30 Driver Distraction Injury Prevention Countermeasures—Part 1: Data Collection, Legislation and Enforcement, Vehicle Fleet Management, and Driver Licensing

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30.1 INTRODUCTION

Each year, around 1.2 million people worldwide die as a result of road crashes.[1] For every death, around 50 million people are injured and around 15 million injuries are severe enough to require hospitalization.[2] Findings from the analysis of police-reported crashes, reviewed in Chapter 16, suggest that driver distraction is a contributing factor in 10–12% of crashes. Converging data, from the 100-car Naturalistic Driving study in the United States,[3] suggest that distraction is a contributing factor in up to 23% of crashes and near-crashes. Globally, therefore, driver distraction is a significant cause of unintentional death. As such, the development, implementation, and evaluation of injury countermeasures to prevent and mitigate the effects of distraction are critical to reducing existing road trauma and preventing distraction from escalating into a bigger problem than it already is.

Injury prevention countermeasure development for distraction is in its infancy relative to other road safety issues, even in developed countries with relatively good road safety records. This is not surprising. Governments continue to rely heavily, often overly, on crash data to justify and stimulate countermeasure development. However, to date, distraction has been poorly defined, systems for accurately and reliably collecting and analyzing data on its role in crashes do not exist in many jurisdictions, and many policymakers are unaware of converging evidence, from epidemiological and other studies, that implicates distraction as a road safety problem. This has thwarted attempts by governments to strategically target key distraction problems using evidence-based strategies, and to justify adequate resources for meaningful implementation of effective countermeasures.

Noteworthy is a lack of published data on the effectiveness of existing distraction prevention and mitigation measures. The limited data that do exist, reviewed in this book, pertain to the impact of banning mobile phone use while driving. Vehicle manufacturers, to their credit, have been proactive in undertaking and commissioning research to understand distraction, and in developing methods, tools, guidelines, and standards for the design and evaluation of products to limit distraction. Even for these interventions, however, there is limited published data on their effectiveness in

limiting distraction, let alone enhancing safety. Hedlund and Leaf[4] come to a similar conclusion. They discuss the efficacy of some countermeasures developed to prevent or mitigate the effects of distraction: mobile phone laws, graduated driver licensing restrictions on mobile phone use for novice drivers, general distraction laws, communications and outreach, and employer programs. They conclude that, with the exception of mobile phone laws, nothing is currently known about the effectiveness of any of these countermeasures in reducing distraction, and even for mobile phone laws, they conclude that the effectiveness data are "uncertain."

In this, and the following two chapters, we discuss countermeasure options (existing and proposed) for preventing and mitigating the effects of distraction. The recommendations derive from the body of material reviewed in this book, from the authors' collective understanding of issues relevant to the topic, and from specific sources (discussed in this chapter) that provide some initial guidance in the area. For the sake of simplicity and to package the recommendations in a manner familiar to governments, road transport authorities, and designers, the countermeasures have been assembled under the following headings: data collection, legislation and enforcement, vehicle fleet management, driver licensing, education and training, vehicle design, technology design, and road design. This chapter focuses on data collection, legislation and enforcement, vehicle fleet management, and driver licensing. The remaining areas are addressed in Chapters 31 and 32.

Given the paucity of data on countermeasure effectiveness and differences in the nature and extent of the distraction problem between jurisdictions, it is difficult to say which countermeasures are most likely to be effective in reducing distraction; even the best countermeasures will be ineffective unless they are properly designed, implemented, and routinely evaluated. Johnston[2] (Chapter 4, p. 16) asserts that current best practice in road safety countermeasure development has the following defining features:

- Routine surveillance of safety progress, using comprehensive, high-quality data systems, covering the gamut of road safety problems
- Strategic targeting of the key problems using evidence-based strategies and program options
- The provision of adequate resource for meaningful implementation
- Rigorous evaluation of the effectiveness of the interventions
- Continuous improvement in implementation based upon the evaluation results and maximum coordination among all relevant institutions

The countermeasures presented in this chapter and in Chapters 31 and 32, therefore, should be regarded as options rather than prescriptions for countermeasure development; although Chapters 16 through 18 provide quantitative data on the role of distraction in crashes and near-crashes that can be used to prioritize the choice of options.

In the writing of this and the two chapters that follow, several documents were reviewed that provide some initial thoughts on countermeasure development: the summary and proceedings of the National Highway Traffic Safety Administration (NHTSA) Driver Distraction Expert Working Group Meetings[5]; a discussion document,

prepared by Transport Canada concerned with strategies for reducing driver distraction from in-vehicle telematics devices[6]; the preface to a special section on driver distraction in the journal *Human Factors*[7]; a U.S. NHTSA highway safety countermeasures guide for state highway safety offices[4]; three keynote papers presented at the First International Conference on Driver Distraction in Sydney, Australia, in June 2005[8–10]; a Monash University Accident Research Centre (MUARC) Submission to the Parliament of Victoria Road Safety Committee Inquiry into Driver Distraction[11]; the August 2006 report of the Parliament of Victoria Road Safety Committee Inquiry into Driver Distraction (henceforth, referred to as the "Australian Distraction Inquiry Report")[12]; the Summary of Proceedings and Recommendations deriving from the International Conference on Distracted Driving, held in Toronto, Canada, in October 2005[13]; and several key review articles and reports.[14–19]

The options for countermeasure development in this and subsequent chapters have been shaped and influenced by ideas, insights, and principles presented in previous chapters of this book. Notable is the overarching policy framework for the management of distraction advocated by Tingvall, in Chapter 33, which is consistent with the Swedish Vision Zero philosophy of traffic safety management.[20] Tingvall argues that a government policy that takes distraction seriously should have the following assumptions as its basis:

- Distraction is a serious problem and is often the initial event in a chain of events that leads to a serious health loss.
- While some distraction is not legally allowed, it is understood to exist now and in the future.
- Based on the above, distraction must be taken into account for all systems, products, and services that exist within the road transport system.
- Distraction should be reduced as well as prepared for in the integrated safety chain.
- In developing technology to reduce the consequences of distraction, consideration must be given to possible modifications in behavior arising from driver interaction with the technology that might diminish the intended safety benefits.

