from both approaches while minimising their disadvantages.

We developed a qualitative cost-benefit assessment framework to assess these options. The criteria our framework is based on covers the key identified potential impact areas of these options:

- Effectiveness: The benefits of laws to mitigate against the risk of driver distraction are essentially the degree such laws are effective in mitigating those risks. The effectiveness of efforts to reduce behaviour that increases safety risks are ultimately determined by how well these laws reduce the prevalence of high-risk behaviour.
- Efficiency: The efficiency with which those laws achieve that risk reduction is determined by the level of social costs (government or non-government such as regulatory burden) incurred in achieving them.
- Coherence: The NTC is a national reform agency that develops transport law reform under direction from the Transport and Infrastructure Council. Our work needs to align with the Transport and Infrastructure Council's Strategic Work Programme and directions.

These four options are explained in in the following chapters. Our analysis and preliminary view on a preferred option are provided in Chapters 8 and 9. Further details on the qualitative cost-benefit assessment framework and the criteria used in the options assessment is also available at Chapter 8.

A comparison of these options based on an indicative list of driver engagement in secondary activities is provided at Appendix C.

**Question 6:** Are the four options clearly described? If not, please describe the areas that may be missing.

# 4 Status quo

**Key points**

- The status quo is the baseline by against all other options will be compared.
- Australian Road Rules 297, 299 and 300 would be maintained in their current form.
- Any amendments to these rules would be the responsibility of the Australian Road Rules Maintenance Group as part of its role in periodically reviewing the Australian Road Rules.
- This option relies on rules dating back to 1999, when texting and calling were the most common features of a mobile phone.
- For this option, we have strictly focused on the letter and intent of the Australian Road Rules. This means we have not included the variations and interpretations that states and territories have used to apply them to a broader range of interactions with a wider range of devices.

## 4.1 Description of the status quo

While this option doesn't align with the Transport and Infrastructure Council ministers' request for a technology-neutral approach, we have included it as the baseline by against all other options will be compared. This is required by the Guideline for Ministerial Councils and National Standard Setting Bodies (Council of Australian Governments, 2007).

This option represents a predominantly technology-based approach. This means that the rules would still focus on driver use of specific technology devices. Australian Road Rules 297, 299 and 300 would be maintained in their current form. Any amendments to these rules would be the responsibility of the Australian Road Rules Maintenance Group as part of its role in **periodically reviewing the Australian Road Rules**.

No significant changes would be expected under this option. Only amendments to provide further clarity regarding the legal use of new technology available in the market (wearables, ridesharing and other driving-related mobile apps, new features in in-vehicle infotainment systems). Changes to states' and territories' associated road rules could be required to reflect any additions made by the Australian Road Rules Maintenance Group.

Under this option, driver distraction would be primarily addressed by a combined approach consisting of one performance-based rule and two prescriptive rules.

These rules and any future amendments apply to all drivers of vehicles (as defined in the road rules) when their vehicle is moving or stationary but not parked. While there is a definition of 'park' in the Australian Road Rules' Dictionary, it is intended to apply to Part 12 (which deals with restrictions on stopping and parking). The rest of the Australian Road Rules outside of Part 12 rely on the ordinary meaning of the work 'park', which does not provide clarity for motorists or enforcement agencies about when it is legal to use a mobile phone or visual display unit.

This ambiguity has created different interpretations of what this word means for the public and police. This has resulted in infringements for drivers using mobile phones while legally parked but still having the engine running. This is creating a problem with no direct connection to the rules' policy intent, which is the safe use of technology devices by drivers.

This issue is currently included in the proposed 13th Australian Road Rules Amendment package. The NTC understands that jurisdictions support changing the definition that eliminates any ambiguity and supports the rules' intent regarding safe use of mobile phones and visual display units.

As explained in the problem statement (section 3.1), this option relies on rules dating back to 1999, when texting and calling were the most common features of a mobile phone. This creates a challenge for states and territories in deciding how the current rules apply to technology introduced to the market recently. Devices and in-vehicle technologies such as smartwatches and software like Apple CarPlay and Android Auto have presented new challenges and there seems to be confusion among drivers about the legal use of new technologies.

We expect that this issue will continue under this option as new technologies appear, and existing technology becomes more prevalent and complex. The current ambiguities on what compliance looks like for various types of driver distraction could reduce the effectiveness of the Australian Road Rules in achieving the desired road safety outcomes.

### 4.1.1 Road rule 297(1) – the driver to have proper control of the vehicle

This performance-based rule regulates a broad range of sources of distraction. A driver's ability to maintain proper control of a vehicle can be affected by various causes, technology-based or not.

This rule does not define proper control. It is not clear what acceptable compliance looks like under this rule.

### 4.1.2 Road rule 299 – television receivers and visual display units in motor vehicles

This prescriptive rule regulates the use of visual display units while driving. It limits the use of devices with screens such as DVD players, tablets and laptop computers.

Rule 299 establishes that a driver must not drive a vehicle with a visual display unit operating if any part of the screen is visible to the driver or likely to distract a driver in another vehicle.

It includes exemptions for:

- bus drivers, if the display shows a destination sign or other bus sign
- motorcyclists, if the device is a driver's aid and is not hand-held
- drivers using these devices (mounted or integrated to the vehicle) as driver's aids
- emergency and police vehicles.

While the Australian Road Rules do not define 'driver's aids', rule 299 provides examples of driver's aids:

- closed-circuit television security cameras
- dispatch systems
- navigational or intelligent highway and vehicle system equipment

- rear-view screens
- ticket-issuing machines
- vehicle monitoring devices.

This rule does not clarify whether drivers can legally interact with displays that are part of in-vehicle systems while the vehicle is moving or stationary (but not parked).

### 4.1.3 Road rule 300 – use of mobile phones

This is another prescriptive rule that regulates the use of mobile phones by drivers. Under this rule, drivers can only use a mobile phone while driving (including when stationary but not parked) to make or receive an audio phone call if the phone:

- is secured in a commercially designed mount fixed to the vehicle, or
- can be operated by the driver without touching any part of the phone.

This rule explicitly differentiates audio phone calls from emails, text messages, video calls, video messages or other similar communication.

Drivers can also use a phone as a driver's aid while driving (including when stationary but not parked) if the phone complies with one of the same two conditions above. As with rule 299 above, this rule provides examples of the same driver's aids.

CB radios or any other two-way radios are explicitly exempted from this rule.

Police and emergency vehicles are exempted from the prohibition to use hand-held mobile phones while driving.

## 4.2 What is allowed and not allowed under this option

Table 1 provides examples of sources of distraction and indicates whether the resulting interactions are allowed under this option. We have abstained from including a wider range of interactions with technology devices because they are not explicitly covered by rules 299 and 300. States and territories have interpreted these rules to apply them to a broader range of interactions with a wider range of devices.

Our determination of what is allowed and not allowed under the Australian Road Rules is strictly based on the letter and intent of the road rules. This means that any use of mobile phones, visual display units and driver's aids that is not explicitly allowed by these rules is deemed as unlawful.

There are also differences in the states' and territories' enactment of these rules. While their enactment of rule 299 has very minor variations, the differences between jurisdictions' in the case of rule 300 include:

- Music: The road rules in New South Wales and Victoria establish that listening to music from a mobile phone is treated similarly to an audio phone call.
- Tablets: The road rules in the Australian Capital Territory establish that tablet computers are treated similarly to other hand-held devices.
- Automatically receiving text messages, emails video messages or similar: The road rules in New South Wales, the Northern Territory, Tasmania and Western Australia specify that automatic receival of text messages, emails, video messages or similar

communications are exempted if they do not become automatically visible on the screen of the phone.

**Table 1. Status quo: allowed and not allowed interactions**

| Secondary activity while driving | Interaction | | Allowed (✓) / not allowed (×) |
|---|---|---|---|
| Hand-held mobile phone and tablet | Dialling | Touch | × |
| | | Voice | × |
| | Audio phone call | Accepting call (tapping) | × |
| | | Accepting call (voice) | × |
| | | Scrolling through contacts | × |
| | | Talking | × |
| | Texting | Touch | × |
| | | Voice | × |
| | Emails | Touch | × |
| | | Voice | × |
| | Playing games | | × |
| | Taking photos/video | | × |
| | Watching video | | × |
| | Navigation | Touch | × |
| | | Typing address | × |
| | | Voice | × |
| | Playing music | Touching | × |
| | | Voice | × |
| | | Typing artist, album or song | × |
| | Any other function | | × |
| Mounted mobile phone and tablet | Dialling | Touching | ✓ |
| | | Voice | ✓ |
| | Audio phone call | Accepting call (tapping) | ✓ |
| | | Accepting call (voice) | ✓ |
| | | Scrolling through contacts | ✓ |
| | | Talking | ✓ |
| | Texting | Touching | × |
| | | Voice | × |
| | Emails | Touching | × |
| | | Voice | × |
| | Playing games | | × |
| | Taking photos/video | | × |
| | Watching video | | × |
| | Navigation | Tapping on screen | ✓ |
| | | Typing address | ✓ |

| | | | |
|---|---|---|---|
| | | Voice control | ✓ |
| | Playing music | Tapping on screen | × |
| | | Voice | × |
| | | Typing artist, album or song | × |
| | Accepting ride requests (ridesharing driver app) | Tapping on screen | × |
| | Any other function that is not a driver's aid | | × |
| Non-mounted mobile phone and tablet (not held by driver) | Dialling | Typing number | × |
| | | Voice | ✓ |
| | Audio phone call | Accepting call (tapping) | × |
| | | Accepting call (voice) | ✓ |
| | | Scrolling through contacts | × |
| | | Talking | ✓ |
| | Texting | Typing | × |
| | | Voice | × |
| | Emails | Typing | × |
| | | Voice | × |
| | Playing games | | × |
| | Taking photos/video | | × |
| | Watching video | | × |
| | Navigation | Touching | × |
| | | Typing address | × |
| | | Voice | ✓ |
| | Playing music | Touching | × |
| | | Voice | × |
| | | Typing artist, album or song | × |
| | Any other function that is not a driver's aid | | × |
| Visual display units (such as DVD displays) | Video and static images | Inside vehicle | × |
| | | Visible to other drivers | × |
| GPS unit (mounted) | Entering address | Typing | ✓ |
| | | Voice | ✓ |
| | Following route | Listening | ✓ |
| | | Glancing at visual directions | ✓ |
| In-car audio system (radio, CD, mp3) | | | ✓ |
| Dispatch system taxis | Accepting jobs | Tapping on screen | ✓ |
| | | Entering address | ✓ |
| Dispatch system delivery | Accepting ride requests | Tapping on screen | ✓ |
| | | Entering address | ✓ |

| | | | |
|---|---|---|---|
| CB radio | Operating | | ✓ |
| Reading newspaper/book/magazine | | | ✓ |
| Handwriting | | | ✓ |
| Eating | | | ✓ |
| Drinking | | | ✓ |
| Personal hygiene / grooming (for example, applying makeup, shaving) | | | ✓ |

**Question 7:** Is the status quo option an accurate representation of the current state of the Australian Road Rules in relation to driver distraction? If not, please describe further.

# 5 Prescriptive option

**Key points**

- This technology-neutral option seeks to provide a higher degree of certainty, clarity and uniformity to regulating driver distraction in the Australian Road Rules.
- This option proposes a set of new offences that would focus on observable behaviour undertaken by drivers that has been found to significantly affect driver performance.
- Instead of indicating what drivers can and cannot do with specific devices, this option provides a list of high-risk behaviours and interactions that drivers should avoid regardless of the technology involved or even the source of distraction.
- The prescriptive option seeks to facilitate enforcement by reducing the level of judgement to be exercised by officers when applying the rules.

## 5.1 Description of the prescriptive option

As we explained in subsection 3.2.1, one submission to our issues paper recommended a fully prescriptive and zero-tolerance approach to technology use in vehicles (Barton, 2019). This option, while not an outright ban, builds on this recommendation and explores the potential of addressing driver distraction with a set of prescriptive rules. The National Road Transport Association's submission to the issues paper highlighted potential benefits in a more prescriptive and detailed approach for the general public (National Road Transport Association, 2019).

This technology-neutral option seeks to provide a high degree of certainty, clarity and uniformity to regulating driver distraction in the Australian Road Rules. This option also seeks to facilitate enforcement by reducing the level of judgement to be exercised by officers when applying the rules.

In our issues paper, we discussed how enforcing the road rules for driver distraction can be difficult because:

- sometimes there is limited visibility of what is occurring inside vehicles, such as low light conditions, tinted windows and heavy traffic conditions
- drivers scan the environment for police and know how to cover their infringing behaviour to avoid police enforcement (Oviedo-Trespalacios et al., 2017)
- there is no feasible way to ensure a driver's attention remains sufficiently focused on the driving task (Hartley, 2007).

However, there are cases in which introducing prescriptive legislation that provides further clarity about what drivers can and cannot do may have resulted in road safety benefits. For instance, studies that found that bans on hand-held mobile phone use resulted in reductions in use immediately after implementing the laws (McCartt et al., 2010, cited in Regan & Prabhakharan, 2019). However, these findings are not conclusive because other studies found cases in which initial decreases in mobile phone use have dissipated weeks or months after implementing bans (McCartt & Geary, 2004 and Hussain et al., 2006, cited in Regan & Prabhakharan, 2019).

The prescriptive option would address technology- and non-technology-based causes of distraction. As we explained in subsection 3.2.1, a technology-neutral approach to the road rules leads to addressing all types of causes of distraction. Not including non-technological sources of distraction that result in high-risk interactions would result in an inconsistent and differentiated treatment of similar behaviours.

The key element in this option is that it provides a clear list of high-risk behaviours and interactions that drivers should avoid regardless of the technology involved or even the source of distraction. This is a significant difference from the status quo, which indicates what drivers can and cannot do with specific devices.

This option would result in a set of offences targeting the observable behaviour undertaken by drivers that would be deemed as non-compliant. This option would address all causes of distraction that have been identified as of the highest risk of crashing by research.

Appendix A lists these behaviours matched to their corresponding sources of distraction and the associated risk levels estimated by various studies.

### 5.1.1 New offences introduced in the road rules

The prescriptive option would introduce new offences in the road rules seeking to deter drivers from performing the following behaviours and interactions while the vehicle is moving or stationary (but not parked):

- Text-based interactions – entering text: These interactions consist of typing or writing letters and symbols through any form of input device (physical or touchscreen keyboard, keypad, touchpad, scroll wheel). Handwriting on a touchscreen is also included. The associated offence(s) would apply to all types of devices – portable, mounted or integrated.
- Text-based interactions – reading long-form text: These interactions result from activities that require reading long-form text (longer than what is displayed in an option menu). These activities include reading emails and literature, browsing the internet and using social media, using text-based communication applications (for example, SMS and WhatsApp). The associated offence(s) would apply to all types of devices – portable, mounted or integrated.
- Image-based interactions – static and moving visual images: These interactions consist of watching and recording videos, playing videogames, using video-based communication applications (for example, Skype, FaceTime) and using applications aimed at displaying photos and complex images (for example, photo libraries, image processing apps and digital image libraries). Video-based safety-enhancing functionalities and image-based navigation directions would not be included. The associated offence(s) would apply to all types of devices – portable, mounted or integrated.
- Visual and visual manual interactions – conventional mediums: These interactions consist of reading from and writing on or looking at printed materials and other non-electronic devices inside the vehicle.
- Manual interactions – portables: These interactions consist of turning a device on or off and operating any other function. The associated offence(s) would only apply to portable (not mounted) electronic devices. A portable device can be on any part of the driver's body (hand-held, on driver's the lap, worn on the wrist) or not.
- Visual interaction – eyes off the road: This interaction consists of looking away from the road for more than two seconds at a time.

These new offences would target those visual and visual manual behaviours and interactions found to significantly increase crash risk. While a large portion are the result of technology-based sources of distraction, two of them would apply to non-technology-based sources.

**Reasons for deterring text-based and other visual and visual manual interactions**

Different studies have highlighted the significant level of risk from activities associated with text-based information. For example, text messaging is regarded in the literature as one of the most dangerous secondary tasks drivers can undertake while driving. A comprehensive study demonstrated that Texting is associated with a significant reduction in driving performance through different aspects, such as higher reaction time to road hazards, poor lane keeping, missed traffic signals and long glances from the roadway (Caird et al., 2014, cited in Goodsell, Cunningham & Chevalier, 2019). Text messaging is particularly risky because it takes the driver's eyes and mind off the road and hand(s) off the wheel (Hallett, Regan & Bruyas, 2011, cited in Goodsell, Cunningham & Chevalier, 2019).

Research into the visual and cognitive demands of using in-vehicle systems also found that text-based tasks were associated with a significantly higher level of demand than other task types. Entering a destination for the navigation function was found to be the most demanding of all, with more than twice the level of the high-demand reference point (Strayer et al., 2017).

An on-road study found that drivers manually entering a destination were more likely to involve braking errors (for example, sudden and erratic braking to hazards and traffic signals) (Dingus et al., 1989, cited in Goodsell, Cunningham & Chevalier, 2019). This finding has been confirmed in simulated driving studies, which showed that manual destination input was associated with increased reaction time to roadway events, greater eyes-off-road time, more frequent glances off the forward roadway and slower speeds (Chiang, Brooks, & Weir, 2001 and Maciej & Vollrath, 2009, cited in Goodsell, Cunningham & Chevalier, 2019).

While these studies focused on text-based interactions with technology devices, these findings lead us to consider whether comparable demands on drivers exist from similar interactions with non-technology-based mediums (books, magazines, journals). A Naturalistic Driving Study found that reading and writing can increase the risk of a crash or near-crash event by almost 10 times (Dingus et al., 2016, cited in Goodsell, Cunningham & Chevalier, 2019). For this reason, these types of interactions are also included in this option.

**Reasons for deterring video and image-based interactions**

Video and other image-based sources of driver distraction have also been found to have significant impacts on driving performance. Research found that participants watching and operating the DVD player were less likely to notice outside events (like a vehicle at the front using its brakes), reacted slower to the hazards and were also more likely to use the brakes and take turns at higher lateral accelerations (Funkhouser & Chrysler, 2007).

Drivers can also engage with video-based communication applications with significant road safety impacts. Research commissioned by AT&T in the U.S. on mobile phone interactions by drivers aged between 16 and 65 found that 10 per cent use a video chat application (such as Skype and FaceTime) while driving (AT&T, 2015). The results of drivers engaging in this activity can be fatal, as proved by a highway crash caused by a driver using FaceTime that resulted in the death of afive5-year-old (The Washington Post, 2017).

However, driver engagement with video-based safety-enhancing functionalities would be exempted from the new offences under this option. These safety-enhancing functionalities

include video feed from rear-view screens, passenger safety cameras for buses and load monitoring cameras for trucks and trailers.

As with text-based interactions, we consider that it is necessary to assume comparable consequences from similar interactions with image-based mediums that are not associated with technology (physical maps and photo books).

**Reasons for deterring manual interactions with portable devices**

While the text-based interactions that result from visual manual distractions are considered the ones with the most severe impact on driving performance, manual interactions with technology can also result in increased risk of crash. Naturalistic Driving Studies found that reaching for an electronic device can increase the risk of crashing substantially. For example, a driver reaching for a mobile phone is over four times more likely to crash than a driver not executing a secondary activity (Dingus et al., 2016). A study into commercial vehicles found that reaching for an electronic device can increase the risk of crashing by more than sixfold (Olson et al., 2009).

**Reasons for deterring interactions that result in long eyeglances away from the road**

An offence seeking to discourage drivers to look away from the roadway for more than two seconds could cover behaviours and interactions associated to other varied sources of distraction. This aligns with evidence from research that has concluded that eyeglances away from the road for more than two seconds significantly increase individual near-crash/crash risk (Klauer et al., 2006). Eyeglance durations of less than two seconds have not been found to significantly increase risk. The purpose of this threshold is to still allow drivers to perform safety-enhancing activities such as using the rear-view mirrors and scanning the driving environment (Klauer et al., 2006).