It is with these principles, ideas, and frameworks as a backdrop that we present the options for countermeasure development that follow.

Appended to this chapter are the recommendations deriving from the Australian State of Victoria's Inquiry into Driver Distraction, referred to earlier. These recommendations contain interesting insights into current political thinking on how to manage driver distraction in a jurisdiction—the State of Victoria, in Australia—that has, for over a decade, had one of the lowest rates of road trauma in the developed world.

30.2 DATA COLLECTION AND ANALYSIS

Currently, in many countries, there do not exist adequate data on the role of distraction as a contributing factor in crashes and near-crashes. This prevents an accurate assessment from being made of the frequency of such crashes, the number

of people being killed and injured, and the factors that give rise to them. For most policymakers around the world, "hard" data of this kind is needed to justify and drive countermeasure development. Even where such hard data do exist, Gordon (in Chapter 16) points out that current estimates are highly likely to be underestimated, and there is considerable variation in the size of estimates across studies.

The recommendations made in the following sections aim to improve the quality of distraction-related data collection and analysis.

30.2.1 Defining Driver Distraction

Distraction is a poorly defined concept. Even within this book definitions of it vary widely. Reaching agreement on a commonly accepted definition of distraction is arguably the single most important activity to be undertaken in understanding and managing the problem. The lack of a consistent definition across studies makes the comparison of research findings difficult or impossible. Inconsistent definitions also lead to different interpretations of crash data and, ultimately, to different estimates of the role of distraction in crashes. The definition coined in this book—*distraction is the diversion of attention away from activities critical for safe driving toward a competing activity*—is presented as a first step in resolving these issues.

30.2.2 Sources of Distraction

Once there is agreement on a suitable definition of distraction, there are subsequent issues that need to be addressed in developing an agreed classification system that can be used to review existing coding structures in crash data systems and future crash studies (see Chapter 16): factors related to impairment, such as alcohol, fatigue and psychological states, need to be distinguished from distraction; inside- and outside-the-vehicle distractions should be distinguished from one another so that they are not included within the same factor or code; distraction needs to be distinguished from poorly allocated attention related to the primary task of driving; decisions must be made on what individual distractions should be grouped together; and it must be decided how to code distraction in terms of the object or scene or the behavior involved.

In Chapter 15, a taxonomy is presented for categorizing sources of distraction currently known to exist as contributing factors in crashes and near-crashes. The taxonomy, which derives from the definition of distraction coined in this book, addresses these issues and provides a suitable starting point for collecting and analyzing data in current and future crash and near-crash information systems. It will need to be refined as the driving task, and the sources of distraction associated with it, continue to evolve. In particular, as noted in Chapter 15, greater effort is needed to identify and classify sources of distraction deriving from outside the vehicle, which have been the subject of relatively less research than those deriving from inside the vehicle.

30.2.3 Crash Data Collection and Analysis Procedures

Improved processes for collecting and analyzing distraction-related crash data are required. In Chapter 16, three complimentary approaches are recommended for improving crash data collection and analysis processes.

The first is to improve the traditional way that Police-reported crash data are collected and analyzed:

- Improve data capture at the crash scene by, for example, improving the design of reporting forms, training investigators to collect distraction-related data, and making use of technology to capture and store crash scene information.
- Improve system processes by, for example, capturing the raw data, reviewing coding structures, and using trained coders.
- The sources of distraction listed in reporting forms should be derived from taxonomic descriptions, such as that presented in Chapter 15 of this book, and the listed categories should be as uniform as possible across territorial boundaries—for benchmarking purposes and for comparing crash data over time and across jurisdictions.

The second approach is to undertake specialized crash studies to collect information on distraction. In-depth studies, in which investigators and other experts attend crash scenes for a selected number of crashes and interview victims, provide more detailed insights into the contributory role of distraction in crashes. However, like traditional police-derived crash reports, they rely heavily on self-report (from drivers and witnesses). Although early in-depth studies, such as the Indiana Tri-level study in the United States,[21] provided important information on the role of distraction in crashes at that time, the driving task, the potential sources of distraction associated with it, and methods and tools available for identifying and classifying distraction as a contributing factor in crashes have evolved since then. Confidential accident and incident reporting systems, such as those operating in commercial and military aviation, provide another option for collecting and analyzing distraction-related data. However, in the relatively less regulated driving domain, they are likely to be more logistically difficult to implement and rely on the voluntary and possibly biased reporting of accidents and incidents by drivers.

The third approach is to build into vehicles technology that will record precrash, crash, and postcrash information about the role of distraction in crashes and near-crashes—information that cannot be reliably obtained from driver or eye witness accounts. Naturalistic driving studies, such as the 100-car study,[3] exemplify this approach. Event data recorders (EDRs) (sometimes referred to as "black box" recorders), which are now installed in many new production vehicles, also provide an opportunity to record distraction-related crash data, on a much wider scale. It is now possible to expand the functionality of these devices to record information about the use and status of vehicle systems being used by a driver around the time of a collision. The United States has been active in legislating, regulating, and standardizing the fitment of EDRs since 1997.[12,22] Aftermarket video camera-based incident recording devices of various kinds are also entering the market. These can record images and sounds, a few seconds before and after crashes, near-crashes, or incidents, that are detected by accelerometers and other sensors built into the unit. Typically, these units store digital video images of the driver, passengers, and the road scene ahead of the vehicle. The data recorded from these devices can be used to complement that obtained from EDRs in understanding the role of distraction in crashes, near-crashes, and incidents.

In collecting distraction-related data, it is desirable to take advantage of special driving populations, such as vehicle fleets.[5] Many police agencies, for example, keep detailed crash records and use EDRs and video-based technologies in their vehicles that can be used to capture data on the role of distraction in crashes and near-crashes for this driving population.

Ultimately, a combination of approaches is needed to build up a complete picture of the role of distraction in crashes.

30.2.4 Epidemiological Research

More epidemiological research is needed to quantify the increased crash risk associated with driver involvement in distracting activities. Few studies have been undertaken—and those that have, have focused primarily on the use of mobile phones and the carriage of passengers while driving. As discussed by McEvoy and Stevenson, in Chapter 17, until recently establishing risks for other types of distracting activities has been difficult because accurately measuring drivers' exposure to various distracting activities before a crash and during equivalent control intervals has been limited to self-report. With the development of the naturalistic driving study, which combines experimental techniques with epidemiological methods, this drawback can be overcome using video evidence and other sensor data. However, there are other limitations associated with naturalistic driving studies (see Chapter 6), which must be addressed in undertaking future studies of this kind.

30.2.5 Other Road Users

The study of distraction has been confined almost entirely to the road transport domain, although some related work has been going on in the computing and aviation domains under the guise of "interruptions." Even within the road transport domain, the focus of distraction efforts to date has been on drivers—distracted walking and distracted riding, whether on bicycles or motorcycles, are potential areas of concern that are totally unexplored and unresearched. Notable also is the paucity of research on driver distraction in the public and commercial transport sectors. The limited research undertaken, reviewed in Chapter 14, suggests that distraction is a problem in bus and heavy vehicle transport operations. Bus drivers, in particular, are required to take on multiple, and at times competing, roles while driving, which make them particularly vulnerable to the effects of distraction. This is exacerbated by the demands of bus driving itself, which is arguably a less "satisficing" task than ordinary driving, particularly in residential areas. Much further research is required to identify and classify the sources of distraction that exist in the public and commercial transport sectors and to quantify their impact on driving performance and safety. In the meantime, Chapter 14 provides initial guidance on preventing and mitigating the effects of distraction in bus operations.

In summary, although there is converging evidence that distraction is a significant road safety issue, further work is needed to improve data collection, analysis, and reporting systems to quantify the nature and extent of the problem more accurately—for all road users. This will, in turn, stimulate and support further countermeasure development.

30.3 LEGISLATION AND ENFORCEMENT

Well-designed legislation that is properly enforced and accompanied by ongoing publicity that is directly linked to enforcement has been shown to be effective in reducing road trauma in Australia and other countries (e.g., Ref. 23). Traffic law and its enforcement is a common tool for seeking to constrain road user behavior to its lowest risk forms[2] and applies to individuals (as in laws that prohibit the use of handheld mobile phones) as well as to institutions (as in laws that mandate that manufacturers position visual display units [VDUs] in locations that cannot be seen by drivers while driving).

Traffic law and its enforcement is an important tool for shaping behavior associated with distraction at all three levels of driving control (see Chapter 4). At the *strategic* level, laws that prohibit driver exposure to distracting objects, events, and activities can be effective in changing societal judgment of what constitutes acceptable risk and safe driving. As noted in Chapter 4, social norms that render as taboo driver engagement in distracting activities prohibited by law may be far more powerful than subtle design modifications in preventing and mitigating the effects of distraction. Traffic law and its enforcement can also be used to shape behavior at the *tactical* and *operational* levels of driving control. At the tactical level, laws could be used to prescribe, for example, minimum headways or maximum speeds at which drivers are allowed to operate vehicles when using handsfree cell phones or other devices permitted to be used under current legal regimes. Similarly, laws that prescribe the optimal location and design of systems that have the potential to distract drivers will directly impact on driving behavior at the operational level, by reducing workload.

Laws can also be used in different ways to limit distraction at different stages of the *integrated safety chain* (see Chapter 33). To the extent that they limit exposure to risk, laws can be effective at the beginning of the integrated safety chain in preventing distraction-related crashes—for example, by mandating that certain functions deemed to be distracting are locked out or in mandating the use of workload managers to support normal driving. Laws can also be used to mandate the fitting to vehicles of devices that mitigate, in real time, the effects of distraction at later stages of the integrated safety chain. They can be used, for example, to mandate the installation of distraction warning systems to support the driver when there is a deviation from normal driving and of driver support systems that sense that the driver is distracted and intervene earlier to mitigate the effects of crashes that are unavoidable.

Although there is variation in road safety laws across countries, those that relate to the mitigation of driver distraction tend to be limited in scope and quite similar. These are reviewed briefly, before discussing options and priorities for future countermeasure development.