In its submission to our issues paper, a state government agency recommended that we consider a two-second threshold in our project. A paper published by the Monash University Research Centre also recommended including the two-second threshold in the road rules relating to driver distraction (Young & Lenné, 2012).

Table 2 lists all these interactions with their associated sources of distraction and risky behaviours.

**Table 2. Interactions deemed illegal under the prescriptive option by introducing new technology-neutral offences**

| Illegal interaction | Observable risky behaviour | Source of distraction | Type of distraction |
|---|---|---|---|
| Text-based interactions – entering text | Eyes off road; hand off wheel | Dialling on a mobile phone (hand-held or mounted) | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Texting on a mobile phone (hand-held or mounted) | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Entering a destination in a navigation device | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Entering text and numbers in vehicle-integrated visual display (e.g. touchscreen functions) | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Texting on a smartwatch (worn on the wrist or mounted) | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Entering text while searching for music in vehicle-integrated music system | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Entering an address in a dispatch device | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Handwriting on a touchscreen | Visual + manual + cognitive |
| Text-based interactions – reading long-form text | Eyes off road; hand off wheel | Reading ebook (e.g. Kindle or another tablet) | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Reading emails from mobile phone, tablet or another device with internet access | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Reading messages from text-based communication applications (e.g. SMS, WhatsApp or similar) on mobile phone, smartwatch tablet or another device with internet access | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Browsing the internet, (including social media) on mobile phone, tablet or another device with internet access | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Reading long-format text from a dispatch device | Visual + manual + cognitive |
| Image-based interactions – static and moving visual images | Eyes off road | Video call (e.g. Skype, FaceTime or similar) on any in-vehicle or portable device | Visual + cognitive |
| | Eyes off road | Looking at digital photo album | Visual + cognitive |
| | Eyes off road | Watching a DVD | Visual + cognitive |
| | Eyes off road | Streaming video from in-vehicle or portable displays | Visual + cognitive |
| Visual and visual manual interactions – conventional mediums | Eyes off road; hand off wheel | Reading a book, newspaper or similar | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Handwriting on non-electronic medium media | Visual + manual + cognitive |
| | Eyes off road | Looking at a map | Visual + cognitive |
| Manual interactions – portables | Eyes off road; hand off wheel | Reaching for a phone | Visual + manual |

| Illegal interaction | Observable risky behaviour | Source of distraction | Type of distraction |
|---|---|---|---|
| | Hand off wheel | Talking or listening on a hand-held phone | Manual + cognitive |
| | Eyes off road; hand off wheel | Reaching for an electronic device | Visual + manual |
| | Eyes off road; hand off wheel | Tapping or scrolling on a smartwatch screen (worn on the wrist) | Visual + manual |
| | Eyes off road; hand off wheel | Using a calculator | Visual + manual + cognitive |
| Visual interaction – eyes off the road | Eyes off road; hand off wheel | Reaching for an object distant from driver | Visual + manual |
| | Eyes off road | Long eyeglances at objects off the roadway | Visual |
| | Eyes off road; hand off wheel | Long and unsafe interactions with in-vehicle visual display (e.g. touchscreen menu) and vehicle controls | Visual + manual |
| | Eyes off road; hand off wheel | Eating in a way that could have a negative or dangerous impact on driving performance | Visual + manual |
| | Eyes off road; hand off wheel | Drinking in a way that could have a negative or dangerous impact on driving performance | Visual + manual |
| | Eyes off road; hand off wheel | Applying makeup/personal grooming | Visual + manual + cognitive |
| | Eyes off road | Interacting with/looking at passengers in a way that could have a negative or dangerous impact on driving performance | Visual + cognitive |

### 5.1.2 Offences in the current rules maintained in this option

This option would preserve an offence already included in rule 299 (sub-rule 299(1b)) about displays that could distract other drivers. This inclusion would prevent circumstances in which display positioning does not distract the driver of the vehicle the display is in, but affects other drivers' focus on the driving task.

The prescriptive option would also maintain the legislator's resolve to ensure drivers have clear view of the road and traffic in all directions (sub-rule 297(2)). Such an offence would address the use of devices positioned in a way that blocks the clear view of the road and traffic.

Offences in sub-rules 297(1A) and (3) would also be maintained under this option. These rules target circumstances in which animals and passengers can impair the driver's control of the vehicle.

### 5.1.3 Offences in the current rules not maintained under this option

Offences in rules 297(1), 299 and 300 would no longer be required because their objectives and associated sources of distraction would be targeted by the offences proposed in the previous subsections.

The offence in rule 297(1) (a driver must have proper control of the vehicle) would be replaced by an offence deterring drivers from looking away from the roadway for more than two seconds at a time. Offences in rules 299 and 300 would duplicate the new offences

under this option seeking to regulate interactions with technology devices. Rules 299 and 300 are also incompatible with a technology-neutral approach as directed by the Transport and Infrastructure Council.

### 5.1.4 Exemptions in the prescriptive option

This option maintains various exceptions from the current road rules because we consider that they serve a practical purpose and do not represent a significant safety risk to road users.

Offences resulting from behaviours and interactions listed in subsection 5.1.1 would not apply to:

- a police or emergency vehicle (sub-sub-rules 299(2ba) and 300(1b));
- displays indicating a destination or functioning as a bus sign (sub-sub-rule 299(2a));
- image-based navigation directions such as those displayed by GPS units and navigation apps in mounted and integrated devices
- video-based safety-enhancing functionalities (for example, rear-view screens, passenger safety cameras for buses, dashboard cameras, load monitoring cameras for trucks and trailers and other closed-circuit television security cameras), which is adapted from the exemptions for driver's aids in rules 299 and 300; and
- notifications of receiving text messages, emails, video messages or similar communications
- CB radios or any other two-way radios.

The exemption for police and emergency vehicles is to enable these drivers to receive critical information for operational reasons. These drivers face life-and-death situations as part of their jobs. For example, a single first responder driving into a high-risk situation could experience restricted airtime due to radio traffic and the only access to critical information is through their mobile phone. The NTC recognises the valuable work first responders provide to our community and will ensure that this project does not create additional barriers or challenges.

CB radios are a valuable tool for commercial drivers. A Naturalistic Driving Study on commercial vehicles found that these devices have a low impact on driving performance (odds ratio lower than 1) and provide a significant protective effect (Olson et al., 2009)

An offence resulting from addressing driver impairment caused by animals (as discussed in subsection 5.1.2) would not apply to a motor bike rider who rides with an animal between themselves and the handle bars for a distance not further than 500 metres on a road for the purpose of farming (sub-rule 297(4)).

The exemption for driving aids in rules 299 and 300 (except for video displayed by safety-enhancing functionalities) would not be maintained under the technology-neutral approach in this option. Addressing risky behaviours or interactions regardless of the source of distraction would make this exception inapplicable and inconsistent with the project objectives.

## 5.2 What is allowed and not allowed under this option

The prescriptive option would result, in a few cases, in more restrictive regulation for certain interactions with devices compared with the status quo. Entering and reading text messages and other long formats of text while the vehicle is moving or stationary (but not parked) with any type of device would be considered non-compliant. This would apply to dispatch systems and other driver's aids, which are currently exempted from the application of rules 299 and 300. This option would also introduce explicit prohibitions in the road rules regarding writing and reading printed materials which do not exist in the current road rules.

Using voice commands is intended to be legal under this option because hands-free operation of devices is preferable to manual. We are aware of research that indicates that interactions can be cognitively demanding and should not to be performed indiscriminately while driving (Strayer, et al., 2016). However, as we discussed in subsection 3.2.1, various studies suggest that using voice-controlled functions may be less detrimental to driving performance than visual manual interactions with technology (Simmons et al., 2017, cited in Goodsell, Cunningham & Chevalier, 2019).

Any banning of voice controls would also represent significant enforcement challenges. Police members are likely to find it difficult to be able to distinguish someone on a hands-free phone call from someone using voice controls to compose a text message or someone singing along to music. Under these circumstances there is a risk that police enforcement would be either overzealous or too lenient.

This option would also result in a relaxation of the current road rules in a few cases. Any function (including playing music) would be lawfully executed on any type of fixed or mounted device as long as it does not require entering or reading long format text or watching video. Additionally, ridesharing drivers would be allowed to accept jobs while their vehicle is moving or stationary (but not parked), provided they are not required to enter text information in the process.

Table 3 provides examples of sources of distraction and indicates whether the resulting interactions are allowed or not under this option. Red colour represents a restriction from the status quo, while green represents a relaxation. No colour means there is no change from the status quo.

We note that driver engagement in 'allowed' interactions or behaviours does not necessarily imply that they are deemed safe. Under this option, driver engagement in any interactions or behaviours that result in observable impairment of driving performance could be subject to the new offence addressing long eyeglances off the road or the states' and territories' legislation regarding careless or negligent driving.

**Table 3. Prescriptive option: allowed and not allowed interactions**

| Secondary activity while driving | Interaction | | Allowed (✓) / not allowed (×) |
|---|---|---|---|
| **Hand-held mobile phone and tablet** | Dialling | Touch | × |
| | | Voice | × |
| | Audio phone call | Accepting call (tapping) | × |
| | | Accepting call (voice) | × |

| Secondary activity while driving | Interaction | | Allowed (✓) / not allowed (×) |
|---|---|---|---|
| | | Scrolling through contacts | × |
| | | Talking | × |
| | Texting | Touch | × |
| | | Voice | × |
| | Emails | Touch | × |
| | | Voice | × |
| | Playing games | | × |
| | Taking photos/video | | × |
| | Watching video | | × |
| | Navigation | Touch | × |
| | | Typing address | × |
| | | Voice control | × |
| | Playing music | Touching | × |
| | | Voice | × |
| | | Typing artist, album or song | × |
| | Any other function | | × |
| **Mounted mobile phone and tablet** | Dialling | Touching | × |
| | | Voice | ✓ |
| | Audio phone call | Accepting call (tapping) | ✓ |
| | | Accepting call (voice) | ✓ |
| | | Scrolling through contacts | ✓ |
| | | Talking | ✓ |
| | Texting | Touching | × |
| | | Voice | ✓ |
| | Emails | Touching | × |
| | | Voice | ✓ |
| | Playing games | | × |
| | Taking photos/video | | × |
| | Watching video | | × |
| | Navigation | Tapping on screen | ✓ |

| Secondary activity while driving | Interaction | | Allowed (✓) / not allowed (×) |
|---|---|---|---|
| | | Typing address | × |
| | | Voice control | ✓ |
| | Playing music | Tapping on screen | ✓ |
| | | Voice | ✓ |
| | | Typing artist, album or song | × |
| | Accepting ride requests (ridesharing driver app) | Tapping on screen | ✓ |
| | Any other function that is not a driver's aid | | ✓ |
| | Dialling | Typing number | × |
| | | Voice | ✓ |
| | Audio phone call | Accepting call (tapping) | × |
| | | Accepting call (voice) | ✓ |
| | | Scrolling through contacts | × |
| | | Talking | ✓ |
| **Non-mounted mobile phone and tablet (not held by driver)** | Texting | Typing | × |
| | | Voice | ✓ |
| | Emails | Typing | × |
| | | Voice | ✓ |
| | Playing games | | × |
| | Taking photos/video | | × |
| | Watching video | | × |
| | Navigation | Touching | × |
| | | Typing address | × |
| | | Voice control | ✓ |
| | Playing music | Touching | × |
| | | Voice | ✓ |
| | | Typing artist, album or song | × |
| | Any other function that is not a driver's aid | | × |
| **Visual display units (such as DVD displays)** | Video and static images | Inside vehicle | × |
| | | Visible to other drivers | × |
| | Emails | Typing | × |

| Secondary activity while driving | Interaction | | Allowed (✓) / not allowed (×) |
|---|---|---|---|
| **Portable computer (not held by driver)** | | Voice | ✓ |
| | using word processor and other applications | Typing | × |
| | | Voice | ✓ |
| | Playing games | | × |
| | taking photos and video | | × |
| | looking at photos and Watching video | | × |
| | Any other function | | × |
| **Smartwatch (on wrist)** | Dialling | Typing number | × |
| | | Voice | ✓ |
| | Audio phone call | Accepting call (tapping) | × |
| | | Accepting call (voice) | ✓ |
| | | Scrolling through contacts | × |
| | | Talking | ✓ |
| | Texting | Typing | × |
| | | Voice | ✓ |
| | Emails | Typing | × |
| | | Voice | ✓ |
| | Playing games | | × |
| | Taking photos/video | | × |
| | Watching video | | × |
| | Navigation | Tapping screen | × |
| | | Typing address | × |
| | | Voice control | ✓ |
| | | Glancing at visual directions | ✓ |
| | Playing music | Touching | × |
| | | Voice | ✓ |
| | | Typing artist, album or song | × |
| | Any other function | | × |
| **GPS unit (mounted)** | Entering address | Typing | × |
| | | Voice | ✓ |

| Secondary activity while driving | Interaction | | Allowed (✓) / not allowed (×) |
|---|---|---|---|
| | Following route | Listening | ✓ |
| | | Glancing at visual directions | ✓ |
| **In-car audio system (radio, CD, mp3)** | | | ✓ |
| **Integrated infotainment system (includes use of Apple CarPlay, Android Auto and other similar applications that act as a controller for a portable device)** | Dialling | Typing number | × |
| | | Voice | ✓ |
| | Audio phone call | Accepting call (tapping) | ✓ |
| | | Accepting call (voice) | ✓ |
| | | Scrolling through contacts | ✓ |
| | | Talking | ✓ |
| | Texting | Typing | × |
| | | Voice | ✓ |
| | Emails | Typing | × |
| | | Voice | ✓ |
| | Navigation | Touching | ✓ |
| | | Typing address | × |
| | | Voice control | ✓ |
| | | Glancing at visual directions | ✓ |
| | Playing music | Touching | ✓ |
| | | Voice | ✓ |
| | | Typing artist, album or song | × |
| | Any other function | | ✓ |
| **Dispatch system taxis** | Accepting jobs | Tapping on screen | ✓ |
| | | Typing address | × |
| **Dispatch system delivery** | Accepting ride requests | Tapping on screen | ✓ |
| | | Typing address | × |
| **CB radio** | Operating | | ✓ |
| **Reading newspaper/book/magazine** | | | × |
| **Handwriting** | | | × |
| **Eating** | | | ✓ |

| Secondary activity while driving | Interaction | | Allowed (✓) / not allowed (×) |
|---|---|---|---|
| **Drinking** | | | ✓ |
| **Personal hygiene/grooming (for example, applying makeup, shaving)** | | | ✓ |

**Question 8:** Are there any high-risk distracting behaviours and interactions that have not been addressed by the proposed new offences?

**Question 9:** Can you propose an alternative approach for discouraging long eyeglances off the roadway that is enforceable in practice?

**Question 10:** Can you propose an alternative approach for discouraging high-risk voice-based interactions that is enforceable in practice?

# 6 Performance-based option

**Key points**

- This technology-neutral option proposes a fully outcomes-based approach for addressing driver distraction.
- It would rely on incorporating the key elements to include in examples of 'proper control' in the road rules.
- This new approach seeks to provide a clearer guidance on what 'proper control' is and the functions required to achieve it (from a definition of the driving task).
- The performance-based approach proposed in this option would address observable activities that can impair a driver's control of a vehicle, as well as the observable consequences of such activities.
- An offence for not driving in 'proper control' (as defined under this option) could address a wider range of sources of distraction.

## 6.1 Description of the performance-based option

This technology-neutral option proposes a fully performance-based approach for addressing driver distraction. This option would rely on incorporating a further developed definition of 'proper control' in the road rules.

As we explained in subsection 3.2.3, we reviewed the number of infringements for rule 297(1) in different jurisdictions and found these figures to be a small fraction of the number of infringements for rule 300. We also contrasted these figures with evidence indicating that drivers engage in conventional, or non-technology based, activities more frequently than technology-based ones (Young, Horberry & Charlton, 2019). Given that the current role of rule 297(1) is to capture all causes of distraction not covered by rules 299 and 300, we consider that the low number of infringements could indicate enforcement issues.

Seven submissions to our issues paper expressed a preference for a performance-based approach for addressing driver distraction. One state government road safety agency, the Australian Mobile Telecommunications Association (2019), Australasian New Car Assessment Program (2019), DriveRisk Australasia (2019), Royal Automobile Association of South Australia (2019), Royal Automobile Club of Victoria (2019) and Insurance Australia Group (2019) consider that a performance-based approach would be better placed for addressing the current and future distractions that can arise from technological and non-technological sources.

This new approach seeks to provide clearer guidance on what 'proper control' is by including examples of the functions required to achieve it (from a definition of the driving task). For more information on the process for developing these examples refer to subsections 3.2.2 and 3.2.3 of this document.

This option seeks to reduce uncertainty about what is required for appropriate compliance.

The performance-based approach proposed in this option would target the effects of distracting activities, as well as the sources of distraction. This option could mitigate the

consequences of a wide range of sources of distraction regardless of whether they are technology-based or not.

### 6.1.1 Amendments to an existing offence in the road rules

The offence in rule 297(1) (a driver must not drive a vehicle unless the driver has proper control of the vehicle) would be amended to incorporate examples of proper control.

This offence would address all behaviours or activities not targeted by the offences proposed to be maintained (as per subsection 6.1.2 below). In this option, rule 297(1) would be amended to include examples of proper control that include the elements proposed in subsection 3.2.3. Examples of proper control would include:

- having directional control
- having acceleration and speed control
- detecting and safely responding to objects, events and other road users.

These examples align with the literature on the observed consequences of driver engagement in distracted activities. Poor lane keeping and driving at reduced and/or inconsistent speed have been associated with driver distraction (Young & Lenné, 2012).

### 6.1.2 Offences in the current road rules maintained in this option

As with the prescriptive option, this option would ensure that drivers have clear view of the road and traffic in all directions (sub-rule 297(2)). This would discourage drivers from positioning objects or devices in a way that blocks the clear view of the road environment.

The performance-based option would also preserve the offences in sub-rules 297(1A) and (3). This seeks to prevent circumstances in which animals and passengers can impair the driver's control of the vehicle.

### 6.1.3 Offences in the current road rules not maintained under this option

Offences in rules 299 and 300 would not be maintained because their associated sources of distraction would be addressed by their impact on the driver's control of the vehicle.

### 6.1.4 Exemptions in the performance-based option

The exemption in sub-rule 297(4) would be part of this option to maintain the ability of farmers to ride a motor bike on a road with an animal between the rider and the handle bars for a short distance (500 metres or less).

None of the exemptions in rules 299 and 300 would be maintained under this option. Focusing on the effects of distraction on driving performance, regardless of the source of distraction, would make these exceptions inapplicable.

## 6.2 What is allowed and not allowed under this option

The performance-based focus of this option would result in the road rules not targeting specific behaviours or interactions with devices. For this reason, it is not possible to present a list of allowed and not allowed activities.

In theory, all activities that do not impair the driver's proper control of the would be compliant under this option. However, states and territories could still apply their legislation for careless or negligent driving to regulate unsafe driver engagement in some of these activities.

**Question 11:** Would a fully outcomes-based approach effectively mitigate the safety risks from diverse sources of distraction?

# 7 Hybrid option

**Key points**

- This technology-neutral option combines elements from the two preceding options.
- The prescriptive side of this option would provide a clear list of high-risk behaviours and interactions that drivers should avoid regardless of the technology involved or even the source of distraction.
- This prescriptive element provides a binary (yes or no) decision making framework for determining compliance.
- The performance-based component would incorporate the definition of 'proper control' proposed in the performance-based option. This would require the judgement of law enforcement officers to determine whether less distinct behaviours (for example, eating and personal grooming) would be deemed non-compliant.
- The new 'proper control' offence would provide a tool to address both the observable causes and consequences of behaviours and interactions that can impair a driver's control of a vehicle.