30.3.1 Existing Laws

There exist general and specific laws relating to driver distraction. In Australia, for example, police have discretion under their own State and Territory legislation to reprimand drivers who they think are driving "carelessly" or "dangerously." This includes careless or dangerous driving that arises from driver distraction. General

laws, such as these, which target driving "without due care and attention," or similar behaviors, are in effect in all provinces and territories in Canada and states in the United States[24,25] (as cited in Ref. 13). In Australia, this general legislation, and in particular the careless driving provision, tends to be used in circumstances where a driver—for whatever reason—has been distracted and a crash occurs. Under this legislation, the charge is heard and determined by a court.[11]

There also exist more specific laws relating to distraction. In Australia, for example, Harmonized Australian Road Rules (ARR) were introduced nationally in 1999. One of these (ARR 300[26]) states that "the driver of a vehicle (except an emergency vehicle or police vehicle) must not use a handheld mobile phone while the vehicle is moving, or is stationary but not parked, unless the driver is exempt from this rule... ." Around 40 countries worldwide have similar bans or restrictions on the use of handheld mobile phones[27–29] (as cited in Ref. 13). Regan et al.[11] have highlighted a number of deficiencies associated with the Australian Rule in its current form. These stem mainly from the inability of the law to keep up with technological changes in the design and functionality of the mobile phone and are worth noting, given the similarity between this and other laws elsewhere:

- The rule relates only to handheld phones, even though handsfree phones carry similar increases in crash risk (see Chapter 11 of this book).
- The rule appears to allow drivers to use handsfree phones (such as a cradle-mounted phones) to send text messages, download video clips, and access other functions and services.
- Given that drivers of police and emergency vehicles are expected to drive, at times by themselves, at high speed and in demanding conditions that require complex maneuvering of their vehicles, the exemption accorded to them does not seem justified on road safety grounds (although it is acknowledged that their exposure to the technology would likely be less than that for ordinary drivers).
- The rule allows for the use while driving of Citizen's Band (CB) and other two-way radios. On the basis of the material reviewed in this book, these would be expected to induce levels of distraction comparable to that of the mobile phone.
- While the rule pertains to mobile phones only, there now exist other technologies, such as personal digital assistants (PDAs) that can be used to converse, send text messages, and perform other functions that can be performed using a mobile phone.
- The rule is difficult to enforce (e.g., in heavy traffic, at night, and in vehicles with heavily tinted windows), and around 30% of Australian drivers are known to regularly violate it.

A related Australian Road Rule (ARR 299[30]) states that, "A driver must not drive a motor 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." Similar laws exist in other countries[25,27]

(as cited in Ref. 13). Drivers are exempt from this rule if they are driving a bus, where the VDU is or displays a destination sign or other bus sign, or the VDU is part of a driver's aid (e.g., dispatch or navigation system). Regan et al.[11] have also highlighted deficiencies associated with this rule in its current form:

- There is no known published empirical evidence that a VDU in one vehicle is capable of distracting a driver driving another vehicle.
- The law pertains only to visually induced distraction. Auditory information displayed by TV, video, and DVD players may divert attention away from tasks critical for safe driving.
- It is not clear whether visual display screens which form part of portable devices, such as mobile phones, MP3 players, ipods, and PDAs, should be classified as "visual display units"
- Some driver's aids (dedicated or nomadic), if poorly designed, have potential to distract the driver.
- The law is difficult to enforce. It is difficult for police to know, for example, which features and services are exempt and whether a VDU in one vehicle is distracting the driver of another vehicle.

In addition to these two ARRs there is another (ARR 297)[31] that relates to a driver not having proper control of a vehicle. However, "proper control" has not been defined in the rules and nor have the courts ruled on what constitutes proper control (p. 121).[12]

Hedlund et al.[13] report that one Canadian province (Newfoundland and Labrador), three U.S. states (Connecticut, New Jersey, and New York), and the District of Columbia prohibit *all* drivers from using handheld mobile phones[24,25,28] (as cited in Ref. 13). Twelve U.S. states and the District of Columbia prohibit all mobile phone use by drivers with a learner's permit or provisional license or by drivers under 18.[4] Several U.S. states also prohibit all mobile phone use by school bus drivers; and in jurisdictions where no such laws exist, some 26 communities prohibit the use of handheld mobile phones.[13] No jurisdiction in the United States restricts handsfree phone use for all drivers, and at least 40 countries are known to prohibit handheld phone use.[4] In Europe, most EU member states have laws that ban the use of handheld phones, or plan to introduce them, and generally allow the use of handsfree phones on the condition that drivers do not endanger traffic.[12] Interestingly, Sweden, which has an excellent road safety record, has no law prohibiting the use of handheld mobile phones.

In the United States the emerging trend is to legislate against a multitude of behaviors.[12] In Washington, D.C., for example, there exists legislation that specifically targets the offense of distracted driving, bans talking on handheld phones while the vehicle is in use, and bans all phone use by school bus and learner drivers. Other activities covered by the legislation include "... reading, writing, performing personal grooming, interacting with pets or unsecured cargo, or engaging in any other activity, which causes distraction and results in inattentive driving."[12]

As noted previously, traffic laws can also apply to institutions. For example, there exist Australian Design Rules (ADRs), under the Motor Vehicles Act 1989, relating to the fitment and location of television and VDUs to new vehicles, which

overlap to some extent with the requirements of ARR 299. Part 18 of ADR 42/04[32] states that, "All receivers or visual display units and their associated equipment must be securely mounted in a position, which does not obscure the driver's vision" and that, "... unless a driver's aid, all television receivers or visual display units must be installed so that no part of the screen is visible to the driver from the normal driving position." There are, however, systems entering the Australian market that could be interpreted as "drivers aids," which have potential to distract the driver if viewed from the normal driving position. Further, there is currently no regime in place in Australia to ensure that all television receivers and VDUs installed in Australian vehicles as aftermarket products are fitted in accordance with the requirements of the ADR.

30.3.2 Safety and Economic Impact of Existing Laws

Surprisingly few studies have evaluated the safety and economic impacts of existing laws relating to distraction.