## 7.1 Description of the hybrid option

This technology-neutral option combines elements from the two preceding options. It includes prescriptive elements seeking to provide a high degree of certainty, clarity and uniformity to regulating driver distraction under the Australian Road Rules.

Eight submissions to the issues paper expressed a preference for a regulatory approach that combines prescriptive and performance-based elements for addressing distraction. These stakeholders appear to agree the potential for both prescriptive and performance-based regulation to provide adequate management of the driver distraction risk in the future. The stakeholders supporting a combined approach are:

- a state government road agency
- the Motorcycle Council of New South Wales (2019)
- the National Heavy Vehicle Regulator (2019)
- the Department of Infrastructure Planning and Logistics (NT) (2019)
- the Victorian Motorcycle Council (2019)
- EROAD Australia Pty Ltd (2019)
- the Truck Industry Council
- Amy Gillett Foundation, Cycling Australia, Bicycle NSW, Pedal Power (ACT), We Ride Australia and WestCycle (joint submission) (2019).

The prescriptive portion of this option would introduce a set of new offences targeting the observable and enforceable behaviour undertaken by drivers found by research to increase the risk of a crash. This option is would provide a clear list of high-risk behaviours and interactions that drivers should avoid regardless of the technology involved or even the

source of distraction. This is a significant departure from the status quo, which indicates what drivers can and cannot do with specific devices.

Appendix B lists these behaviours matched to their corresponding sources of distraction and the associated risk levels estimated by various studies.

The hybrid option also includes a performance-based approach for addressing sources of driver distraction that are difficult to regulate by prescriptive rules. This option would incorporate the examples of 'proper control' proposed in the performance-based option. While the performance-based part of this option would be outcomes based, it would reduce uncertainty in determining whether a driver is behaving in a way that impedes or hinders the proper control of the vehicle.

This option would specifically target behaviours or interactions with technology associated with activities that have been found to affect driving performance, and simultaneously address the observable causes and consequences other behaviours and interactions. This combined approach would provide both a binary (yes or no) decision making framework for addressing high risk behaviours as well as require the judgement of law enforcement officers to determine whether less distinct behaviours (for example, eating and personal grooming) would be deemed non-compliant.

### 7.1.1 New offences introduced in the road rules

The hybrid option would introduce new offences in the road rules seeking to deter drivers from performing the following behaviours and interactions while the vehicle is moving or stationary (but not parked):

- Text-based interactions – entering text: These interactions consist of typing or writing letters and symbols through any form of input device (physical or touchscreen keyboard, keypad, touchpad, scroll wheel). Handwriting on a touchscreen is also included. The associated offence(s) would apply to all types of devices – portable, mounted or integrated.
- Text-based interactions – reading long-form text: These interactions result from activities that require reading long-form text (longer than what is displayed in an option menu). These activities include reading emails and literature, browsing the internet and using social media, using text-based communication applications (for example, SMS, WhatsApp). The associated offence(s) would apply to all types of devices – portable, mounted or integrated.
- Image-based interactions – static and moving visual images: These interactions consist of watching and recording videos, playing videogames, using video-based communication applications (for example, Skype, FaceTime) and using applications aimed at displaying photos and complex images (for example, photo libraries, image processing apps, digital image libraries). Video-based safety-enhancing functionalities and image-based navigation directions would not be included. The associated offence(s) would apply to all types of devices – portable, mounted or integrated.
- Visual and visual manual interactions – conventional mediums: These interactions consist of reading from and writing on or looking at printed materials and other non-electronic devices inside the vehicle.
- Manual interactions – portables: These interactions consist of turning a device on or off and operating any other function. The associated offence(s) would only apply to portable (not mounted) electronic devices. A portable device can be on any part of the driver's body (for example, hand-held, on the driver's lap, worn on the wrist) or not.

As with the prescriptive option (subsection 5.1.1), these new offences would focus on those visual and visual manual behaviours and interactions found to significantly increase crash risk. While a large portion of these types of behaviours or interactions are the result of technology-based sources of distraction, one category would apply to non-technology-based sources.

The new offences address three broad categories of interactions: text-based interactions, video and image-based interactions and manual interactions. In subsection 5.1.1, we explain why these categories are considered to significantly reduce driver performance.

Table 4 lists all these interactions with their associated sources of distraction and risky behaviours.

**Table 4. Interactions deemed illegal under the hybrid option by introducing new technology-neutral offences**

| Illegal interaction | Observable risky behaviour | Source of distraction | Type of distraction |
|---|---|---|---|
| Text-based interactions – entering text | Eyes off road; hand off wheel | Dialling on a mobile phone (hand-held or mounted) | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Texting on a mobile phone (hand-held or mounted) | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Entering a destination in a navigation device | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Entering text and numbers in vehicle-integrated visual display (e.g. touchscreen functions) | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Texting on a smartwatch (worn on the wrist or mounted) | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Entering text while searching for music in vehicle-integrated music system | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Entering an address in a dispatch device | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Handwriting on a touchscreen | Visual + manual + cognitive |
| Text-based interactions – reading long-form text | Eyes off road; hand off wheel | Reading an ebook (e.g. Kindle or another tablet) | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Reading emails from mobile phone, tablet or another device with internet access | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Reading messages from text-based communication applications (e.g. SMS, WhatsApp or similar) on mobile phone, smartwatch tablet or another device with internet access | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Browsing the internet, (including social media) on mobile phone, tablet or another device with internet access | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Reading long-format text from a dispatch device | Visual + manual + cognitive |

| Illegal interaction | Observable risky behaviour | Source of distraction | Type of distraction |
|---|---|---|---|
| Image-based interactions – static and moving visual images | Eyes off road | Video call (e.g. Skype, FaceTime or similar) on any in-vehicle or portable device | Visual + cognitive |
| | Eyes off road | Looking at digital photo album | Visual + cognitive |
| | Eyes off road | Watching a DVD | Visual + cognitive |
| | Eyes off road | Streaming video from in-vehicle or portable displays | Visual + cognitive |
| Visual and visual manual interactions – conventional mediums | Eyes off road; hand off wheel | Reading a book, newspaper or similar | Visual + manual + cognitive |
| | Eyes off road; hand off wheel | Handwriting on non-electronic medium media | Visual + manual + cognitive |
| | Eyes off road | Looking at a map | Visual + cognitive |
| Manual interactions – portables | Eyes off road; hand off wheel | Reaching for a phone | Visual + manual |
| | Hand off wheel | Talking or listening on hand-held phone | Manual + cognitive |
| | Eyes off road; hand off wheel | Reaching for an electronic device | Visual + manual |
| | Eyes off road; hand off wheel | Tapping or scrolling on a smartwatch screen (worn on the wrist) | Visual + manual |
| | Eyes off road; hand off wheel | Using a calculator | Visual + manual + cognitive |

### 7.1.2 Amendments to an existing offence in the road rules

Just like with the performance-based option, the offence in rule 297(1) (a driver must not drive a vehicle unless the driver has proper control of the vehicle) would be amended to incorporate examples of proper control that includes highlighting the need to have lateral, longitudinal and velocity control, and the ability to respond to hazards.

This offence would address all the sources of distraction not targeted by the new offences proposed in subsection 7.1.1 above. In this option, rule 297(1) would be amended to include examples of proper control as proposed in subsection 3.2.3. Examples of proper control would include:

- having directional control
- having acceleration and speed control; and
- detecting and safely responding to objects, events and other road users.

Table 5 provides examples of the behaviours that would be addressed by this offence under this hybrid option.

**Table 5. Behaviours addressed by the amended rule 297(1) under the Hybrid option**

| Illegal interaction | Observable risky behaviour | Source of distraction | Type of distraction |
|---|---|---|---|
| Any observable behaviour, interaction or indication of impairment of the driver's ability to safely control the vehicle | Eyes off road; hand off wheel | Reaching for an object distant from the driver | Visual + manual |
| | Eyes off road | Long eyeglances at objects off the roadway | visual |
| | Eyes off road; hand off wheel | Long and unsafe interactions with in-vehicle visual display | Visual + manual |

| Illegal interaction | Observable risky behaviour | Source of distraction | Type of distraction |
|---|---|---|---|
| | | (e.g. touchscreen menu) and vehicle controls | |
| | Eyes off road; hand off wheel | Eating in a way that could have a negative or dangerous impact on driving performance | Visual + manual |
| | Eyes off road; hand off wheel | Drinking in a way that could have a negative or dangerous impact on driving performance | Visual + manual |
| | Eyes off road; hand off wheel | Applying makeup/personal grooming | Visual + manual + cognitive |
| | Eyes off road | Interacting with/looking at passengers in a way that could have a negative or dangerous impact on driving performance | Visual + cognitive |

### 7.1.3 Offences in the current road rules maintained in this option

This option would also seek to preserve the legislator's intent for rules for the offences in rules 299 and 300. As we discussed in subsection 3.2.1, it is largely in line with findings from research regarding visual and visual manual interactions being associated in significant crash risks.

This principle applies to interactions with devices that were already part of the current rules, like manipulating and operating handheld devices. The difference is that this option approaches such interactions from a technology-neutral basis as shown in the proposed new offence for manual interactions with technology devices discussed in the sub-section above.

As with the prescriptive option, the hybrid option would also preserve the offences in:

- sub-rule 299(1b) about displays that could distract other drivers
- sub-rule 297(2) to ensure drivers have a clear view of the road and traffic in all directions
- sub-rules 297(1A) and (3) which regulate circumstances in which animals and passengers can impair a driver's control of the vehicle.

### 7.1.4 Offences in the current rules not maintained under in this option

Just like with the prescriptive option, offences in rules 299 and 300 would duplicate the new offences seeking to regulate interactions with technology devices. Rules 299 and 300 are also incompatible with a technology-neutral approach as directed by the Transport and Infrastructure Council.

### 7.1.5 Exemptions in the hybrid option

As with the prescriptive option, offences resulting from behaviours and interactions listed in subsection 7.1.2 would not apply to:

- a police or emergency vehicle (sub-sub-rules 299(2ba) and 300(1b))
- moving images from displays indicating a destination or functioning as a bus sign (sub-sub-rule 299(2a))

- image-based navigation directions like those displayed by GPS units and navigation apps in mounted and integrated devices
- video-based safety-enhancing functionalities (for example, rear-view screens, passenger safety cameras for buses, dashboard cameras, load-monitoring cameras for trucks and trailers and other closed-circuit television security cameras), which is adapted from the exemptions for driver's aids in rules 299 and 300
- notifications of receiving text messages, emails, video messages or similar communications
- CB radios or any other two-way radios.

The offence resulting from addressing driver impairment caused by animals (as discussed in subsection 7.1.3) would not apply to the rider of a motorbike riding with an animal between themselves and the handle bars for a distance not further than 500 metres on a road for the purpose of farming (sub-rule 297(4)).

The exemption for driving aids in rules 299 and 300 (except for video displayed by safety-enhancing functionalities) would not be maintained under the hybrid option. Addressing high-risk behaviours or interactions regardless of the source of distraction would make this exception inapplicable and inconsistent with the project objectives.

## 7.2 What is allowed and not allowed under this option

The hybrid option would result in the same new restrictions (in comparison with the status quo) as the prescriptive option. The same restrictions over text-based interactions with technology (handwriting and reading printed materials) would apply under this option. In addition, the relaxations proposed under the prescriptive option associated with interactions with technology other than text-based and video-based activities would also be applicable under this option.

The relaxation allowing ridesharing drivers to accept ride requests while their vehicle is moving or stationary would also exist under the hybrid option.

Just like under the prescriptive option, the use of voice commands is intended to be legal under this option because hands-free operation of devices is preferable to manual. This is based on:

- studies suggesting that using voice-controlled functions may be less detrimental to driving performance than visual manual interactions (Simmons et al., 2017, cited in Goodsell, Cunningham & Chevalier, 2019)
- the significant enforcement challenges that police are likely to face with voice-based interactions, which could result in either overzealous or too lenient enforcement.

Like in the performance-based option, the outcomes-focused section of this hybrid option would address any evidence of impairment of the driver's proper control of the vehicle, regardless of the cause. This would allow regulating drivers' unsafe engagement in activities with variable effects on driving performance.

This option recognises that drivers can safely execute non-driving-related tasks if they self-regulate their level of engagement and type of activity in response to the demands of the road environment. For example, activities like interacting with passengers are difficult to regulate because it would be challenging to determine and enforce a safe threshold. However, the consequences of unsafe engagement in this activity can be detected by the evidence of impairment of proper control of the vehicle.

Table 6 provides examples of sources of distraction and indicates whether the resulting interactions are allowed or not under this option. Red colour represents a restriction from the status quo, while green represents a relaxation.

As with the prescriptive option, driver engagement in 'allowed' interactions or behaviours does not necessarily imply that they are deemed safe. Under this option, if such engagement results in observable impairment of driving performance it could be subject to the rule on proper control or the states' and territories' legislation regarding careless or negligent driving.

**Table 6. Hybrid option: allowed and not allowed interactions**

| Secondary activity while driving | Interaction | | Allowed (✓) / not allowed (×) |
|---|---|---|---|
| **Hand-held mobile phone and tablet** | Dialling | Touch | × |
| | | Voice | × |
| | Audio phone call | Accepting call (tapping) | × |
| | | Accepting call (voice) | × |
| | | Scrolling through contacts | × |
| | | Talking | × |
| | Texting | Touch | × |
| | | Voice | × |
| | Emails | Touch | × |
| | | Voice | × |
| | Playing games | | × |
| | Taking photos/video | | × |
| | Watching video | | × |
| | Navigation | Touch | × |
| | | Typing address | × |
| | | Voice control | × |
| | Playing music | Touching | × |
| | | Voice | × |
| | | Typing artist, album or song | × |
| | Any other function | | × |
| **Mounted mobile phone and tablet** | Dialling | Touching | × |
| | | Voice | ✓ |
| | Audio phone call | Accepting call (tapping) | ✓ |
| | | Accepting call (voice) | ✓ |

| Secondary activity while driving | Interaction | | Allowed (✓) / not allowed (×) |
|---|---|---|---|
| | | Scrolling through contacts | ✓ |
| | | Talking | ✓ |
| | Texting | Touching | × |
| | | Voice | ✓ |
| | Emails | Touching | × |
| | | Voice | ✓ |
| | Playing games | | × |
| | Taking photos/video | | × |
| | Watching video | | × |
| | Navigation | Tapping on screen | ✓ |
| | | Typing address | × |
| | | Voice control | ✓ |
| | Playing music | Tapping on screen | ✓ |
| | | Voice | ✓ |
| | | Typing artist, album or song | × |
| | Accepting ride requests (ridesharing driver app) | Tapping on screen | ✓ |
| | Any other function that is not a driver's aid | | ✓ |
| **Non-mounted mobile phone and tablet (not held by driver)** | Dialling | Typing number | × |
| | | Voice | ✓ |
| | Audio phone call | Accepting call (tapping) | × |
| | | Accepting call (voice) | ✓ |
| | | Scrolling through contacts | × |
| | | Talking | ✓ |
| | Texting | Typing | × |
| | | Voice | ✓ |
| | Emails | Typing | × |
| | | Voice | ✓ |
| | Playing games | | × |
| | Taking photos/video | | × |

| Secondary activity while driving | Interaction | | Allowed (✓) / not allowed (×) |
|---|---|---|---|
| | Watching video | | × |
| | Navigation | Touching | × |
| | | Typing address | × |
| | | Voice control | ✓ |
| | Playing music | Touching | × |
| | | Voice | ✓ |
| | | Typing artist, album or song | × |
| | Any other function that is not a driver's aid | | × |
| **Visual display units (such as DVD displays)** | Video and static images | Inside vehicle | × |
| | | Visible to other drivers | × |
| **Portable computer (not held by driver)** | Emails | Typing | × |
| | | Voice | ✓ |
| | using word processor and other applications | Typing | × |
| | | Voice | ✓ |
| | Playing games | | × |
| | taking photos and video | | × |
| | looking at photos and Watching video | | × |
| | Any other function | | × |
| **Smartwatch (on wrist)** | Dialling | Typing number | × |
| | | Voice | ✓ |
| | Audio phone call | Accepting call (tapping) | × |
| | | Accepting call (voice) | ✓ |
| | | Scrolling through contacts | × |
| | | Talking | ✓ |
| | Texting | Typing | × |
| | | Voice | ✓ |
| | Emails | Typing | × |
| | | Voice | ✓ |
| | Playing games | | × |
| | Taking photos/video | | × |

| Secondary activity while driving | Interaction | | Allowed (✓) / not allowed (×) |
|---|---|---|---|
| | Watching video | | × |
| | Navigation | Tapping screen | × |
| | | Typing address | × |
| | | Voice control | ✓ |
| | | Glancing at visual directions | ✓ |
| | Playing music | Touching | × |
| | | Voice | ✓ |
| | | Typing artist, album or song | × |
| | Any other function | | × |
| **GPS unit (mounted)** | Entering address | Typing | × |
| | | Voice | ✓ |
| | Following route | Listening | ✓ |
| | | Glancing at visual directions | ✓ |
| **In-car audio system (radio, CD, mp3)** | | | ✓ |
| **Integrated infotainment system (includes use of Apple CarPlay, Android Auto and other similar applications that act as a controller for a portable device)** | Dialling | Typing number | × |
| | | Voice | ✓ |
| | Audio phone call | Accepting call (tapping) | ✓ |
| | | Accepting call (voice) | ✓ |
| | | Scrolling through contacts | ✓ |
| | | Talking | ✓ |
| | Texting | Typing | × |
| | | Voice | ✓ |
| | Emails | Typing | × |
| | | Voice | ✓ |
| | Navigation | Touching | ✓ |
| | | Typing address | × |
| | | Voice control | ✓ |
| | | Glancing at visual directions | ✓ |
| | Playing music | Touching | ✓ |
| | | Voice | ✓ |

| Secondary activity while driving | Interaction | | Allowed (✓) / not allowed (×) |
|---|---|---|---|
| | | Typing artist, album or song | × |
| | Any other function | | ✓ |
| **Dispatch system taxis** | Accepting jobs | Tapping on screen | ✓ |
| | | Typing address | × |
| **Dispatch system delivery** | Accepting ride requests | Tapping on screen | ✓ |
| | | Typing address | × |
| **CB radio** | Operating | | ✓ |
| **Reading newspaper/book/magazine** | | | × |
| **Handwriting** | | | × |
| **Eating** | | | ✓ |
| **Drinking** | | | ✓ |
| **Personal hygiene/grooming (for example, applying makeup, shaving)** | | | ✓ |

**Question 12:** Does the proposed combination of prescriptive and performance-based components in the hybrid option sufficiently address all the sources of distraction that can significantly reduce driver performance? If not, please elaborate.

# 8 Impact assessment

**Key points**

- We conducted a qualitative cost benefit analysis employing indicative ranges of specific costs and benefits to inform recommendations to decision makers.
- The criteria we developed covers the key identified potential impact areas of the options. These criteria are:
  - Effectiveness: The benefits of laws to mitigate against the risk of driver distraction are essentially the degree such laws are effective in mitigating those risks.
  - Efficiency: The efficiency with which those laws achieve that risk reduction is determined by the level of social costs (government or non-government, such as regulatory burden) incurred in achieving them.
  - Coherence: Our work needs to align with the Transport and Infrastructure Council Strategic Work Programme. On 6 November 2015, the Transport and Infrastructure Council released its long-term vision for infrastructure and transport in Australia and agreed to seven themes framing its priorities for national reform. In addition, the Council directed the NTC to also consider developing of a technology-neutral approach for regulating driver distraction.
- Our assessment of all the options under these criteria allows us to determine our preferred option as explained in Chapter 9.

## 8.1 Approach

A quantitative cost benefit analysis involves estimating (and monetising) costs and benefits associated with options to resolve a specified policy problem. In doing so it identifies the option with the largest net benefit. Such an approach requires that all significant costs and benefits can be defensibly estimated and monetised.

Alternative approaches are more appropriate where full monetisation of costs and benefits is not appropriate. In the assessment of options to address driver distraction within the road rules there are several challenges to applying a full quantitative cost-benefit analysis, including the following:

- Research and evidence are limited on the current incidence of road accidents related to driver distraction. While estimates from available research suggest somewhere between 9 and 17 per cent of accidents involving motor vehicles have driver distraction as a contributing cause, there is very limited evidence supporting an understanding of the types of distraction behaviour that make up those estimates. In addition, other research approaches – such as naturalistic driving studies of distraction behaviour – have produced inconsistent findings as to the level of risk associated with particular behaviours.
- Likely behavioural responses to the different options and resultant risk reduction cannot be credibly quantified.
- The existing level of ‘regulatory burden’ cannot be accurately quantified given the number of different types of businesses that use the road and the likely behaviour of

each if no laws existed that regulated distraction related behaviour. Likewise, the regulatory burden impact of the performance-based option cannot be credibly estimated given the wide range of behaviours that it may or may not have restrictions removed as a result of adopting that option.

As such this impact analysis has adopted a qualitative cost-benefit assessment framework supported by indicative measurements of impacts where appropriate. The approach is:

- Criteria are developed that cover the key identified potential impact areas of the options being considered. These are assessed against each option.
- For each criterion:
  - any sub-criteria are established and the basis by which each option will be assessed is set out
  - the status quo option is assessed and establishes the baseline
  - each of the other options are assessed against the baseline established under the assessment of the status quo
  - a summary assessment of all the options is provided.
- A final overall assessment is provided, bringing the assessments of each criterion together.

### 8.1.1 Criteria development

The benefits of laws to mitigate against the risk of driver distraction are essentially the degree such laws are **effective** in mitigating those risks.

The **efficiency** with which those laws achieve that risk reduction is determined by the level of social costs (government or non-government, such as regulatory burden) incurred in achieving them.

The NTC is a national reform agency that develops transport law reform under direction from the Transport and Infrastructure Council, which requires us to develop consensus among different levels of government and ensure reform has coherence with the existing policies, laws and strategies of Australian state, territory and Commonwealth governments.

In addition to reviewing the Australian Road Rules to determine whether they sufficiently address the key factors that cause driver distraction, the Transport and Infrastructure Council directed the NTC to also consider developing a **technology-neutral** approach for regulating driver distraction.

## 8.2 Effectiveness

In terms of the effectiveness of the options the two important related considerations in understanding the dynamics are the likely effectiveness in enforcing each option and the behavioural response of road users.

For the purpose of this assessment, driver distraction is separated into two categories:

- technological distraction – distraction caused through interactions with technological devices (these are currently dealt with in rules 299 and 300)
- conventional distraction – distraction caused by other factors than interactions with technological devices (these are currently only indirectly dealt with by rule 297).

To be able to quantify the impact of each option against these risk categories, we would need a more detailed understanding of the existing level of risks associated with specific behaviours than is available, as well as a defensible way of estimating the likely effectiveness (enforceability and behavioural response).

Given these limitations, the approach to assessing the likely effectiveness of each option consists of:

- for Option 1 (status quo), setting out a conceptual baseline of the prevalence and impact on safety of current levels of driver distraction and the effectiveness of the existing laws in mitigating driver distraction behaviour (referencing all available relevant evidence)
- establishing an indicative baseline of the current level of technological and conventional driver distraction in terms of number of different accident types (fatal, serious injury and property damage only (PDO))
- establishing indicative estimates for the effectiveness of the existing rules in reducing driver distraction-related accidents
- assessing each option with reference to this baseline with an indicative range of risk impact estimates based on plausible behavioural change scenarios if the option were to be implemented
- providing a summary assessment of how the options compare against the effectiveness criteria.

### 8.2.1 Option 1: Status quo

**Current level of driver distraction-related accidents in Australia**

Driver distraction as a safety issue is not as well understood as other road safety risk factors such as drink-driving and speeding. While the most widely studied cause of distraction in driver distraction literature is mobile phone use, the increasing functionality of smartphones exposes drivers to a growing number of new phone interactions (Goodsell, Cunningham & Chevalier, 2019). Research in new technologies and other sources of distraction has limitations and is relatively immature in comparison with other road safety risks. Accurate data about its real impact on road fatalities and serious injury in Australia is not available.

Many studies about the road safety impacts of driver distraction cite statistics from the National Highway Traffic Safety Administration (NHTSA) in the US. According to NHTSA, 9 per cent of fatal crashes in 2017 were reported as distraction-affected crashes and 14 per cent of these were reported to have involved mobile phone use (NHTSA, 2019).

The Australian National Crash In-Depth Study investigated 340 crashes where a vehicle occupant was admitted to hospital for at least 24 hours. This study found that distraction was present in 16 per cent of these crashes. In-vehicle distractions were present in 9 per cent of these crashes, with interactions with passengers and mobile phones as the most frequent sources of in-vehicle distractions (Beanland, et al., 2013). In Victoria, preliminary figures for the 2015-16 financial year estimated that drivers and riders injured in crashes involving distraction accounted for 8 per cent of deaths and 7 per cent of serious injuries.

However, it is widely accepted that driver distraction is under-reported. The negative implications associated with distracted driving – especially if in connection with a crash – means that self-reporting of negative behaviour is lower than actual occurrence of that behaviour (NHTSA, 2018).

Research undertaken in Europe has found that car drivers spend 25–30 per cent of their total driving time on distracting activities (European Road Safety Observatory, 2015). A recent Australian study found that drivers are engaged in a non-driving task while at the wheel every 96 seconds (Young et al., 2018).

A Commonwealth Government survey found that 79 per cent of drivers agree that talking on a mobile phone while driving increases the risk of being involved in a road crash. However, 21 per cent admit to using their mobile phones for activities such as browsing the internet, texting, taking photos or using applications (Department of Infrastructure, Regional Development and Cities, 2018). This disconcerting result could be explained by the large number of drivers who believe that diverting their attention to secondary tasks does not impair their own driving performance (Watson & Strayer, 2010). Such belief is against evidence showing that 97.5 per cent of drivers experience a significant reduction in driving performance when executing a secondary task (Watson & Strayer, 2010).

It is possible that the problem of driver distraction from technology could get worse. Mobile phones are ubiquitous, with 95 per cent of Australians owning one (Department of Infrastructure, Regional Development and Cities, 2018). Most Australians (81 per cent) have smart phones, allowing them to conduct a range of activities in addition to making and receiving calls and sending and receiving text messages (Australian Communications and Media Authority, 2017 cites in Department of Infrastructure, Regional Development and Cities, 2018).

In addition, wearable technology is becoming increasingly popular. According to estimates, by May 2018 Apple had sold approximately 46 million Apple Watches worldwide (Asymco quoted in iClarified, 2018). While Google stopped producing Google Glass in 2015, more modern head-mounted displays similar to Google Glass are in development. Other companies such as Fitbit, Xiaomi, Garmin and Huawei are also producing wearable devices. The global market for wearable technology has consistently grown since 2012 and was forecast to grow to around $8.4 billion by 2018 (Statista, 2018).

### Challenges with enforcing existing laws

Road rule 297(1) is expected to address a broad range of sources of distraction by requiring drivers to have proper control of their vehicles. However, as we have previously established in this paper, this rule does not define proper control. It is not clear what acceptable compliance looks like under this rule.

Road rules 299 and 300 regulate the safe use of visual display units and mobile phones respectively. These rules date back to 1999, when texting and calling were the most common features of a mobile phone.

This means that devices introduced later to the market are not explicitly addressed by current legislation. States and territories have had to interpret those rules based on similarities between new devices and mobile phones and visual display units to be able to regulate their use by drivers.

### Effectiveness of the existing laws

For this option, we have assumed the current level distraction-affected crashes to be within the range between 9 and 16 per cent estimated by the NHTSA and the Australian National Crash In-Depth Study respectively. However, as we explained previously, we note that these figures may be higher as the incidence of driver distraction is under-reported.

The existing rules combine performance-based and prescriptive rules to address the road safety risks of driver distraction. In theory, the current rules should maximise the advantages and offset the disadvantages of both approaches. However, this does not appear to be the case.

Rule 297(1) is a performance-based rule with the flexibility to address the safety risks from any sources of distraction that fall outside the scope of rules 299 and 300. Yet, as we mentioned in sub-section 4.1.1, this rule does not define proper control, specify any requirements for compliance or provide examples of improper control. This lack of clarity makes it a difficult rule to enforce and comply with.

As we discussed in subsection 3.2.3, infringement figures for this rule in different jurisdictions are a small fraction of the number of infringements in relation to rule 300. Considering that a range of studies reveal that drivers engage in conventional, or non-technology-based, activities more frequently than technology-based tasks (Young, Horberry & Charlton, 2019), we consider the level of effectiveness for this rule to be low.

As we mentioned previously, rules 299 and 300 date back to 1999, before the emergence of smartphones, tablets and smartwatches. Texting, calling and watching DVDs were the primary interactions with technology in a vehicle. They only preclude the limit or use of specific technology devices – mobile phones, visual display units and television receivers – while permitting their use as driver aids. Those devices have evolved and changed significantly over time, while new technologies have also entered the market.

Rule 299 does not adequately address the risk of distraction from drivers operating visual displays in in-vehicle systems while the vehicle is moving. Some functions in these devices can sometimes affect the level of attention these systems demand from drivers (Birrell & Young, 2011).

Rule 300 refers to the use of mobile phones as opposed to focusing on the device's functions that could potentially have distracting effects on the driver. Recent functions available in modern smartphones are not adequately regulated by this rule. In addition, new devices that provide similar functionalities are not explicitly covered by rule 300.

While states and territories have made their own amendments and interpreted these two rules to accommodate technological developments, they have reported confusion among drivers about what is required to comply with these rules. We consider the effectiveness for rules 299 and 300 to be low to medium.

The lack of clarity of rule 297(1) and the inflexibility of rules 299 and 300 reduces the effectiveness of this option. The possibility of future updates by the Australian Road Rules Maintenance Group would still result in a high likelihood of quickly becoming outdated again, requiring further and frequent updates.

However, it is likely that rule 300 still provides a clear message to the public about the risk of using a hand-held mobile phone for making audio phone calls while driving. Police also have an instrument for penalising this driver behaviour. We conclude that the level of distraction-affected crashes could be higher without this rule as unsafe mobile phone use by drivers would increase.

**Baseline**

As presented above, the research and data on distraction as the cause of motor vehicle accidents is sparse and the proportion of technology-related distraction even more so. For the purposes of establishing an indicative baseline this impact analysis assumes 9 per cent

of the existing accidents are caused by driver distraction, in line with both the NHTSA study and the Australian National Crash In-Depth Study. Of these, it is assumed that 20 per cent are related to technology use (6 per cent higher than the NHTSA study's estimate of accidents related to mobile phone use).

Based on these percentages, and assuming these are evenly distributed across crash types, the indicative cost of technology and non-technology (conventional) distraction-related accidents based on 2018 national data are summarised in Table 7.

**Table 7. Distraction-related crashes baseline ($ millions)**

| Distraction type | Accident type | No. of accidents[a] | Estimated average cost[b] | Indicative total cost |
|---|---|---|---|---|
| Technological | Fatal (fatalities) | 20 (22) | $ 5.00 | $ 100.71 |
| | Injury | 249 | $ 0.35 | $ 87.22 |
| | PDO | 8100 | $ 0.013 | $ 105.30 |
| | Total | 8369 | | $ 293.23 |
| Conventional | Fatal (fatalities) | 81 (88) | $ 5.00 | $ 402.84 |
| | Injury | 997 | $ 0.35 | $ 348.87 |
| | PDO | 32400 | $ 0.013 | $ 421.20 |
| | Total | 33477 | | $ 1,172.91 |

a) Fatal accident numbers based on five-year average from BITRE; Injury numbers based on an Austroads study estimating 'fatal and serious injury' crashes from 2009 to 2013, subtracting BITRE fatality crash data from that period; property damage only (PDO) data based BITRE data.

b) Fatal crash costs based on average of 1.09 lives lost per fatal crash, OBPR recommended value of statistical life inflated to 2019 dollars, and rounded from $4.92 million to $5 million to conservatively reflect that fatal accidents will always involve property damage and often serious injuries of others; injury and PDO costs based on 2009 BITRE estimates inflated to 2019 dollars.

Table 7 provides indicative estimates of the current magnitude of technological and conventional accidents in Australia.

### Effectiveness of existing rules

It is challenging to establish the effectiveness of the existing rules in reducing distraction related crashes given the absence of the counter-factual world where no such regulations exist at all. Studies in America where many states have introduced similar bans on mobile phone use have produced mixed results varying from finding small negative crash outcomes

(Highway Loss Data Institute, 2010; Ehsani et al, 2014; Roper, 2017) to reductions in fatal crashes and hospitalisations (Ferdinand et al, 2014; Kwon et al, 2014; Ferdinand et al, 2015) implicitly larger in percentage than the total numbers presented in table 7 for technological related crashes. For the purposes of establishing an indicative estimate of the reduction of technology-based distraction incidents we have assumed that technological related crashes would be 24 per cent higher in the absence of the existing laws (Table 8). This is considerably lower than the higher estimates from the American studies of similar laws.

**Table 8. Effectiveness of existing laws in reducing technology-related crashes**

| Accident type | No. of accidents reduced | Estimated average cost of accident ($ million) | Indicative value of risk reduction ($ million) |
|---|---|---|---|
| Fatal (fatalities) | 4.8 (5.3) | $ 5.000 | $ 24.2 |
| Injury | 59.8 | $ 0.350 | $ 20.9 |
| PDO | 1944.0 | $ 0.013 | $ 25.3 |
| Total | 2008.6 | | $ 70.4 |

Rule 297(1) is the only measure within the road rules that mitigates the risk of conventional distraction behaviour. Because the number of infringements under this rule is considerably lower than for rule 300 (based on preliminary figures for various jurisdictions over the past three years), it is not clear that this rule currently has a material impact on such behaviours. If, for the purposes of establishing an indicative measure, it was assumed that 1 per cent of conventional distraction-related incidents were mitigated by the presence and enforcement of rule 297(1), this would imply the effectiveness levels provided in Table 9.

**Table 9. Effectiveness of existing laws in reducing in conventional distraction-related crashes**

| Accident type | No. of accidents reduced | Estimated average cost of accident ($ million) | Indicative value of risk reduction ($ million) |
|---|---|---|---|
| Fatal (fatalities) | 0.8 | $ 5.000 | $ 4.0 |
| Injury | 10.0 | $ 0.350 | $ 3.5 |
| PDO | 324.0 | $ 0.013 | $ 4.2 |
| Total | 334.8 | | $ 11.8 |

These indicative estimates will form the parameters within which the impact of the options would be considered. That is, indicative estimates for:

- Crashes caused by technology-based distraction can be no worse than 24 per cent higher than the existing level under the status quo if the option is considered completely ineffectual in stopping high-risk technological distraction behaviour
- Crashes caused by conventional distraction can be no worse than 1 per cent compared with the existing level under the status quo if the option is considered completely ineffectual in stopping high-risk technological distraction behaviour.

### 8.2.2 Option 2: Prescriptive

The prescriptive option proposes a fully prescriptive approach to address the road safety risks of driver distraction. The main benefit of this approach is that it provides more certainty to police and the public and the community to determine whether certain behaviours and interactions are compliant. Compliance can be determined from an objective observation of driver behaviour, and a binary decision (yes or no) is all that is required. There is no need to subjectively measure the degree to which the driver is engaging in non-compliant behaviour.

**Impact on technology-based distractions**

Appendix A shows how this option targets the visual and visual manual distractions found to significantly increase the risk of a crash or near-crash event. We consider that the new offences under this option targeting text-based, image-based and manual interactions with technology to be more effective than rules 299 and 300. The new offences provide a clearer guide for drivers and police about the high-risk interactions with technology that would be illegal under this option. These new offences would remove the current ambiguity regarding the legal use of new devices entering the market.

In section 5.1 we discussed cases in which introducing prescriptive legislation that provides further clarity about what drivers can and cannot do has resulted in road safety benefits. Studies found that bans on hand-held mobile phone use resulted in reductions in use and crash rates immediately after implementation of the laws (Kwon et al, 2014; McCartt et al., 2010, cited in Regan & Prabhakharan, 2019).

The proposed changes under this option are highly likely to have at least some impact in reducing technology-based distraction accidents. At the high end it could have a substantial impact if it is effective in reducing targeted behaviours. The indicative range is based on the following reductions in technology-based distraction crashes as a result of this option.

- 2.4 per cent – based on achieving a further 10 per cent of the effectiveness of the existing laws
- 12 per cent – based on the achieving a further 50 per cent of the effectiveness of the existing laws in mitigating driver distraction crashes.

Table 10 shows the indicative low and high impacts of technology-based distraction under option 2.

**Table 10. Indicative low and high impacts technology-based distraction – option 2**

| Distraction type | Accident type | No. of accidents | Estimated average cost ($ million) | Indicative total cost ($ million) |
|---|---|---|---|---|
| Low | Fatal (fatalities) | 0.5 (0.5) | $ 5.000 | $ 2.4 |
| | Injury | 6.0 | $ 0.350 | $ 2.1 |

| | | | | |
|---|---|---|---|---|
| | PDO | 194.4 | $ 0.013 | $ 2.5 |
| | Total | 200.9 | | $ 7.0 |
| High | Fatal (fatalities) | 2.4 (2.6) | $ 5.000 | $ 12.1 |
| | Injury | 29.9 | $ 0.350 | $ 10.5 |
| | PDO | 972.0 | $ 0.013 | $ 12.6 |
| | Total | 1004.3 | | $ 35.2 |

**Impact on conventional distractions**

The new offences targeting visual and visual manual interactions with conventional mediums would provide an additional deterrence regarding these high-risk activities. As we discussed in subsection 5.1.1, their associated causes of distraction place comparable demands on drivers. A Naturalistic Driving Study found that reading and writing can increase the risk of a crash or near-crash event by almost 10 times (Dingus et al., 2016, cited in Goodsell, Cunningham & Chevalier, 2019).

However, introducing an offence for drivers who take eyeglances off the road for more than two seconds could result in making activities that are intended to be compliant under this option illegal (Young & Lenné, 2012). In addition, law enforcement agencies have noted the significant enforcement challenge of requiring police to detect the eyes-off-road behaviour under various conditions. This could result in overzealous or too lenient enforcement in detecting this offence.

The indicative range of potential impact on conventional distraction events are:

- 0 per cent change – which assumes that any benefit from making certain conventional distraction behaviours illegal would be offset by an ineffectual two second eyes-off-road law replacing the existing ‘proper control’ requirement under rule 297 (1)
- 1 per cent reduction in conventional distraction crashes – which assumes a small reduction in crashes due to reduced high-risk behaviour in response to prescribing the two seconds eyes-off-road rule having the same effect as rule 297(1) under the status quo.

The implications of this indicative range are presented in Table 11.