Research suggests that banning the use of handheld mobile phones while driving initially lowers the rate of handheld mobile phone use (by up to 50%), before figures subsequently rise back up to prelegislation levels.[33–36] The reasoning behind this subsequent rise and return to prelegislation levels may be twofold: after a brief period of compliance, drivers may judge that the risk of getting caught is minimal, and return to using handheld mobile phones while driving; and after a reduction in publicity about the risks of mobile phone use while driving, drivers may forget or underestimate these risks.[36]

Very few studies have examined the economic implications of banning the use of mobile phones while driving. Two early studies (Hahn and Tetlock, 1999; Redelmeier and Weinstein, 1999; as cited in Ref. 37), attempted to quantify the monetary benefits associated with a ban on handheld mobile phones and the monetary costs associated with the loss of consumer convenience in being able to use the devices while driving. Both studies concluded that a ban on the use of hand-held mobile phones would not be economically efficient. The Hahn and Tetlock benefit–cost analysis estimated that a ban on mobile phones would result in a societal loss of US $23 billion annually. The cost-effectiveness analysis conducted by Redelmeier and Weinstein estimated that the cost per quality adjusted life year (QALY) saved would be US $300,000. However, in a more recent study,[37] the key assumptions for the two earlier studies were revised so that they were consistent, reflected the latest information available, and assumed a ban on the use of both handheld and handsfree mobile phones. It was concluded that the estimated net benefit of a ban on mobile phone use while driving (in the United States) was close to zero; that is, the value of preventing crashes caused by mobile phone use while driving is approximately equal to the value of the calls that would be eliminated by a ban.

Of course, this discussion raises the more general issue of what might be called the "distraction paradox"—the fact that, at times, it may be beneficial in safety terms for drivers to willingly and deliberately expose themselves to known sources of distraction. DVD players, for example, even if they can be heard by the driver, have potential to placate children for lengthy periods on long trips, thereby, reducing the

intensity and duration of passenger-related distraction. Similarly, conversations, either with a passenger or with someone at the other end of a mobile phone, may help maintain alertness and delay the onset of drowsiness and fatigue. The net interactive effect of a given source of distraction on driving performance and safety is thus a balance between its behavioral benefits and its costs. There is, however, no known research on this topic.

30.3.3 Where to from Here?

Hedlund et al.[13] (p. 10) argue that, to be more effective, laws intended to reduce driver distraction should, "follow the same principles as all good traffic safety laws: They should

- be written well, without loopholes or unintended consequences;
- place minimal burden on law enforcement in observing and documenting the prohibited behaviour and in documenting and assisting in the prosecution of the offence; and
- have the full support of prosecutors and judges."

Some further specific recommendations for improving the effectiveness of existing laws are made below.

30.3.3.1 Technologies

Existing legislation that prohibits the use of handheld mobile phones and other information and communication technologies while driving needs to keep pace with the uncertain evolution of these technologies.[13] Exemptions, where these are provided, should be justified on road safety grounds. This applies to exemptions that apply to technologies (in Australia, e.g., the prohibition on the use of handheld phones does not include CB radios or other two-way radios; and television receivers and VDUs are allowed to be viewed by drivers if they are, or are part of, a driver's aid such as a navigation system) and exemptions that apply to specific users of the devices (e.g., the drivers of public transport, emergency, and police vehicles).[11] High-risk groups, such as learner and probationary drivers, should be prohibited from using handheld and handsfree mobile phones, and other technologies known to significantly increase crash risk while driving.[11,13] As for any road safety countermeasures, the long-term effects of legislation that prohibits the use of mobile phones and other technological devices while driving must be evaluated on a regular basis. The outcomes of such evaluations should inform the design of measures to optimize the effectiveness of the legislation.

Police enforcement of existing laws that prohibit driver use of handheld mobile phones appears to be inadequate in some countries—in Australia, for example, around 30% of drivers use handheld mobile phones while driving even though it is illegal to do so. In addition to determining why this is so and what can be done to improve the effectiveness of current enforcement practices, it is important to exploit emerging technological countermeasures that might obviate the need for police enforcement. If the technology exists, for example, to prevent mobile phones and

other devices from being used in cinemas and hospitals, why not use technology in a similar way to block reception when a mobile phone or other device is being used illegally in a vehicle that is traveling above a certain maximum speed on the road network? Workload managers, discussed in Part 8 of this book, provide another means for selectively restricting driver access to mobile phone functions at times when driver workload is estimated to be high. The penalties for violation of laws that prohibit the use of mobile phones and other technological devices while driving should be commensurate with those pertaining to other deviant behaviors, such as speeding and drink driving, which carry comparable increases in crash risk.[11]

As discussed earlier in this chapter, a total ban on the use (not carriage) of all mobile phones (handheld and handsfree) while driving for work purposes has been implemented by some employers. Such bans appear to be justified on road safety grounds, at least when the devices are used to converse. The authors of Chapters 16 and 17, for example, report data from the 100-car naturalistic driving study[3] that show that increases in crash risk associated with dialing a handheld device and talking and listening on a handheld device are 2.8 and 1.3, respectively, implying that talking and listening are less risky than dialing. However, the population-attributable risk percentages derived for each of these two sets of activities (which take into account driver exposure) are the same—3.6%. Hence, for the population at large, dialing a handheld device and talking and listening on a handheld device are associated with approximately equal increases in crash risk (because drivers spend a greater percentage of time talking and listening to handheld devices than dialing). McEvoy and Stevenson, in Chapter 17, also cite converging evidence from epidemiological research in Australia, which demonstrates increases in crash risk associated with the use of handheld and handsfree mobile phones of 4.1 and 3.8 times, respectively.