**Table 11. Indicative low and high impacts conventional distraction – option 2**

| Distraction type | Accident type | No. of accidents | Estimated average cost ($ million) | Indicative total cost ($ million) |
|---|---|---|---|---|
| Low | Fatal (fatalities) | 0.0 (0) | $ 5.000 | $ - |
| | Injury | 0.0 | $ 0.350 | $ - |

| | | | | |
|---|---|---|---|---|
| | PDO | 0.0 | $ 0.013 | $ - |
| | Total | 0.0 | | $ - |
| High | Fatal (fatalities) | 0.8 (0.9) | $ 5.000 | $ 4.0 |
| | Injury | 10.0 | $ 0.350 | $ 3.5 |
| | PDO | 324.0 | $ 0.013 | $ 4.2 |
| | Total | 334.8 | | $ 11.7 |

### 8.2.3 Option 3: Performance-based

The approach to regulating driver distraction proposed under this option relies on defining a standard or outcome. This results in flexibility for drivers to choose the way to comply with the rules and allows the road rules to accommodate changes in technology and associated behaviours.

Including examples of proper control would increase the effectiveness of rule 297(1) in comparison with the status quo. These examples would provide a more objective measure for police to determine compliance by establishing the key requirements for driving in proper control. This simplifies enforcement and informs drivers about what compliance looks like.

However, the approach in this option is still less certain about what acceptable compliance may look like in comparison with a prescriptive approach. The performance-based option requires a higher level of competence from regulators and drivers. Regulators might need to develop supporting guidance material to assist drivers with compliance.

**Impact on technology-based distractions**

As discussed in the assessment of the status quo option, a significant number of Australian drivers admit to using their mobile phones for non-driving related activities while at the wheel. Drivers engage in these distracting activities influenced more by their perceived rewards than by potential risks to themselves and others (Ba et al., 2015). In addition, a large portion of drivers believe that diverting their attention to secondary tasks does not impair their own driving performance, against evidence showing that such belief is incorrect for 97.5 per cent of drivers (Watson & Strayer, 2010).

For these reasons, it is likely that unsafe driver interactions with technology would increase due to removing prescriptive rules specifically deterring such interactions. As a result, technology-based distraction-affected crashes would likely increase under this option.

The indicative ranges are based on the following reductions in technology-based distraction crashes as a result of this option:

- 2.4 per cent – based on a 10 per cent deterioration in the effectiveness of the existing laws in mitigating technology-related driver distraction crashes with deterioration partially mitigated by the effect of the performance-based measure being somewhat effective in reducing technology-related risky behaviours.

- 12 per cent – based on a 50 per cent deterioration of the effectiveness of the existing laws in mitigating technology-related driver distraction crashes.

**Table 12. Indicative low and high impacts technology-based distraction – option 3**

| Distraction type | Accident type | No. of accidents | Estimated average cost ($ million) | Indicative total cost ($ million) |
|---|---|---|---|---|
| Low | Fatal | -0.5(-0.5) | $ 5.000 | -$ 2.4 |
| | Injury | -6.0 | $ 0.350 | -$ 2.1 |
| | PDO | -194.4 | $ 0.013 | -$ 2.5 |
| | Total | -200.9 | | -$ 7.0 |
| High | Fatal | -2.4(-2.6) | $ 5.000 | -$ 12.1 |
| | Injury | -29.9 | $ 0.350 | -$ 10.5 |
| | PDO | -972.0 | $ 0.013 | -$ 12.6 |
| | Total | -1004.3 | | -$ 35.2 |

**Impact on conventional distractions**

The examples of proper control proposed under this option would provide guidance regarding lateral, longitudinal and velocity control, and the ability to safely respond to hazards. Examples of non-compliance with this offence would include:

- engaging in any activity that could compromise the driver's ability to:
  - control the vehicle's direction, speed and acceleration
  - safely respond to objects, events and other road users
- involuntary lane departure
- sudden acceleration
- sudden breaking without an observable cause
- late reaction or failing to react to roadway hazards.

It is likely that the added clarity under this option would represent an improvement from rule 297(1) under the status quo for addressing conventional sources of distraction that have been found to be more prevalent than technology-based tasks (Young, Horberry & Charlton, 2019). Some of these activities (for example, eating, drinking, talking to passengers) would be challenging to regulate through prescriptive rules.

The indicative range of potential impact on conventional distraction events are:

- 1 per cent reduction in conventional crash causes – which assumes a modest improvement in conventional distraction behaviours due to the more detailed 'proper control' requirement under rule 297(1)
- 3 per cent reduction in conventional distraction crashes – which assumes a larger improvement in conventional distraction behaviours due to the more detailed 'proper control' requirement under rule 297(1).

The implications of this indicative range are presented in Table 13.

**Table 13. Indicative low and high impacts conventional distraction – option 3**

| Distraction type | Accident type | No. of accidents | Estimated average cost ($ million) | Indicative total cost ($ million) |
|---|---|---|---|---|
| Low | Fatal (fatalities) | 0.8 (0.9) | $ 5.000 | $ 4.0 |
| | Injury | 10.0 | $ 0.350 | $ 3.5 |
| | PDO | 324.0 | $ 0.013 | $ 4.2 |
| | Total | 334.8 | | $ 11.7 |
| High | Fatal (fatalities) | 2.4 (2.6) | $ 5.000 | $ 12.1 |
| | Injury | 29.9 | $ 0.350 | $ 10.5 |
| | PDO | 972.0 | $ 0.013 | $ 12.6 |
| | Total | 1004.3 | | $ 35.2 |

### 8.2.4 Option 4: Hybrid

Under the prescriptive part of this option, compliance can be determined from an objective observation of driver behaviour, and a binary decision (yes or no) is all that is required. There is no need to subjectively measure the degree to which the driver is engaging in non-compliant behaviour.

By not including an offence for drivers who take eyeglances off the road for more than two seconds, this option removes the risk of unintentionally legislating against some activities that are intended to be compliant.

Instead, the hybrid option amends the existing offence in rule 297(1) by introducing examples of 'proper control'. This preserves flexibility for drivers to choose the way to comply with the rules while providing an objective measure for police to determine compliance based on examples of driving in proper control.

**Technology-based distractions**

As with the prescriptive option, the hybrid option targets the visual and visual manual distractions found to significantly increase the risk of a crash or near-crash event. The new offences under this option targeting text-based, image-based and manual interactions with technology are assumed to be more effective than rules 299 and 300. We consider that the new offences would improve certainty for drivers and police about the high-risk interactions with technology that would be illegal under this option. This option would remove the current ambiguity regarding the legal use of new devices entering the market.

The proposed changes under this option would likely have a similar impact on technology-based distraction behaviour as the prescriptive option. In terms of indicative estimates:

- 2.4 per cent – based on achieving a further 10 per cent of the effectiveness of the existing laws
- 12 per cent – based on the achieving a further 50 per cent of the effectiveness of the existing laws in mitigating driver distraction crashes.

**Table 14. Indicative low and high impacts technology-based distraction – option 4**

| Distraction type | Accident type | No. of accidents | Estimated average cost ($ million) | Indicative total cost ($ million) |
|---|---|---|---|---|
| Low | Fatal (fatalities) | 0.5 (0.5) | $ 5.000 | $ 2.4 |
| | Injury | 6.0 | $ 0.350 | $ 2.1 |
| | PDO | 194.4 | $ 0.013 | $ 2.5 |
| | Total | 200.9 | | $ 7.0 |
| High | Fatal (fatalities) | 2.4 (2.6) | $ 5.000 | $ 12.1 |
| | Injury | 29.9 | $ 0.350 | $ 10.5 |
| | PDO | 972.0 | $ 0.013 | $ 12.6 |
| | Total | 1,004.3 | | $ 35.2 |

### Conventional distractions

As with the performance-based option, the examples of proper control proposed under this option would provide guidance regarding lateral, longitudinal and velocity control, and the ability to safely respond to hazards. Examples of non-compliance with this offence would include:

- engaging in any activity that could compromise the driver's ability to:
  - control the vehicle's direction, speed and acceleration

  - safely respond to objects, events and other road users
- involuntary lane departure
- sudden acceleration
- sudden breaking without an observable cause
- late reaction or failing to react to roadway hazards.

Like the prescriptive option, this option also prescribes certain conventional distraction behaviours.

The indicative range of potential impact on conventional distraction events are:

- 1.5 per cent reduction in conventional crash causes – which assumes a modest improvement in conventional distraction behaviours due to the more detailed 'proper control' requirement under rule 297(1) and a modest effect of increased prescription under rules 299/300
- 4 per cent reduction in conventional distraction crashes – which assumes a larger improvement in conventional distraction behaviours due to the more detailed 'proper control' requirement under rule 297(1) and relatively larger effect of increased prescription under rules 299/300.

The implications of this indicative range are presented in Table 15.

**Table 15. Indicative Low and High Impacts Conventional Distraction Option 4**

| Distraction type | Accident type | No. of accidents | Estimated average cost ($ million) | Indicative total cost ($ million) |
|---|---|---|---|---|
| Low | Fatal (fatalities) | 1.2 (1.3) | $ 5.000 | $ 6.0 |
| | Injury | 15.0 | $ 0.350 | $ 5.2 |
| | PDO | 486.0 | $ 0.013 | $ 6.3 |
| | Total | 502.2 | | $ 17.6 |
| High | Fatal (fatalities) | 3.2 (3.5) | $ 5.000 | $ 16.1 |
| | Injury | 39.9 | $ 0.350 | $ 14.0 |
| | PDO | 1296.0 | $ 0.013 | $ 16.8 |
| | Total | 1339.1 | | $ 46.9 |

### 8.2.5 Summary assessment

The assessment of each option against the effectiveness criteria is summarised in Table 16.

**Table 16. Summary assessment of each options' effectiveness**

| | Option 1: Status quo | Option 2: Prescriptive | Option 3: Performance-based | Option 4: Hybrid |
|---|---|---|---|---|
| Technology-based distraction | N/A | The proposed additional behaviours addressed and better targeted under this option are highly likely to have at least some impact in reducing technology-based distraction accidents.<br><br>Indicative impact:<br>Reduction of 0.5 to 2.6 fatalities p/a<br><br>Reduction of $7.0 million to $35.2 million economic value lost from accidents | It is likely that unsafe driver interactions with technology would increase due to removing prescriptive rules specifically deterring such interactions. As a result, technology-based distraction-affected crashes would likely increase under this option.<br><br>Indicative impact:<br>Increase of 0.5 to 2.6 fatalities p/a<br><br>Increase of $7.0 million to $35.2 million economic value lost from accidents | The proposed additional behaviours addressed and better targeted under this option are highly likely to have at least some impact in reducing technology-based distraction accidents.<br><br>Indicative impact:<br>Reduction of 0.5 to 2.6 fatalities p/a<br><br>Reduction of $7.0 million to $35.2 million economic value lost from accidents |
| Conventional Distraction | N/A | Extra prescription might reduce some high-risk conventional distraction behaviours.<br><br>The two-second eyes-off-road rule will be very hard to enforce and may be possibly be even less effectual than the current 'proper control' rule.<br><br>Indicative impact:<br>Reduction of 0 to 0.9 fatalities p/a<br><br>Reduction of $0 to $11.7 million economic value lost from accidents | It is likely that the added clarity under this option would represent an improvement from rule 297(1) under the status quo for addressing conventional sources of distraction<br><br>Indicative impact:<br>Reduction of 0.9 to 2.6 fatalities p/a<br><br>Reduction of $11.7 million to $35.2 million economic value lost from accidents | Extra prescription might reduce some high-risk conventional distraction behaviours.<br><br>It is likely that the added clarity under this option would represent an improvement from rule 297(1) under the status quo for addressing conventional sources of distraction<br><br>Indicative impact:<br>Reduction of 1.3 to 3.5 fatalities p/a<br><br>Reduction of $17.6 million to $46.9 million economic value lost from accidents |

Overall, it is likely that option 4 would be most effective in reducing risks to driver distraction, including being at least as effective as any other option in addressing either technology-based and conventional driver distraction risk. It is likely to be equally as effective as option 2 in reducing technology-based driver distraction and slightly more effective than option 4 in addressing conventional distraction risk – the next best options for those particular risk categories.

## 8.3 Efficiency

Efficiency is a measure of the costs associated with achieving a desired outcome. Efficiency increases as the amount of resources required to achieve a specified outcome, falls. Costs of regulatory proposals can be borne by both government and non-government sectors.

The primary 'trigger' for a RIS when a new regulatory proposal is being considered is that the options considered are 'likely to have a regulatory impact on businesses, community organisations or individuals'.

The proposed options developed to address the risks on driver distraction in the road rules could prohibit activities that businesses and individuals are currently allowed to undertake while driving or alternatively will allow some behaviours that are currently prohibited.

For instance, if someone is required to pull over and park their motor vehicle to carry out a task, they would implicitly have a time cost 'imposed' on them in complying with that requirement. Alternatively, they may need to purchase a particular technology that allows them to legally continue to carry out the function without pulling over.

Options may also vary by the implications for costs on government agencies such as police and the courts. Though it is possible that there may be some variation in the impact of the different options on government resources (for example it is possible that performance-based measures may result in greater legal uncertainty and so increased likelihood of costly appeal proceedings to infringements), this RIS has not sought to measure the impact of these options on police and judicial resources. Assessing the relative impact would be excessively speculative and is very unlikely to alter the choice of the best option.

The approach to assessing the likely efficiency of each option consists of:

- for option 1 (status quo), the assessment identifies the possible burdens the existing laws might incur on individuals and businesses as well as specific types of businesses affected by the existing prescriptions in the rules
- establishing indicative estimates of the specific identified burdens
- assessing each option with reference to this baseline set out in the status quo including any indicative estimates established for new restrictions or identified restrictions 'relaxed' from the existing rules
- providing a summary assessment of how the options compare against the efficiency criteria.

### 8.3.1 Option 1: Status quo

Under the current set of rules under review in this RIS (specifically rules 299 and 300), drivers are not permitted to use a hand-held mobile phone or other devices for any tasks or visual display units apart from mounted 'driver aids' (such as navigational devices). If a mobile phone or navigational device is mounted, drivers are allowed to carry out some

functions such as dialling, accepting phone calls and operating navigational devices (including typing in addresses).

It is likely that some individuals and businesses would need to purchase a mount that would allow for them to use navigational devices and mobile phones legally. These mounts can range from $15 to several hundred dollars depending on specifications. Table 17 establishes indicative cost estimates for complying with this existing requirement.

**Table 17. Estimated impact on individuals and businesses from the road rules' requirement to use a mobile phone mount affixed to the vehicle**

| | Individuals | Business | Total |
|---|---|---|---|
| Cars[a)] | 1,000,000 | 1,250,000 | 2,250,000 |
| Mount $ | 20 | 20 | 20 |
| Average life | 3 years | 3 years | 3 years |
| Compliance cost | $ 6,666,667 | $ 8,333,333 | $ 15,000,000 |

a) Based on roughly 5 per cent and 20 per cent of private and business registered light vehicles from the Survey of Motor Vehicle Use (ABS 2019)

The indicative estimated is based on the assumption that about 5 per cent of privately registered vehicles and 20 per cent of business registered vehicles spend at least (i.e. cost to legally comply) $20 (assumed minimum costs) on a complaint mount with an average life of 3 years. The total annual cost would be $15 million a year to individuals ($6.67 million) and business ($8.33 million).

The current rules prohibit the use of some app-based functions on mobile devices, even if they are mounted. This, for instance prevents driver apps like those used by rideshare companies from being used legally while the vehicle is not parked. Assuming that compliant practice would involve a rideshare driver or courier pulling over to accept a ride request, this would apply a time related compliance cost.[3]

After dropping off a customer, rideshare operators may drive to a more advantageous position to pick up the next customer. In Australia, there are estimated to be 80,000 rideshare operators making an average 800 trips a year[4]. Assuming 5 per cent of these trips are accepted by a driver who would need to pull over to legally accept the job for an average

% [3] Time related compliance costs can be measured by multiplying

- the number of agents affected
- the average frequency each agent is required to carry out the additional task in a given time-period
- the average time the additional task takes
- the average value of time to the affected agents

[4] Based on estimate of 60,000 Uber drivers with 70.5 per cent market share. Rounded down on assumption that there is some overlap between Uber and other services (IBISWorld, 2019b)

of one minute, this would result in an average cost of $22.7 per hour to rideshare businesses/operators, amounting to $1.2 million a year (Table 18).

**Table 18. Estimated impact on rideshare operators**

| | |
|---|---|
| Rideshare operators[a)] | 80,000 |
| Trips per year[a)] | 800 |
| Affected share | 0.05 |
| Average lost time | 1 minute |
| Cost per hour of operator[b)] | $ 22.7 |
| Total annual cost | $ 1.2 Million |

a) Based on Houston Kemp analysis of NSW Uber data extrapolated nationally by population (Kemp & Gu, 2017)

b) Based on average of Transport Workers Union (2018) survey and Uber Analysis (Financial Times 2018)

Rule 297(1), which requires drivers to maintain 'proper control' may restrict other activities that a driver may otherwise engage in if such a rule did not exist.

### 8.3.2 Option 2: Prescriptive

Under the prescriptive option, a driver will be unable to use mounted devices to, say, type addresses. This may result in some courier type businesses requiring technological investments such as voice enabled navigation systems to continue to operate without pulling over to accept jobs or enter addresses into navigational devices or apps.

Voice activated navigational systems can cost upwards of $150. Assuming 20 per cent of small couriers would be required to purchase such a device (or equivalent solution) to continue to operate, and these devices have a three-year useful life, the total cost to such businesses would be $150,000 (Table 19).

**Table 19. Estimated impact on courier businesses**

| | |
|---|---|
| Total couriers[a)] | 15,000 |
| Affected couriers[a)] | 0.2 |
| Voice activation | $150 |
| Average life | 3 years |
| Total annual cost | $ 150,000 |

a) Based on IBISworld (2019a) estimates of number of courier businesses with turnover of $50,000 to $200,000 and share of "point to point" businesses (considered most likely to be affected)

As established in the status quo option, many rideshare drivers use ride-matching apps that are currently not compliant with existing rules. The prescriptive option would remove the implicit requirement that they pull over to accept client matches thus resulting an indicative burden reduction of about $1.2M.

More broadly, the prescriptive option would make illegal a number of practices that are currently explicitly prevented. These include using handheld devices, text-based communication applications and other non-communications-related functions (for example, social media, video-calls, watching videos). This RIS has not attempted to measure any burden associated with these restrictions.

### 8.3.3 Option 3: Performance-based

The performance-based option potentially allows for significant number of activities currently prohibited to be conducted as long as they do not impair a driver's control of the vehicle. The complexity and uncertainty in accurately identifying the frequency and verifiability (if they can legitimately be conducted while maintaining proper control of the vehicle) of all of these tasks makes plausible measurement very difficult.

In terms of the status quo baseline, drivers would no longer be required to purchase a mount to continue to use their phone under existing regulations. This would suggest an indicative burden reduction of $15 million per year.

### 8.3.4 Option 4: Hybrid

The hybrid option has similar impacts as the prescriptive option as it:

- prescribes the manual entering of addresses into devices, even if they are mounted
- enables the use of app-0based matching devices such as those used by rideshare operators.

The indicative estimates are therefore the same as option 2 – that is, a reduction of $1.2 million in allowing the use rideshare apps and an increase of $150,000 due to some couriers needing to invest in voice-recognition capabilities.

### 8.3.5 Summary assessment

Table 20 summarises the analysis of options against the efficiency criteria.

**Table 20. Summary assessment of the options' efficiency**

| | Option 1: Status quo | Option 2: Prescriptive | Option 3: Performance-based | Option 4: Hybrid |
|---|---|---|---|---|
| Regulatory burden | N/A | Could result in requirement for couriers to install voice-recognition technology to comply with new requirements.<br>Indicative increased burden:<br>$150,000 p/a<br><br>Would enable ride share operators to use apps legally without pulling over<br><br>Indicative reduced burden:<br>$1.2 million p/a | Would mean that drivers would no longer be legally required to buy a phone mount to legally use their phone<br><br>Indicative reduced burden:<br>$15 million p/a<br><br>Potential to allow other existing burdens to be removed (not measured) | Could result in requirement for couriers to install voice-recognition technology to comply with new requirements.<br>Indicative estimate:<br>$150,000 p/a increased burden<br><br>Would enable ride share operators to use apps legally without pulling over<br><br>Indicative reduced burden:<br>$1.2 million p/a |

Option 3, the performance-based approach, will see the greatest reduction in regulatory burden. The indicative measure of the reduction – which assumes that one million registered personal vehicles and 1.25 million business registered vehicles will no longer need to purchase a mobile phone mount – is estimated at $15 million per year.

Options 2 and 4 also suggest a net reduction in the burden to the extent that the indicative estimates are accurate. Under both options, allowing rideshare operators to legally use apps was assessed to have a larger burden reduction than the increase to couriers in having to purchase voice-recognition technology.

## 8.4 Coherence

The NTC is a national reform agency that develops transport law reform under direction from the Transport and Infrastructure Council. We are required to develop consensus among different levels of government and ensure reform has coherence with the existing policies, laws and strategies of Australian state, territory and commonwealth governments.

Our work needs to align with the Transport and Infrastructure Council Strategic Work Programme. On 6 November 2015, the Transport and Infrastructure Council released its long-term vision for infrastructure and transport in Australia and agreed to seven themes framing its priorities for national reform (Transport and Infrastructure Council, 2019). Two of these themes are relevant to the objectives of this project:

- continuing a focus on transport safety while maintaining awareness of technological developments (positive and disruptive) that may impact safety and security

- removing barriers to innovation, and capitalising on new and emerging technologies.

Emerging transport technologies can provide opportunities to improve transport productivity and reduce deaths and injuries. We consider that enabling these technologies to reach their potential is essential for improving our living standards and Australia's competitiveness.

Technological neutrality in the road rules for driver distraction provides an opportunity to encourage innovation and ensure that technology with the potential to improve road safety is not prohibited.

More broadly, other existing government policies – such as the Safe Systems framework – are adequately covered by the effectiveness criteria and so are not specifically assessed under the coherence criteria.

The assessment of each option against the coherence criteria focuses on a qualitative assessment of each option regarding how compliant it is with the requirement of technological neutrality and how well it potentially removes barriers to innovation.

### 8.4.1 Option 1: Status quo

The current laws were established in 1999 to deal with the emergence of mobile phones and to target the two primary functions of mobile phones – texting and dialling (calling).

The impetus for this work was a Transport and Infrastructure Council directive to review the existing rules addressing driver distraction to make them technologically neutral. The current rules are not technologically neutral and may be an impediment to further technological innovation.

### 8.4.2 Option 2: Prescriptive

The prescriptive element in this option focuses on the distraction activity rather the technology of the device and, as such, achieves the objective of technological neutrality. The new offences proposed under this option focus on the distraction activity rather the technology of the device and therefore achieve the objective of technological neutrality.

The prescriptive option may also enable the take up of new technologies that assist in reducing safety risk, such as voice-recognition devices. This option aligns more closely with the Transport and Infrastructure Council's long-term vision for infrastructure and transport in Australia. Not allowing drivers to manually enter information into a device may encourage the take up of technologies such as voice-user interfaces. This prescriptive element aligns with the Council's theme about removing barriers to innovation and capitalising on new and emerging technologies.

### 8.4.3 Option 3: Performance-based

The performance-based option is technologically neutral because it would no longer directly prohibit distraction activities themselves rather it would see all distraction behaviour captured under the 'proper control' mechanism in rule 297(1), which would be expanded to include explicit examples of what a failure to exhibit proper control entails.

### 8.4.4 Option 4: Hybrid

Like under option 2, the prescriptive rules in option 4 focus on the distraction activity rather than the technology of the device and, as such, achieve the objective of technological neutrality. The proposed new offences focus on the distraction activity rather the technology of the device and therefore achieve the objective of technological neutrality.

Like with the prescriptive option, not allowing the manual entering of information into a device aligns more closely with the Transport and Infrastructure Council's long-term vision for infrastructure and transport in Australia. This prescriptive element may encourage the take up of new technologies (such as enhanced voice-user interfaces) in line with the Council's theme about removing barriers to innovation and capitalising on new and emerging technologies.

### 8.4.5 Summary assessment

The assessment of the options against the coherence criteria is summarised in Table 21.

**Table 21. Summary assessment of the options' coherence**

| | **Option 1: Status quo** | **Option 2: Prescriptive** | **Option 3: Performance-based** | **Option 4: Hybrid** |
|---|---|---|---|---|
| Coherence | Not technologically neutral | Technologically neutral and may encourage take-up on new technologies | Technologically neutral | Technologically neutral and may encourage take-up on new technologies |

Overall, each of the developed options, by design, achieve the technological neutrality requirement. Options 2 and 4 may enable the take up of new technologies that assist in reducing safety risk, such as voice-user interfaces.

**Question 13:** Do you agree with the impact categories and assessment criteria? If not, what additional impact categories or assessment criteria should be included?

**Question 14:** Does our analysis accurately assess the road safety benefits for each reform option? Please provide any further information or data that may help to clearly describe or quantify the road safety benefits.

**Question 15:** Is the assumption that technology related distraction crashes would be 24 per cent higher in the absence of existing laws plausible? If not, can you provide any evidence that supports a different estimate?

**Question 16:** Has the consultation RIS captured the relevant individuals or groups that may be significantly affected by each of the options? Who else would you include and why?

**Question 17:** Has the consultation RIS used an appropriate analytical method for assessing the benefits and costs of the options? What else should be considered?

# 9 Conclusion and next steps

**Key points**

- Following our analysis of the four options, our preliminary view is that the Hybrid option is the preferred option because it would provide:
  - a clear list of high-risk behaviours and interactions that drivers should avoid regardless of the technology involved or even the source of distraction
  - reduced uncertainty about 'proper control' to address both the observable causes and consequences of behaviours and interactions that can impair a driver's control of a vehicle.
- We expect this option to provide the highest road safety benefits in terms of reducing the number of fatalities and economic costs from accidents.
- This option would result in a similar net reduction in burden to businesses as the prescriptive option.
- The hybrid option would meet the Transport and Infrastructure Council's requirement for technological neutrality and enable the take up of new technologies.

## 9.1 Preferred option

Following the analysis in the previous chapter, we conclude that the hybrid option is our preferred option for progressing to the next stage of this project. We consider that, overall, this option is the most suitable for regulating the risks from driver distraction at an acceptable level of impact on businesses and individuals. This option aligns with the Transport and Infrastructure Council's Strategic Work Programme.

According to our assessment, the hybrid option would:

- be the most effective at mitigating driver distraction safety risks
- equal the prescriptive option as the two second most efficient options (behind the performance-based option)
- be technologically-neutral and enable the take-up of new technologies.

While the performance-based option would most likely result in the highest reduction in regulatory burden, it could also result in an increase in unsafe driver interactions with technology. As a result, technology-based distraction-affected crashes would most likely increase under that option.

As mentioned in the previous section, the final preferred option to be recommended to the Transport and Infrastructure Council for consideration will be informed by feedback from stakeholders to this consultation RIS.

**Effectiveness**

We consider that introducing the new offences under the hybrid option would reduce the current level of crashes in relation to the sources of distraction associated with targeted interactions and behaviours. Introducing prescriptive legislation that provides further clarity

about what drivers can and cannot do has previously resulted in significant road safety benefits.

The added clarity under this option would also represent an improvement from rule 297(1) under the status quo for addressing conventional sources of distraction.

The indicative estimates for the effectiveness of the hybrid option show that this option would have the highest level of effectiveness of all the options proposed in this consultation RIS.

**Efficiency**

The hybrid option would result in similar impacts as the prescriptive option as it:

- prescribes that manually entering addresses into devices is not allowed, even if they are mounted
- enables driver apps to be used, such as those used by rideshare operators.

This option suggests a net reduction in the burden to businesses. Allowing rideshare operators to legally use apps is likely to have a larger burden reduction than the increase to couriers in having to purchase voice-recognition technology.

While the performance-based option, would most likely have the greatest reduction in the regulatory burden (by no longer requiring devices to be mounted), there would be an unacceptable increase in safety risks. These risks would be the result of removing explicit prohibitions targeting the unsafe use of devices while driving.

**Coherence**

This option meets the Transport and Infrastructure Council's requirement for technological neutrality. It also aligns with the Council's long-term vision for infrastructure and transport in Australia because it may encourage the take-up of technologies such as voice-user interfaces.

**Question 18:** On balance, do you agree that the preferred option best addresses the identified problem? If not, which option do you support?

## 9.2 Next steps

### 9.2.1 Public consultation for this RIS

The views of a broad range of stakeholders are crucial in guiding any policy positions. As such, we are asking stakeholders to consider the questions asked in this paper. However, those questions are provided as a guide only. Stakeholders are welcome to provide us with feedback on any aspect of this consultation RIS.

We are seeking submissions on this consultation RIS by 4 September 2019.

### 9.2.2 Next stage

The evidence and views gathered from the public consultation for the consultation RIS will inform the development of a decision RIS, with our final analysis of the options for technology-neutral road rules for driver distraction.

We are scheduled to prepare a decision RIS in November 2019. The development of this document will involve targeted consultation with the states and territories and industry peak bodies. It will be presented to the Transport and Infrastructure Council in May 2020 for consideration.

# Appendix A New offences in options and naturalistic driving studies

## Prescriptive option and naturalistic driving studies

| | | | | | | | | | Exposure | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Odds ratios | | | | | PAR | | Young et al.,2018 | | Dingus et al.,2016 |
| Illegal interaction | Source of distraction | Dingus et al., 2016 | Klauer et al., 2006 | Olson et al., 2009 | Hickman et al.,2010 | Fitch et al.,2013 | Klauer et al.,2006 | Olson el al 2009 | Duration | N | Prevalence |
| Text-based interactions — entering text | Dialling on a *hand-held* phone | 12.2 | 2.79 | 5.93 | 3.51 | 0.99 | 3.6 | 2.5 | | | 0.14% |
| | Texting | 6.1 | 0 | 23.24 | 163.6 | 1.73 | | | | | 1.91% |
| | Adjust in-vehicle visual display (e.g. touchscreen menu) | 4.6 | | | | | | | 4.3 | 217 | 0.83% |
| | In-vehicle radio | 1.9 | 0.55 | | | | | | 4.3 | 217 | 2.21% |
| | Using a dispatch device (truck study) | | | 9.9 | | | | | | | |
| | Writing | 9.9 | | 9 | | | | | | | 0.09% |
| Text-based interactions — reading long-form text | Adjust in-vehicle visual display (e.g. touchscreen menu) | 4.6 | | | | | | | 4.3 | 217 | 0.83% |
| | In-vehicle radio | 1.9 | 0.55 | | | | | | 4.3 | 217 | 2.21% |
| | Using a dispatch device (truck study) | | | 9.9 | | | | | | | |
| | Browsing | 2.7 | | | | | | | | | 0.73% |
| Image-based interactions — static and moving visual images | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Visual and visual manual interactions — conventional mediums | Reading a book, newspaper, Kindle or similar | 9.9 | 3.38 | | | | 2.9 | | | | 0.09% |
| | Writing | 9.9 | | 9 | | | | | | | 0.09% |
| | Looking at a map | | | 7 | | | | | | | |
| Manual interactions — portables | Reaching for phone | 4.8 | | | | | | | | | 0.58% |
| | Talk or listen to *hand held* phone | 2.2 | 1.29 | 1.04 | 0.89 | 0.79 | 3.6 | | 398.2 | 5 | 3.24% |
| | Reaching for an *electronic* object | | | 6.7 | | | 7.6 | | 6.3 | 67 | |
| | Using a calculator | | | 8.2 | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Do not look away from the road for more than 2 seconds at a time | Reaching for a *non-moving* object | 9.1 | 1.38 | 3.09 | | 3.65 | | | 6.3 | 67 | 1.08% |
| | Looking at external object | 7.1 | 3.7 | 0.54 | | | | | 8.3 | 117 | 0.93% |
| | Adjust in-vehicle climate control | 2.3 | | | | | | | 4.3 | 217 | 0.56% |
| | Adjust in-vehicle visual display (e.g. touchscreen menu) | 4.6 | | | | | | | 4.3 | 217 | 0.83% |
| | In-vehicle radio | 1.9 | 0.55 | | | | | | 4.3 | 217 | 2.21% |
| | Eating | 1.8 | 1.57 | 1.01 | 1.11 | | | | 253.2 | 17 | 1.90% |
| | Drink from container | 1.8 | 1.03 | 0.97 | | | | | 72.1 | 14 | 1.22% |
| | Interacting with/look at *passenger in adjacent seat* | 1.4 | 0.5 | 0.35 | | | | | 296.6 | 82 | 14.58% |
| | Dancing in seat to music | 1 | | | | | 3.1 | | | | 1.10% |
| | Inserting/retrieving CD | | 2.25 | | | | | | | | |
| | Smoking (reach, light, extinguish) | | | 0.6 | | | | | | | |
| | Smoking (cigarette in mouth or hand) | | | 0.97 | | | | | | | |
| | Insect in vehicle | | 6.37 | | | | | | | | |
| | Personal grooming/hygiene | 1.4 | 0.7 | | | | | | 9.3 | 84 | 1.69% |
| | Interacting with/look at *child in rear seat* | 0.5 | 0.33 | | | | | | | | 0.80% |
| | Applying makeup/personal grooming | | 3.13 | 4.48 | | | | | 9.3 | 84 | |
| | Reaching for a *moving* object | | 8.82 | | | | | | 6.3 | 67 | |
| | Interacting with/look at *passenger in rear seat* | | 0.39 | | | | | | 281 | 5 | |
| | Reaching for a *non-moving* object | 9.1 | 1.38 | 3.09 | | 3.65 | | | 6.3 | 67 | 1.08% |
| | Adjust in-vehicle climate control | 2.3 | | | | | | | 4.3 | 217 | 0.56% |
| | Eating | 1.8 | 1.57 | 1.01 | 1.11 | | | | 253.2 | 17 | 1.90% |
| | Drink from container | 1.8 | 1.03 | 0.97 | | | | | 72.1 | 14 | 1.22% |
| | Dancing in seat to music | 1 | | | | | 3.1 | | | | 1.10% |
| | Inserting/retrieving CD | | 2.25 | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Smoking (reach, light, extinguish) | | | 0.6 | | | | | | | |
| | Smoking (cigarette in mouth or hand) | | | 0.97 | | | | | | | |
| | Insect in vehicle | | 6.37 | | | | | | | | |

## Hybrid option and naturalistic driving studies

| | | | Odds ratios | | | | | PAR | | Exposure | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Young et al.,2018 | | Dingus et al.,2016 |
| | Illegal interaction | Source of distraction | Dingus et al.,2016 | Klauer et al.,2006 | Olson et al., 2009 | Hickman et al.,2010 | Fitch et al.,2013 | Klauer et al.,2006 | Olson el al 2009 | Duration | N | Prevalence |
| Prescriptive | Text-based interactions — entering text | Dialling on a *hand held* phone | 12.2 | 2.79 | 5.93 | 3.51 | 0.99 | 3.6 | 2.5 | | | 0.14% |
| | | Texting | 6.1 | | 23.24 | 163.6 | 1.73 | | | | | 1.91% |
| | | Adjust in-vehicle visual display (e.g. touchscreen menu) | 4.6 | | | | | | | 4.3 | 217 | 0.83% |
| | | In-vehicle radio | 1.9 | 0.55 | | | | | | 4.3 | 217 | 2.21% |
| | | Using a dispatch device (truck study) | | | 9.9 | | | | | | | |
| | | Writing | 9.9 | | 9 | | | | | | | 0.09% |
| | Text-based interactions — reading long-form text | Adjust in-vehicle visual display (e.g. touchscreen menu) | 4.6 | | | | | | | 4.3 | 217 | 0.83% |
| | | In-vehicle radio | 1.9 | 0.55 | | | | | | 4.3 | 217 | 2.21% |
| | | Using a dispatch device (truck study) | | | 9.9 | | | | | | | |
| | | Browsing | 2.7 | | | | | | | | | 0.73% |
| | Image-based interactions — static and moving visual images | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | Visual and visual manual interactions — conventional mediums | Reading a book, newspaper, Kindle or similar | 9.9 | 3.38 | | | | 2.9 | | | | 0.09% |
| | | Writing | 9.9 | | 9 | | | | | | | 0.09% |
| | | Looking at a map | | | 7 | | | | | | | |
| | Manual interactions — portables | Reaching for phone | 4.8 | | | | | | | | | 0.58% |
| | | Talk or listen to *hand held* phone | 2.2 | 1.29 | 1.04 | 0.89 | 0.79 | 3.6 | | 398.2 | 5 | 3.24% |
| | | Reaching for an *electronic* object | | | 6.7 | | | 7.6 | | 6.3 | 67 | |
| | | Using a calculator | | | 8.2 | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Performance | Any observable behaviour, interaction or indication of impairment of the driver's ability to safely control the vehicle | Reaching for a *non-moving* object | 9.1 | 1.38 | 3.09 | | 3.65 | | | 6.3 | 67 | 1.08% |
| | | Looking at external object | 7.1 | 3.7 | 0.54 | | | | | 8.3 | 117 | 0.93% |
| | | Adjust in-vehicle climate control | 2.3 | | | | | | | 4.3 | 217 | 0.56% |
| | | Adjust in-vehicle visual display (e.g. touchscreen menu) | 4.6 | | | | | | | 4.3 | 217 | 0.83% |
| | | In-vehicle radio | 1.9 | 0.55 | | | | | | 4.3 | 217 | 2.21% |
| | | Eating | 1.8 | 1.57 | 1.01 | 1.11 | | | | 253.2 | 17 | 1.90% |
| | | Drink from container | 1.8 | 1.03 | 0.97 | | | | | 72.1 | 14 | 1.22% |
| | | Interacting with/look at *passenger in adjacent seat* | 1.4 | 0.5 | 0.35 | | | | | 296.6 | 82 | 14.58% |
| | | Dancing in seat to music | 1 | | | | | 3.1 | | | | 1.10% |
| | | Talk or listen to *hands free* phone | | 2.25 | | | | | | | | |
| | | Inserting/retrieving CD | | | 0.6 | | | | | | | |
| | | Smoking (reach, light, extinguish) | | | 0.97 | | | | | | | |
| | | Smoking (cigarette in mouth or hand) | | 6.37 | | | | | | | | |
| | | Insect in vehicle | 1.4 | 0.7 | | | | | | 9.3 | 84 | 1.69% |
| | | Personal grooming/hygiene | 0.5 | 0.33 | | | | | | | | 0.80% |
| | | Interacting with/look at *child in rear seat* | | 3.13 | 4.48 | | | | | 9.3 | 84 | |
| | | Applying makeup/personal grooming | | 8.82 | | | | | | 6.3 | 67 | |
| | | Reaching for a *moving* object | | 0.39 | | | | | | 281 | 5 | |
| | | Interacting with/look at *passenger in rear seat* | 9.1 | 1.38 | 3.09 | | 3.65 | | | 6.3 | 67 | 1.08% |