Whether or not there should be a total societal ban on the use of mobile phones while driving is a matter for policymakers to decide. Logically, at least, it makes no sense to ban handheld phones and not handsfree phones if the increase in crash risk associated with the use of the device in these two modes is similar. Perhaps, this is why Sweden, with an excellent road safety record, has chosen not to ban the use of either handheld or handsfree phones. The potential gains in safety of implementing a total societal ban on the use of mobile phones would likely equal any consequent losses in economic productivity, based on the data reviewed in this chapter—at least when mobile phones are used for conversing. Such a ban would likely be difficult to enforce, and its initial impact in reducing mobile phone use while driving may not persist in the longer term. As noted previously, surveys of public opinion suggest that support for a total ban on phone usage while driving would be low. Given that the mobile phone is a flexible platform that is capable of hosting a range of relatively low-cost functions that have potential to support the driving task and enhance safety (e.g., satellite navigation, intelligent speed adaptation), and given that when it is used to converse it may have some safety benefits (e.g., in mitigating the effects of drowsiness and fatigue; see Chapter 21), it may be premature at this point in time to implement a total societal ban on its use while driving. Further research is needed to determine new ways of limiting levels of distraction associated with mobile phone use (e.g., through better design and by supporting use of it with real-time distraction

prevention and mitigation countermeasures), for all functions that can be accessed when using the device while driving, and in exploiting the potential of the devices to host functions that have potential to assist the driver and enhance safety. Such activity might help bring together vehicle manufacturers, aftermarket suppliers, and nomadic device developers in achieving the common goal of optimizing driver safety.

Finally, transport authorities, in conjunction with automotive manufacturers and providers of aftermarket products, need to develop verification processes for the installation of new technologies so that vehicle owners and potential purchasers can be assured that the installation satisfies the design rules that apply in that jurisdiction.[11,12] There is also a need for the development of safety standards, ratings, and labels for aftermarket products.[13]

As discussed in Chapter 2, the whole issue of whether a distracted driver is blameworthy when circumstances act to displace the primacy of their social role as a driver—such as when a driver diverts attention away from activities critical for safe driving toward a screaming baby to fulfill their role as a parent—requires careful thought. This is an important issue, but it is bound to be one of the more difficult legal issues to resolve.

30.3.3.2 Other Sources of Distraction

Emerging laws in the United States recognize the role that other sources of distraction, such as grooming and carrying animals, can also play in degrading driving performance and increasing crash risk. However, specific laws such as these may be difficult to enforce and no known studies have evaluated the effectiveness of them. As for any road law, they should target those activities, which confer the greatest risk to safety (see Chapters 16 through 18).

More general distracted driving laws that prohibit drivers from engaging in any activity that diverts attention away from activities critical for safe driving also operate in some parts of the United States. These give publicity on the dangers of distracted driving more relevance and credibility.[12] No studies, however, have evaluated whether such general distracted driving laws have any effect, and it is unlikely that they will be effective unless they are vigorously publicized and enforced.[4] In addition, objective criteria for identifying driving behaviors that are indicative of distracted driving need to be developed, to enable police to detect and penalize drivers who engage in distracted driving, similar to those developed for sobriety testing of drunk drivers.

As part of graduated driver licensing regimes, there is justification for restricting the carriage of multiple passengers by learner and probationary drivers, at least for part of the probationary period. Such laws are already in force in some jurisdictions. In the United States, for example, laws in 35 states and the District of Columbia limit the number of passengers allowed with a driver with a provisional license, and there is evidence that these restrictions reduce teenage driver crashes and injuries.[4] However, the actual extent to which reduced distraction contributes to the effectiveness of such restrictions in reducing road trauma remains unclear.

In summary, there is scope for improving existing laws. They should be data-driven, justifiable on road safety grounds, enforceable, in pace with technological

developments, evaluated, and recognize that drivers are in some situations biologically and socially primed to be distracted.

30.4 VEHICLE FLEET MANAGEMENT

In Australia, about a quarter of all vehicles involved in crashes are business vehicles,[38] and nearly 50% of all Australian workplace fatalities occur on roads if traveling to and from work is included.[12] The situation is similar in many other developed countries. Given the dangers associated with work-related driving, effort is needed to reduce this problem, or at least to ensure it does not grow.

Employers in Australia, and many other countries, are required to provide a duty of care to drivers of their vehicles as an occupational health and safety requirement. Fleet owners and managers, therefore, are in a powerful position to develop and implement policies that internally regulate driver exposure to distracting activities in vehicles driven for work purposes and to purchase and lease vehicles and equipment that are best designed to minimize driver distraction. In Australia, the companies purchase for their fleets around 60% of all new vehicles sold in the country. These vehicles, when sold, will filter rapidly through the rest of the community, further enhancing the safety of private motorists.

Many government agencies and corporations around the world have implemented specific policies on mobile phone use while driving by their employees. In Australia, for example, several large companies, including Shell, BP, ExxonMobil, BHP Billiton, and BOC Gases, have banned the use of handheld and handsfree phones in company vehicles.[12] Some employers have extended this ban to cover the use of mobile phones while walking around worksites.[12] Many corporations around the world also have more general "safe driving policies" that include advice on the management of driver distraction.