# Appendix B Sources of distraction and their associated risks

| | Odds ratios | | | | | PAR | | Exposure | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Young et al.,2018 | | Dingus et al.,2016 |
| Source of distraction | Dingus et al.,2016 | Klauer et al.,2006 | Olson et al., 2009 | Hickman et al.,2010 | Fitch et al.,2013 | Klauer et al.,2006 | Olson el al 2009 | Duration | N | Prevalence |
| Dialling on a *hand-held* phone | 12.2 | 2.79 | 5.93 | 3.51 | 0.99 | 3.6 | 2.5 | | | 0.14% |
| Reading a book, newspaper, Kindle or similar | 9.9 | 3.38 | | | | 2.9 | | | | 0.09% |
| Writing | 9.9 | | 9 | | | | | | | 0.09% |
| Reaching for a *non-moving* object | 9.1 | 1.38 | 3.09 | | 3.65 | | | 6.3 | 67 | 1.08% |
| Looking at external object | 7.1 | 3.7 | 0.54 | | | | | 8.3 | 117 | 0.93% |
| Texting | 6.1 | | 23.24 | 163.6 | 1.73 | | | | | 1.91% |
| Reaching for phone | 4.8 | | | | | | | | | 0.58% |
| Adjust in-vehicle visual display (e.g. touchscreen menu) | 4.6 | | | | | | | 4.3 | 217 | 0.83% |
| Browsing | 2.7 | | | | | | | | | 0.73% |
| Adjust in-vehicle climate control | 2.3 | | | | | | | 4.3 | 217 | 0.56% |
| Talk or listen to *hand held* phone | 2.2 | 1.29 | 1.04 | 0.89 | 0.79 | 3.6 | | 398.2 | 5 | 3.24% |
| In-vehicle radio | 1.9 | 0.55 | | | | | | 4.3 | 217 | 2.21% |
| Eating | 1.8 | 1.57 | 1.01 | 1.11 | | | | 253.2 | 17 | 1.90% |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drink from container | 1.8 | 1.03 | 0.97 | | | | | 72.1 | 14 | 1.22% |
| Personal grooming/hygiene | 1.4 | 0.7 | | | | | | 9.3 | 84 | 1.69% |
| Interacting with/look at *passenger in adjacent seat* | 1.4 | 0.5 | 0.35 | | | | | 296.6 | 82 | 14.58% |
| Dancing in seat to music | 1 | | | | | 3.1 | | | | 1.10% |
| Interacting with/look at *child in rear seat* | 0.5 | 0.33 | | | | | | | | 0.80% |
| Applying makeup/personal grooming | | 3.13 | 4.48 | | | | | 9.3 | 84 | |
| Reaching for a *moving* object | | 8.82 | | | | | | 6.3 | 67 | |
| Reaching for an *electronic* object | | | 6.7 | | | 7.6 | | 6.3 | 67 | |
| Talk or listen to *hands free* phone | | | 0.44 | 0.65 | 0.73 | | | 273.3 | 13 | |
| Interacting with/look at *passenger in rear seat* | | 0.39 | | | | | | 281 | 5 | |
| Using a calculator | | | 8.2 | | | | | | | |
| Inserting/retrieving CD | | 2.25 | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Smoking (reach, light, extinguish) | | | 0.6 | | | | | | | |
| Smoking (cigarette in mouth or hand) | | | 0.97 | | | | | | | |
| Insect in vehicle | | 6.37 | | | | | | | | |
| Using a dispatch device (truck study) | | | 9.9 | | | | | | | |
| Looking at a map | | | 7 | | | | | | | |

# Appendix C Options comparison – allowed and not allowed

**Allowed – not allowed**

| | |
|---|---|
| Allowed[5] | ✓ |
| Not allowed | × |
| Not explicitly addressed | O |

**Change from status quo**

| | |
|---|---|
| Relaxation[6] | |
| Restriction | |

| Secondary activity while driving | Interaction | | Status quo | Prescriptive | Performance-based | Hybrid |
|---|---|---|---|---|---|---|
| Hand-held mobile phone and tablet | Dialling | Touch | × | × | ✓ | × |
| | | Voice | × | × | ✓ | × |
| | Audio phone call | Accepting call (tapping) | × | × | ✓ | × |
| | | Accepting call (voice) | × | × | ✓ | × |
| | | Scrolling through contacts | × | × | ✓ | × |
| | | Talking | × | × | ✓ | × |
| | Texting | Touch | × | × | ✓ | × |
| | | Voice | × | × | ✓ | × |
| | Emails | Touch | × | × | ✓ | × |
| | | Voice | × | × | ✓ | × |
| | Playing games | | × | × | ✓ | × |
| | Taking photos/video | | × | × | ✓ | × |
| | Watching video | | × | × | ✓ | × |
| | Navigation | Touch | × | × | ✓ | × |
| | | Typing address | × | × | ✓ | × |
| | | Voice | × | × | ✓ | × |
| | Playing music | Touching | × | × | ✓ | × |
| | | Voice | × | × | ✓ | × |
| | | Typing artist, album or song | × | × | ✓ | × |
| | Any other function that is not a driver's aid | | × | × | ✓ | × |
| Mounted mobile phone and tablet | Dialling | Touching | ✓ | × | ✓ | × |
| | | Voice | ✓ | ✓ | ✓ | ✓ |
| | Audio phone call | Accepting call (tapping) | ✓ | ✓ | ✓ | ✓ |
| | | Accepting call (voice) | ✓ | ✓ | ✓ | ✓ |
| | | Scrolling through contacts | ✓ | ✓ | ✓ | ✓ |
| | | Talking | ✓ | ✓ | ✓ | ✓ |
| | Texting | Touching | × | × | ✓ | × |
| | | Voice | × | ✓ | ✓ | ✓ |
| | Emails | Touching | × | × | ✓ | × |
| | | Voice | × | ✓ | ✓ | ✓ |
| | Playing games | | × | × | ✓ | × |
| | Taking photos/video | | × | × | ✓ | × |
| | Watching video | | × | × | ✓ | × |
| | Navigation | Tapping on screen | ✓ | ✓ | ✓ | ✓ |

[5] Driver engagement in 'allowed' interactions or behaviours does not necessarily imply that they are deemed safe. If such engagement results in observable impairment of driving performance it would still be subject to other offences.

[6] Performance-based option: While in theory all activities that do not impair the driver's proper control of the vehicle would be compliant under this option, states and territories could still apply their careless or negligent driving legisltaiton to regulate driver engagement in activities considered unsafe by police.

| | | | | | | |
|---|---|---|---|---|---|---|
| | | Typing address | ✓ | × | ✓ | × |
| | | Voice control | ✓ | ✓ | ✓ | ✓ |
| | Playing music | Tapping on screen | × | ✓ | ✓ | ✓ |
| | | Voice | × | ✓ | ✓ | ✓ |
| | | Typing artist, album or song | × | × | ✓ | × |
| | Any other function that is not a driver's aid | | × | ✓ | ✓ | ✓ |
| Non-mounted mobile phone and tablet (not held by driver) | Dialling | Typing number | × | × | ✓ | × |
| | | Voice | ✓ | ✓ | ✓ | ✓ |
| | Audio phone call | Accepting call (tapping) | × | × | ✓ | × |
| | | Accepting call (voice) | ✓ | ✓ | ✓ | ✓ |
| | | Scrolling through contacts | × | × | ✓ | × |
| | | Talking | ✓ | ✓ | ✓ | ✓ |
| | Texting | Typing | × | × | ✓ | × |
| | | Voice | × | ✓ | ✓ | ✓ |
| | Emails | Typing | × | × | ✓ | × |
| | | Voice | × | ✓ | ✓ | ✓ |
| | Playing games | | × | × | ✓ | × |
| | Taking photos/video | | × | × | ✓ | × |
| | Watching video | | × | × | ✓ | × |
| | Navigation | Touching | × | × | ✓ | × |
| | | Typing address | × | × | ✓ | × |
| | | Voice | ✓ | ✓ | ✓ | ✓ |
| | Playing music | Touching | × | × | ✓ | × |
| | | Voice | × | ✓ | ✓ | ✓ |
| | | Typing artist, album or song | × | × | ✓ | × |
| | Any other function that is not a driver's aid | | × | × | ✓ | × |
| Visual display units (such as DVD displays) | Video and static images | Inside vehicle | × | × | ✓ | × |
| | | Visible to other drivers | × | × | ✓ | × |
| Portable computer | Emails | Typing | O | × | ✓ | × |
| | | Voice | O | ✓ | ✓ | ✓ |
| | using word processor and other applications | Typing | O | × | ✓ | × |
| | | Voice | O | ✓ | ✓ | ✓ |
| | Playing games | | O | × | ✓ | × |
| | taking photos and video | | O | × | ✓ | × |
| | looking at photos and Watching video | | O | × | ✓ | × |
| | Any other function | | O | × | ✓ | × |
| Smartwatch (on wrist) | Dialling | Typing number | O | × | ✓ | × |
| | | Voice | O | ✓ | ✓ | ✓ |
| | Audio phone call | Accepting call (tapping) | O | × | ✓ | × |
| | | Accepting call (voice) | O | ✓ | ✓ | ✓ |
| | | Scrolling through contacts | O | × | ✓ | × |
| | | Talking | O | ✓ | ✓ | ✓ |
| | Texting | Typing | O | × | ✓ | × |
| | | Voice | O | ✓ | ✓ | ✓ |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Emails | Typing | O | × | ✓ | × |
| | | Voice | O | ✓ | ✓ | ✓ |
| | Playing games | | O | × | ✓ | × |
| | Taking photos/video | | O | × | ✓ | × |
| | Watching video | | O | × | ✓ | × |
| | Navigation | Tapping screen | O | × | ✓ | × |
| | | Typing address | O | × | ✓ | × |
| | | Voice control | O | ✓ | ✓ | ✓ |
| | | Glancing at visual directions | O | ✓ | ✓ | ✓ |
| | Playing music | Touching | O | × | ✓ | × |
| | | Voice | O | ✓ | ✓ | ✓ |
| | | Typing artist, album or song | O | × | ✓ | × |
| | Any other function | | O | × | ✓ | × |
| GPS unit (mounted) | Entering address | Typing | ✓ | × | ✓ | × |
| | | Voice | ✓ | ✓ | ✓ | ✓ |
| | Following route | Listening | ✓ | ✓ | ✓ | ✓ |
| | | Glancing at visual directions | ✓ | ✓ | ✓ | ✓ |
| In-car audio system (radio, CD, mp3) | | | ✓ | ✓ | ✓ | ✓ |
| Integrated infotainment system (includes use of Apple CarPlay, Android Auto and other similar applications that act as a controller for a portable device) | Dialling | Typing number | O | × | ✓ | × |
| | | Voice | O | ✓ | ✓ | ✓ |
| | Audio phone call | Accepting call (tapping) | O | ✓ | ✓ | ✓ |
| | | Accepting call (voice) | O | ✓ | ✓ | ✓ |
| | | Scrolling through contacts | O | ✓ | ✓ | ✓ |
| | | Talking | O | ✓ | ✓ | ✓ |
| | Texting | Typing | O | × | ✓ | × |
| | | Voice | O | ✓ | ✓ | ✓ |
| | Emails | Typing | O | × | ✓ | × |
| | | Voice | O | ✓ | ✓ | ✓ |
| | Navigation | Touching | O | ✓ | ✓ | ✓ |
| | | Entering address | O | × | ✓ | × |
| | | Voice control | O | ✓ | ✓ | ✓ |
| | | Glancing at visual directions | O | ✓ | ✓ | ✓ |
| | Playing music | Touching | O | ✓ | ✓ | ✓ |
| | | Voice | O | ✓ | ✓ | ✓ |
| | | Typing artist, album or song | O | × | ✓ | × |
| | Any other function | | O | ✓ | ✓ | ✓ |
| Dispatch system taxis | Accepting jobs | Tapping on screen | ✓ | ✓ | ✓ | ✓ |
| | | Entering address | ✓ | × | ✓ | × |
| Dispatch system delivery | Accepting ride requests | Tapping on screen | ✓ | ✓ | ✓ | ✓ |
| | | Entering address | ✓ | × | ✓ | × |
| CB radio | Operating | | ✓ | ✓ | ✓ | ✓ |
| Rideshare app | Accepting jobs | Tapping on screen | × | ✓ | ✓ | ✓ |
| Reading newspaper/book/magazine | | | ✓ | × | ✓ | × |
| Handwriting | | | ✓ | × | ✓ | × |

| | | | | | | |
|---|---|---|---|---|---|---|
| Eating | | | ✓ | ✓ | ✓ | ✓ |
| Drinking | | | ✓ | ✓ | ✓ | ✓ |
| Personal hygiene/grooming (e.g. applying makeup, shaving) | | | ✓ | ✓ | ✓ | ✓ |

# Glossary

| Term | Definition |
|---|---|
| App | A software application developed for use on portable computing devices, such as smartphones, smartwatches and tablets. |
| Australian Road Rules | Model road rules developed by the National Transport Commission and applied in state and territory legislation. |
| Automated driving system | Complex combinations of various components that can be defined as systems where perception, decision making and operation of the automobile are performed by electronics and machinery instead of a human driver. |
| Cost benefit analysis | A methodology that involves the weighing of the costs associated with a decision against the benefits arising from that decision. |
| Driver | Defined in the Australian Road Rules as the person who drives a vehicle (except a motor bike, bicycle, animal or animal-drawn vehicle). |
| Driver aids | Technologies used by drivers to prevent crashes and make driving more convenient. |
| GPS unit | A general term describing any satellite constellation that provides positioning, navigation and timing services on a global or regional basis. |
| Heavy vehicle | A vehicle with a gross vehicle mass of 4.5 tonnes or more. |
| In-vehicle information system | A device that provides drivers with information that is otherwise unavailable to them such as road and traffic conditions, navigation information, weather conditions, hazard alerts and communication services. |
| Levels of driving automation | Society of Automotive Engineers' automation level definitions that define the different driving modes for automated vehicles based on the dynamic driving task requirements. |
| Level 2 automated vehicle | Level of driving automation in which the driving automation system can control both the steering and the speed simultaneously, with the expectation that the human driver remains in charge of object and event detection and response and supervises the driving automation system. This is commonly referred to as partial automation. |
| National Heavy Vehicle Regulator | Australia's national, independent regulator for all vehicles over 4.5 tonnes gross vehicle mass. |

| | |
|---|---|
| National Transport Commission | Independent statutory body that contributes to achieving national transport policy objectives by developing regulatory and operational reform of road, rail and intermodal transport. |
| Qualitative cost benefit assessment | A type of cost benefit analysis that considers qualitative factors as part of the analysis of a decision. |
| Qualitative factors | Decision outcomes that cannot be measured. |
| Rider | Defined in the Australian Road Rules as the person who is riding a motor bike, bicycle, animal or animal-drawn vehicle. |
| Rideshare | An arrangement in which a passenger travels in a private vehicle driven by its owner, usually for a fee, as arranged by using a website or app. |
| Smartwatch | A mobile device worn on the wrist, typically with a touchscreen interface, with many of the same functionalities as a smartphone. |
| Voice-user interface | A computer interface that uses speech recognition to understand spoken commands and questions. |
| Wearable device | Electronic device that can be worn on the body, either as an accessory or as part of material used in clothing. |

# References


Australia Bureau of Statistics (ABS) 2019, *9208.0 Survey of Motor Vehicle Use Australia, 12 months ended 30 June 2018*, accessed at: **https://www.abs.gov.au/AUSSTATS/subscriber.nsf/log?openagent&92080do001_201202201810.xls&9208.0&Data%20Cubes&FB092A8C3F596DCBCA2583C2001D1845&0&12%20months%20ended%2030%20June%202018&20.03.2019&Latest**

Amy Gillett Foundation, Cycling Australia, Bicycle NSW, Pedal Power, We Ride Australia & WestCycle 2019, *Public submission – Developing technology-neutral road rules for driver distraction*, February 2019, accessed at: **https://www.ntc.gov.au/Media/Reports/(43BD3588-A7F7-B9DF-76A8-82530B2D8720).pdf**

AT&T 2015, *Smartphone Use While Driving Grows Beyond Texting to Social Media, Web Surfing, Selfies, Video Chatting*, 19 May 2015, accessed at: **http://about.att.com/story/smartphone_use_while_driving_grows_beyond_texting.html**

Australasian New Car Assessment Program 2019, *ANCAP Submission: Addressing NTC Issues Paper on Developing Technology-Neutral Road Rules for Driver Distraction*, February 2019, accessed at: **https://www.ntc.gov.au/media/1944/ntc-issues-paper-developing-technology-neutral-road-rules-for-driver-distraction-jason-smith-ancap-safety-feb-2019.pdf**

Australian Mobile Telecommunications Association 2019, *AMTA Submission to National Transport Commission Project: Developing technology-neutral road rules for driver distraction*, February 2019, accessed at: **https://www.ntc.gov.au/media/1951/ntc-issues-paper-developing-technology-neutral-road-rules-for-driver-distraction-lisa-brown-australian-mobile-telecommunications-association-feb-2019-2.pdf**

Australian Road Rules, as at 19 March 2018.

Austroads 2019, *Vehicles as a Workplace: Launch & Forum*, [accessed on 16 April 2019] accessed at: **https://austroads.com.au/latest-news/vehicles-as-a-workplace-launch-and-forum**

Barton, R 2019, *Public Submission – Developing technology neutral road rules for driver distraction*, February 2019, accessed at: **https://www.ntc.gov.au/media/1939/ntc-issues-paper-developing-technology-neutral-road-rules-for-driver-distraction-rod-barton-parliament-of-victoria-feb-2019.pdf**

Beanland, V, Fitzharris, M, Young, K & Lenné, MG 2013, *Driver inattention and driver distraction in serious casualty crashes: Data from the Australian National Crash In-depth Study*, Accident Analysis & Prevention, vol. 54, pp. 99–107, accessed at: **https://www.sciencedirect.com/science/article/abs/pii/S000145751300047X**

Birrell, SA & Young, MS 2011, *The impact of smart driving aids on driving performance and driver distraction*, Transportation Research, Part F, no. 14, pp. 484–493, accessed at: **https://www.sciencedirect.com/science/article/abs/pii/S1369847811000751**

Brown, I 1986, *Functional requirements of driving*, Medical Research Council Applied Psychology Unit, Cambridge, England

Business Insider Australia 2017, *GM is launching a feature that allows people to shop while driving*, Tech Insider, 6 December 2017, accessed at: **https://www.businessinsider.com.au/gm-marketplace-allows-people-to-shop-while-driving-2017-12**

Chevalier, A, Cunningham, M & Roberts, P 2019, *ARRB response to the NTC's Driver Distraction Issues Paper*, Australian Road Research Board (ARRB), accessed at: **https://www.ntc.gov.au/Media/Reports/(D2686DC6-21DA-4139-888C-353B6BBD9B96).pdf**

Christie, R & Harrison, W 2003, *Driver training and education programs of the future*, Report No. 03/03, RACV Ltd, Melbourne

Council Of Australian Governments 2007, *A Guide for Ministerial Councils and National Standard Setting Bodies*, Best Practice Regulation, October 2007, accessed at: **https://www.pmc.gov.au/sites/default/files/publications/COAG_best_practice_guide_2007.pdf**

Cunningham, M & Regan, M 2018, *Automated vehicles may encourage a new breed of distracted drivers*, The Conversation, 25 September 2018, accessed at: **https://theconversation.com/automated-vehicles-may-encourage-a-new-breed-of-distracted-drivers-101178**

Department of Infrastructure Planning and Logistics 2019, *Public submission: Developing technology-neutral road rules for driver distraction*, February 2019, accessed at: **https://www.ntc.gov.au/media/1943/ntc-issues-paper-developing-technology-neutral-road-rules-for-driver-distraction-anonymous-department-of-infrastructure-planning-and-logistics-feb-2019.docx**

Department of Infrastructure, Regional Development and Cities 2018, *Community attitudes to road safety – 2017 survey report*, accessed at: **https://infrastructure.gov.au/roads/safety/publications/2018/pdf/community_att_17.pdf**

Dingus, TA, Guo, F, Lee, S, Antin, JF, Perez, M, Buchanan-King, M & Hankey 2016, *Driver crash risk factors and prevalence evaluation using naturalistic driving data*, Proceedings of the National Academy of Sciences, vol. 113, no. 10, pp. 2636-2641.