Employers are in a particularly powerful position to prevent and mitigate within society the effects of driver distraction. There are several reasons for this. First, they are able to influence driving behavior at all levels—at the strategic level (e.g., by limiting the availability of distracting technologies and devices to employees and reducing productivity pressures to use mobile phones on the job), at the tactical level (e.g., through on-the-job education and training in how to self-regulate driving behavior in response to distraction), and at the operational level (e.g., through the provision to drivers of vehicles equipped with technologies designed to minimize distraction). They also have at their disposal a captive audience to which they can apply a wide range of traffic safety strategies: exposure control (e.g., through company regulations that prohibit use of mobile phones); crash prevention (e.g., through the purchase or lease of vehicles equipped with real-time distraction mitigation systems); injury control (e.g., through the purchase or lease of vehicles equipped with passive safety features, such as airbags that protect the driver in the event that a distraction-related crash is unavoidable); behavior modification (through education, and enforcement of company regulations); and post-injury control (e.g., through the purchase or lease of vehicles equipped with automatic crash notification systems in the event of an unavoidable distraction-related crash). Finally, vehicle fleet managers have discretion in choosing, for the vehicles they purchase, a wide range of

distraction prevention and mitigation technologies that are capable of addressing all stages of the integrated safety chain (Chapter 33)—from normal driving through to postcrash.

The following sections outline a range of initiatives that employers have at their disposal to prevent and mitigate distraction-related crashes.

30.4.1 Company Policies to Manage Distraction

30.4.1.1 Responsibilities

The following, general, recommendations are made to manage driver distraction within corporate vehicle fleet safety management programs:

- Road transport authorities, occupational health and safety authorities, and other stakeholders need to work together to encourage an occupational health and safety approach to driver distraction for people who drive as part of their work.[12]
- Governments should play a leading role in developing their own vehicle safety policies for the management of driver distraction and in encouraging the private sector to follow suit.
- Governments need to provide employers, government and private, with advice and guidance in developing vehicle safety policies: advice to employers on their legal responsibilities and potential liabilities in relation to driver distraction; guidance on strategies that could be adopted by them, and by those they contract to perform services for them, to limit the adverse effects of distraction; and product information that stimulates them to purchase vehicle makes and models and nomadic devices that minimize driver distraction.

30.4.1.2 Company Policies—General Issues

Company policies designed to manage distraction should address the following general issues:

- Employees should be made aware of the existence and contents of the company's existing policy, and versions of it.
- The policy should provide clear guidance on what the company believes are acceptable circumstances in which it is appropriate for drivers to willingly engage in distracting activities, and those which are prohibited.
- The policy should explain to employees their legal and company responsibilities, penalties for violation of the policy, and incentives for adherence to it.
- The policy should identify the range of distractions that can adversely affect driving performance and the relative risks involved in engaging in distracting activities while driving.
- The policy should contain guidance for employees in how to minimize the effects of driver distraction.

30.4.1.3 Company Policies—Content

The following issues should be considered in developing company policies, programs, and strategies for managing distraction.

Collection, monitoring, and analysis of crash data. Systems are needed to measure and quantify driver exposure to distractions while driving, for quantifying the extent to which distractions contribute to injury and noninjury crashes, and for determining whether company policies are effective in reducing injury and property damage attributable to distraction.

Exposure reduction. Effective enforcement of the company's distraction policy is the principle means by which driver exposure to prohibited sources of distraction can be controlled.

Enforcement. Penalties for failing to adhere to the company policy, and aspects of it, should be determined and documented, along with incentives for driver compliance with the policy.

Education. Education programs should cover the following basic issues:

- The company policy on distraction
- National and state legislation relevant to distraction
- Penalties for violating company policy and state legislation
- The definition and nature of driver distraction
- Sources of distraction
- The impact of distraction on driving performance and crash risk
- Relative risks involved in using mobile phones in different weather conditions, geographical areas (e.g., country areas), and traffic conditions
- Individual differences in vulnerability to distraction
- The role of passengers in managing distraction
- Strategies for minimizing distraction, including knowledge about features of technologies in the vehicle and the safest ways of using them to reduce distraction

Training. Company training programs should focus on developing the following knowledge and skills:

- Knowledge of mobile phone features (e.g., voice recognition) and features of other technologies that reduce distraction
- How to use vehicle technologies and nomadic devices in the safest manner to minimize distraction while driving
- Optimal modes of self-regulation to reduce the effects of distraction (e.g., slowing down, increasing following distance)
- Self-awareness of the relative effects of distraction on driving performance deriving from different phone tasks (e.g., handheld, handsfree, text messaging), conversation complexity, driving task demand, weather conditions, and so on

More detailed advice on training and education initiatives to limit distraction is provided in Chapter 31.

Technology design. The design and placement of technologies in vehicles used by employees while driving critically determines the extent to which they are vulnerable to distraction as follows:

- Employers should request, when purchasing vehicles, mobile phones, and other technologies, evidence that they comply with best practice human factors and ergonomic guidelines and standards for minimizing driver distraction.
- Employees should be provided with vehicles, technologies, and nomadic devices with the best features for minimizing distraction. Several helpful features to reduce distraction when using a handsfree phone exist: speed and voice dialing, a large speed and voice dial memory capacity, automatic radio muting, large display screen and control buttons, automatic answering facility, automatic brightness control, and long display illumination times.
- Ideally, nomadic devices that are allowed to be used while driving should be connected with the vehicle via Bluetooth or a simple physical connection (e.g., plug, port, or dock—as is possible with iPod devices) to enable the driver to operate the device through normal vehicle controls and displays (which, hopefully, are more compatible for use while driving).
- New and existing nomadic and retrofitted aftermarket devices should be installed and located in vehicles in accordance with design guidelines and best practice ergonomic and human factors guidelines and standards to minimize distraction.
- A driver distraction subcommittee should be formed—involving management and employees—that is responsible for developing criteria for the purchase of in-vehicle technologies, ensuring that they are properly located in vehicles, and assessing them for ergonomic design and usability before deployment in company vehicles.
- Technologies that enable in-vehicle device use to be restricted or locked out in circumstances when it is unsafe to use the device, such as beyond certain speeds, in certain locations, when performing certain maneuvers, when the windscreen wipers are activated, and so on, are preferred.