DriveRisk Australasia 2019, *Submission: Developing technology-neutral road rules for driver distraction*, February 2019, accessed at: **https://www.ntc.gov.au/media/1953/ntc-issues-paper-developing-technology-neutral-road-rules-for-driver-distraction-owen-neochi-driverisk-australaisa-feb-2019.pdf**

Ehsani, J, Bingham, C, Ionides, E. & Childers, D 2014, *The impact of Michigan's text messaging restriction on motor vehicle crashes*, Journal of Adolescent Health, vol. 54, pp. S68-S74, accessed at: https://www.researchgate.net/profile/C_Raymond_Bingham/publication/261837898_The_Impact_of_Michigan's_Text_Messaging_Restriction_on_Motor_Vehicle_Crashes/links/5653044108aefe619b18ec8c/The-Impact-of-Michigans-Text-Messaging-Restriction-on-Motor-Vehicle-Crashes.pdf

Elliot, B 1992, *Report on achieving high levels of compliance with road safety Laws - A review of road user behaviour modification*, Report No. 6, Brisbane: Travelsafe Committee, Legislative Assembly of Queensland.

Engström, J, Monk, CA, Hanowski, RJ, Horrey, WJ, Lee, JD, McGehee, DV, Regan, M, Stevens, A, Traube, E, Tuukkanen, M, Victor, T & Yang, CYD 2013, *A conceptual framework*

*and faxonomy for understanding and categorizing driver inattention*, Driver Distraction & Human Machine Interaction (DD & HMI) Working Group, United States and European Union Bilateral Intelligent Transportation Systems Technical Task Force (US-EU Bilateral ITS TF), September 2013 accessed at:
**https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=2671**

EROAD Australia Pty Ltd 2019, *Submission on Developing technology-neutral road rules for driver distraction*, February 2019, accessed at:
**https://www.ntc.gov.au/Media/Reports/(F09E38F5-7C1B-E113-663A-F66CBF4AD2E8).pdf**

European Road Safety Observatory 2015, *Driver distraction*, accessed at:
**https://ec.europa.eu/transport/road_safety/sites/roadsafety/files/pdf/ersosynthesis2015-detail-driverdistraction25_en.pdf**

Ferdinand, A, Menachemi, N, Sen, B, Blackburn, J, Morrisey, M & Nelson, L 2014, *Impact of Texting Laws on Motor Vehicular Fatalities in the United States*, American Journal of Public Health 104, no.8, pp. 1370-1377, accessed at:
**https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4103220/pdf/AJPH.2014.301894.pdf**

Ferdinand, A, Menachemi, N, Blackburn, J, Sen, B, Nelson, L & Morrisey, M 2015, *The impact of texting bans on motor vehicle crash–related hospitalizations*, American journal of public health 105, no. 5, pp. 859-865, accessed at:
**https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4386499/pdf/AJPH.2014.302537.pdf**

Financial Times 2018, *Australia's Uber drivers earn less than minimum wage*, accessed at:
**https://www.ft.com/content/f9ce2cd8-d5c2-11e8-a854-33d6f82e62f8**

Fitch, GM, Soccolich, SA, Guo, F, McClafferty, J, Fang, Y, Olson, RL, Perez, MA, Hanowski, RJ, Hankey, JM & Dingus, TA 2013, *The impact of hand-held and hands-free cell phone use on driving performance and safety-critical event risk*, National Highway Traffic Safety Administration, Washington, DC: Rep. No. DOT HS 811 757

Fitzharris, M, Young, K & Bowman, D 2012, *Potential benefits of 'driver distraction' regulatory reform*, Monash University Accident Research Centre, Clayton

Funkhouser, D & Chrysler, ST 2007, *Assessing Driver Distraction Due to In-Vehicle Video Systems through Field Testing at the Pecos Research and Testing Center*, Report No. SWUTC/07/473700-00082-1, Southwest Region University Transportation Center, College Station, TX, 2007, accessed at:
**https://static.tti.tamu.edu/swutc.tamu.edu/publications/technicalreports/473700-00082-1.pdf**

Goodsell, R, Cunningham, M & Chevalier, A 2019, *Driver Distraction: A Review of Scientific Literature*, Project No. 013817, prepared for the National Transport Commission, accessed at: **https://www.ntc.gov.au/Media/Reports/(5D3494AB-A9FC-F4C2-DF7D-C4814C4CED32).pdf**

Hartley, J 2007, *Driver distraction: a law enforcement perspective*. In: Faulks, Regan, Stevenson, Brown, Porter & Irwin (eds.). Distracted driving, Australasian College of Road Safety, Sydney, pp. 329–344, accessed at:
**http://acrs.org.au/files/papers/13%20Hartley%20A%20law%20enforcement%20perspective.pdf**

Hickman, JS, Hanowski, RJ & Bocanegra, J 2010, *Distraction in commercial trucks 476 and buses: Assessing prevalence and risk in conjunction with crashes and near-crashes,* Federal Motor Carrier Safety Administration, Washington, DC: Rep. No. FMCSA-RRR-010-049

Highway Loss Data Institute, 2010, *Texting laws and collision claim frequencies,* Highway Loss Data Institute Bulletin, vol. 27, no. 11, pp. 1-10, accessed at: **https://www.iihs.org/media/fc495300-6f8c-419d-84d7-c3b94d178e5a/enPLrA/HLDI%20Research/Bulletins/hldi_bulletin_27.11.pdf**

IBISWorld 2019a, *Courier Pick-up and Delivery Services*, Industry Report I5102

IBISWorld 2019b, *Ridesharing Services in Australia*, Industry Report OD5540

iClarified, 2018, *Total Apple Watch sales estimated at 46 million [chart]*, posted 4 May 2018 at 12:07am, accessed at: **https://www.iclarified.com/65633/total-apple-watch-sales-estimated-at-46-million-chart**

Insurance Australia Group 2019, Developing technology-neutral road rules for driver distraction, February 2019, accessed at: **https://www.ntc.gov.au/Media/Reports/(E2ED241D-AE37-2748-81EA-EBAAB3C43B1F).pdf**

Isler, RB, Starkey, NJ & Sheppard, P 2011, *Effects of higher-order driving skill training on young, inexperienced drivers' on-road driving performance*, Accident Analysis and Prevention, no. 43, pp. 1818-1827

Johnson, SB & Jones, VC 2011, *Adolescent development and risk of injury: using developmental science to improve interventions*, Injury Prevention, no. 17, pp. 50-54

Kemp, A & Gu, H 2017, *Use of ride sharing and taxi services in New South Wales – A report for the Independent Pricing and Regulatory Tribunal*, Houston Kemp, November 2017, accessed at: **https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/pricing-reviews-transport-services-admin-taxi-fares-and-licences-from-july-2018/publications-taxi-fares-and-licences-from-july-2018/consultant-report-houstonkemp-use-of-ride-sharing-and-taxi-services-in-nsw-december-2017.pdf**

Klauer, SG, Dingus, TA, Neale, V.L., Sudweeks, JD, & Ramsey, DJ 2006, *The impact of driver inattention on near-crash/crash risk: an analysis using the 100-Car Naturalistic Driving Study data,* National Highway Traffic Safety Administration, DOT HS 810 594, April 2006, accessed at: **https://vtechworks.lib.vt.edu/bitstream/handle/10919/55090/DriverInattention.pdf**

Kwon, O, Yoon, Y & Jang, K 2014, *Evaluating the effectiveness of the law banning handheld cellphone use while driving*, Safety science, vol. 70, pp. 50-57, accessed at: https://www.sciencedirect.com/science/article/pii/S092575351400099X

Motorcycle Council of New South Wales 2019, *Public Submission: Developing technology-neutral road rules for driver distraction*, February 2019, accessed at: **https://www.ntc.gov.au/media/1937/ntc-issues-paper-developing-technology-neutral-road-rules-for-driver-distraction-brian-wood-australian-motorcycle-council-feb-2019.pdf**

National Heavy Vehicle Regulator 2019, *NHVR Response: Developing technology-neutral road rules for driver distraction*, February 2019, accessed at: **https://www.ntc.gov.au/Media/Reports/(2B0EE7AD-EDD2-9E11-9AB7-3DF31F53F2BD).pdf**

National Highway Traffic Safety Administration (NHTSA) 2019, *Traffic safety facts research note: Distracted Driving in Fatal Crashes, 2017*. Research note, DOT HS 812 700, accessed at: **https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812700**

National Highway Traffic Safety Administration (NHTSA) 2018, *Traffic safety facts research note: Distracted Driving 2016*. Research note, DOT HS 812 517, accessed at: **https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812517**

National Road Transport Association 2019, *Submission to the National Transport Commission: Developing technology-neutral road rules for driver distraction – Issues Paper*, February 2019, accessed at: **https://www.ntc.gov.au/media/1940/ntc-issues-paper-developing-technology-neutral-road-rules-for-driver-distraction-warren-clark-national-road-transport-association-natroad-feb-2019.pdf**

National Transport Commission 2011, *Review of the Australian Road Rules and Vehicle Standards Rules*, discussion paper – October 2011, accessed at: **https://www.ntc.gov.au/Media/Reports/(A4CA5CEA-FE90-E625-D305-039068E43FEA).pdf**

National Transport Commission 2017a, Changing driving laws to support automated vehicles, Discussion Paper, October 2017, accessed at: **https://www.ntc.gov.au/Media/Reports/(E5695ACE-993C-618F-46E1-A876391B8CD9).pdf**

National Transport Commission 2017b, *Work Program 2017-21*, accessed at: **https://www.ntc.gov.au/Media/Reports/(5221BAAC-9DAB-B48F-54F2-C96CFD60D3CE).pdf**

Office of Best Practice Regulation 2007, *Best Practice Regulation: A guide for Ministerial Councils and National Standard Setting Bodies*, accessed at: **https://www.pmc.gov.au/sites/default/files/publications/COAG_best_practice_guide_2007.pdf**

Olson, RL, Hanowski, RJ, Hickman, JS & Bocanegra, J 2009, *Driver distraction in commercial vehicle operations*, Report No. FMCSA-RRR-09-042, U.S. Department of Transportation, Washington, D.C., 2009, accessed at: **https://rosap.ntl.bts.gov/view/dot/17715**

Oviedo-Trespalacios, O, King, M, Hague, M & Washington 2017, *Risk factors of mobile phone use while driving in Queensland: Prevalence, attitudes, crash risk perception, and task-management strategies*, PLoS ONE, vol. 12, no. 9, e0183361, accessed at: **https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0183361&type=printable**

Oviedo-Trespalacios, O, Williamson, A & King, A 2019, *User preferences and design recommendations for voluntary 2 smartphone applications to prevent distracted driving*, Transportation Research Part F: Traffic Psychology and Behaviour, no. 64, pp. 47-57, accessed at: **https://doi.org/10.1016/j.trf.2019.04.018**

Parnell, KJ, Stanton, NA & Plant, KL 2017, *What's the law got to do with it? Legislation regarding in-vehicle technology use and its impact on driver distraction*, Accident Analysis and Prevention, no. 100, pp. 1–14, accessed at: **https://www.sciencedirect.com/science/article/abs/pii/S0001457516304535**

Pedestrian Council of Australia Limited 2019, *NTC Submission - Driver Distraction*, March 2019, accessed at: **https://www.ntc.gov.au/Media/Reports/(D1D8A9C7-42AB-F710-354D-81AD46CD3B79).pdf**

Regan, M, Hallett, C & Gordon, CP 2011, *Driver distraction and driver inattention: definition, relationship and taxonomy*, Accident Analysis and Prevention, no. 43, pp. 1771–1781, accessed at: **https://www.cambsdriveiq.co.uk/Regan_et_al_2011_driver_distraction.pdf**

Regan, M & Prabhakharan, P 2019, *Submission to National Transport Commission in Response to Issued Paper Developing Technology-neutral Road Rules for Driver Distraction*, Research Centre for Integral Transport Innovation, University of New South Wales Sydney, accessed at: **https://www.ntc.gov.au/Media/Reports/(A352B22F-1424-085D-76EC-24A6D33508AC).pdf**

Road Safety Commission 2018, *2017 Preliminary summary of fatalities on Western Australian roads*, Government of Western Australia, accessed at: **https://www.rsc.wa.gov.au/RSC/media/Documents/Road%20Data/Statistics/Annual%20crash%20statistics/annual-prelim-crash-statistics-2017.pdf**

Roper, J 2017, *A Study of the Effectiveness of the Hands-Free Ordinance in San Antonio, Texas,* accessed at: **https://digital.library.txstate.edu/bitstream/handle/10877/6626/RoperJacob.pdf?sequence=1&isAllowed=y**

Royal Automobile Association of South Australia 2019, *Developing Technology Neutral Road Rules for Driver Distraction: RAA submission to the National Transport Commission*, February 2019, accessed at: **https://www.ntc.gov.au/Media/Reports/(F201DCDC-28FB-713E-0802-6B985AA107A3).pdf**

Royal Automobile Club of Victoria 2019, *Submission to Issues Paper for Developing Technology-Neutral Road Rules for Driver Distraction*, February 2019, accessed at: **https://www.ntc.gov.au/Media/Reports/(1110361C-9DA6-A0DD-6613-643F31BC1EEA).pdf**

Statista, 2018, *Forecasted value of the global wearable devices market from 2012 to 2018 (in billion U.S. dollars)*, accessed at: **https://www.statista.com/statistics/302482/wearable-device-market-value/**

Strayer, DL, Cooper, JM, Turrill, J, Coleman, JR & Hopman, J 2016, *Talking to your car can drive you to distraction*, Cognitive Research: Principles and Implications, volume 1, November 2016, accessed at: **https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5256443/**

Strayer, DL, Cooper, JM, Goethe, RM, McCarty, MM, Getty, D & Biondi, F 2017, *Visual and cognitive demands of using in-vehicle infotainment systems*, Washington, DC: AAA Foundation for Traffic Safety, accessed at: **https://aaafoundation.org/wp-content/uploads/2017/11/VisualandCognitive.pdf**

Strayer, DL, Drews, FA & Crouch, DJ 2006, *A Comparison of the Cell Phone Driver and the Drunk Driver*, Human Factors, vol. 48, no. 2, accessed at: **https://rosap.ntl.bts.gov/view/dot/17718/dot_17718_DS1.pdf**

Transport and Infrastructure Council 2019, *Transport and Infrastructure Council Strategic Work Programme*, accessed at: **https://www.transportinfrastructurecouncil.gov.au/publications/files/Council_Strategic_Work_Programme.pdf**

Transport Workers Union 2018, *Rideshare Driver Survey*, accessed at: **https://www.twu.com.au/Home/Campaigns/Rideshare-Drivers/Rideshare-Survey-Infographic/**

Tranter, P & Warn, J 2008, *Relationships between interest in motor racing and driver attitudes and behaviour amongst mature drivers: An Australian case study*, Accident Analysis & Prevention vol. 40, no. 5, pp. 1683-9

Truck Industry Council 2019, *Public submission – Developing technology-neutral road rules for driver distraction*, February 2019, accessed at: **https://www.ntc.gov.au/Media/Reports/(75041DEA-C749-46C7-3EE5-718714464EEA).pdf**

Twisk, D 2007, *Trends in risk of young drivers and countermeasures in European Countries*, Paper presented to National Safety Council's International Symposium on Novice Teen Driving: GDL and Beyond, February 5-7, Tucson, AZ

Ulleberg, P & Rundmo, T 2003, *Personality, attitudes and risk perception as predictors of risky driving behaviour among young drivers*, Safety Science, vol. 41, no. 5, pp. 427-443

Verschuur, WL & Hurts, K 2008, *Modelling safe and unsafe driving behaviour*, Accident Analysis & Prevention, vol. 40, no. 2, pp. 644-56

Victorian Motorcycle Council 2019, *Developing Technology Neutral Road Rules for Driver Distraction: Victorian Motorcycle Council Submission*, February 2019, accessed at: **https://www.ntc.gov.au/media/1947/ntc-issues-paper-developing-technology-neutral-road-rules-for-driver-distraction-anonymous-victorian-motorcycle-council-feb-2019.pdf**

The Washington Post 2017, *A man using FaceTime killed a 5-year-old girl in a highway crash. Was Apple to blame?*, 2 January 2017, accessed at: **https://www.washingtonpost.com/news/the-intersect/wp/2017/01/02/a-man-using-facetime-killed-a-5-year-old-girl-in-a-highway-crash-was-apple-to-blame/?noredirect=on&utm_term=.f0398399739b**

Watson, B 1997, *When common sense just won't do: Misconceptions about changing the behaviour of road users*, In Bullen & Troutbeck (eds), The Second International Conference on Accident Investigation, Reconstruction, Interpretation & the Law: Proceedings, 20-23 October 1997 (pp. 347-359), Brisbane

Watson, JM & Strayer, DL 2010, *Supertaskers: Profiles in extraordinary multitasking ability*, Psychonomic Bulletin & Review, vol. 17, no. 4, pp. 479-485

World Health Organization 2011, *Mobile phone use: a growing problem of driver distraction*, accessed at: **http://www.who.int/violence_injury_prevention/publications/road_traffic/distracted_driving_en.pdf**

Yagil, D 2005, *Drivers and traffic laws: A review of psychological theories and empirical research*, Traffic and Transport Psychology, Elsevier, Oxford, accessed at: **http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.528.6758&rep=rep1&type=pdf**

Young, K, Horberry, T & Charlton, J 2019, *Submission to the National Transport Commission on the Issues Paper: Developing Technology-Neutral Road Rules for Driver*

*Distraction*, Monash University Accident Research Centre (MUARC), accessed at: **https://www.ntc.gov.au/media/1938/ntc-issues-paper-developing-technology-neutral-road-rules-for-driver-distraction-kristie-young-monash-university-accident-research-centre-feb-2019.pdf**

Young, K & Lenné, M, 2012, *Driver distraction regulatory reform in Australia*, Monash University Accident Research Centre, Clayton.

Young, K, Osborne, R, Koppel, S, Charlton, J, Grzebieta, R, Williamson, A, Haworth, N, Woolley, J & Senserrick, T 2018, *What are Australian drivers doing behind the wheel? An overview of secondary task data from the Australian Naturalistic Driving Study*, Journal of the Australasian College of Road Safety, accessed at: **http://acrs.org.au/wp-content/uploads/What-are-Australian-drivers-doing-behind-the-wheel-An-overview-of-secondary-task-data-from-the-Australian-Naturalistic-Driving-Study.pdf**

Young, K & Regan, M 2003, *Driver distraction: A review of the literature and recommendations for countermeasure development*, Proceedings of the 2003 Road Safety Research, Policing and Education Conference, 24-26 September, accessed at: **https://acrs.org.au/files/arsrpe/RS030132.pdf**

Young, K & Regan, M 2007, 'Driver distraction: A review of the literature'. In: Faulks, Regan, Stevenson, Brown, Porter & Irwin (eds), *Distracted driving*, Australasian College of Road Safety, Sydney, pp. 379-405, accessed at: **http://acrs.org.au/files/papers/15%20Young%20A%20review%20of%20the%20literature.pdf**

Ba, Y, Zhang, W, Peng, Q, Salvendy, G & Crundall, D 2015, *Risk-taking on the road and in the mind: behavioural and neural patterns of decision making between risky and safe drivers*, Ergonomics, July 2015, accessed at: **http://dx.doi.org/10.1080/00140139.2015.1056236**

Zendrive 2019, *Public Enemy No. 1: Phone Addicts replace drunk drivers as the most dangerous threat on the road*, Zendrive's Distracted Driving Study 2019, April 2019, accessed at: **https://go1.zendrive.com/distracted-driving-study-2019/**

# List of tables and figures

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