There is, in summary, much that can be done to minimize distraction in vehicles being driven for work purposes, and employees are in a powerful position to do so.

30.5 LICENSING

The licensing system provides an important mechanism for reducing the adverse effects of distraction.[4,11,19] It can be used to shape and modify driving behavior at all three levels of driving control (strategic, tactical, and operational), over variable timescales. However, little has been done to date to exploit it as a driver distraction countermeasure. The following, general, recommendations derive from earlier suggestions made by Young et al.[19] and Regan et al.[11]

Most existing licensing handbooks for Learner and Probationary drivers contain only limited reference to distraction as a potential risk for drivers. Such documents should include information about the range of distractions inside and outside the

vehicle that can adversely impact on driver performance and safety, how they do so, the relative risks deriving from engagement in these activities, the factors that make young drivers more vulnerable to the effects of distraction, and practical strategies for avoiding and coping with distractions, including advice on technology features and modes of interaction with technologies that minimize distraction.

Knowledge tests, undertaken to obtain learner permits and probationary licenses, should include items that test driver knowledge of these issues. So-called "hazard perception tests," which test for the ability to detect, recognize, and respond appropriately to traffic hazards, should be designed to more closely simulate the demands of real driving by incorporating surrogate driving and competing tasks (such as radio-tuning) that allow road authorities to assess a driver's ability to perceive and effectively respond to potential and actual hazards when loaded or distracted. Practical driving tests, undertaken in real vehicles with license testers, should be designed to assess driver awareness of distractions, their willingness to engage in distracting activities, and their ability to safely compensate for the effects of distraction.

Graduated licensing schemes should be designed to systematically, and chronologically, expose learner and probationary drivers to potentially distracting activities (such as operating entertainment systems, using handsfree mobile phones, and carrying passengers) based on their level of driving experience and demonstrated competence in safely managing the effects of distraction. As noted earlier in this chapter there is justification, on road safety grounds, for banning mobile phone use and restricting the carriage of multiple passengers by learner and probationary drivers, at least for part of the probationary period. Such laws are already in force in some jurisdictions.

Testing for the presence of knowledge and skills acquired through education and training is important in ensuring that drivers are properly equipped to drive safely and in motivating learner drivers to undertake education and training programs that have been proven to be effective in reducing crash risk. Chapter 31 contains recommendations for the design and content of driver education and training initiatives for preventing and mitigating the effects of distraction. It identifies specific distraction-related knowledge and skills, which could be tested for within the driver licensing system.

30.6 CONCLUSIONS

Although there is converging evidence that distraction is a road safety problem, better data are needed to more accurately characterize and quantify the problem and to prioritize countermeasure development. Agreement on a suitable definition of distraction, from which can be extracted a taxonomy for classifying sources of distraction, is critical in bettering our understanding of the true nature and role of distraction in accidents and incidents, for all road users. The definition coined in this book—*distraction is the diversion of attention away from activities critical for safe driving toward a competing activity*—is presented as a first step in resolving this issue.

Legislation is common among jurisdictions and has potential to prevent and mitigate the effects of distraction if well written and enforceable. Evidence to suggest

that existing legislation is effective in doing so, however, is limited. Legislation needs to be evidence-based, target high-risk groups, be evaluated on a regular basis, and keep pace with the evolution of technologies. Exemptions from laws, where provided, should be justified on road safety grounds and penalties for violations of laws that prohibit driver engagement in distracting activities should be comparable to those pertaining to other driving behaviors, which carry similar increases in crash risk. Developments in technology are making it possible to both improve and obviate the need for police enforcement and these should be pursued. Whether a distracted driver is blameworthy when circumstances act to displace the primacy of their social role as a driver is an important issue to resolve.

Employers have a significant role to play in limiting distraction in society and have at their disposal many options for doing so. The critical starting point is development of a company-wide endorsed policy for managing distraction. Governments can play a leading role in developing policies for managing distraction and in encouraging and supporting the private sector to follow suit.

Little has been done to date in exploiting the driver licensing system as a driver distraction countermeasure. There are many options for doing so. Graduated driver licensing systems that progressively delimit driver exposure to potentially distracting activities are likely to yield significant road safety benefits.

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A.30.1 APPENDIX A: RECOMMENDATIONS OF THE PARLIAMENT OF VICTORIA

A.30.1.1 Inquiry into Driver Distraction

A.30.1.1.1 Introduction

The Road Safety Committee of the Parliament of Victoria, Australia, handed down in August 2006 a 200-page report on its Inquiry into Driver Distraction (see Ref. 12). This Committee comprises seven members of Parliament, drawn from both houses and all political parties. To the knowledge of the authors, it is the first known report to be tabled on the topic of driver distraction by a bipartisan Parliamentary committee, and provides a comprehensive summary of Australian and international research and activities in the area. The Committee made 31 recommendations for addressing distraction as a road safety issue. These are reproduced below (with permission), and provide an interesting insight into recent thinking on this issue, in a jurisdiction (the Australian State of Victoria) that has one of the lowest rates of road trauma in the developed world.

A.30.1.1.2 Recommendations

1. That VicRoads adopt a clearer concise definition of driver distraction, consistent with the definition arising out of the 2005 Toronto conference on driver distraction, and establish a range of categories of distraction sources. Any definition and categorisation should distinguish distraction from other driver behaviours such as fatigue and inattention.
2. That VicRoads and Victoria Police develop methods to enable the future assessment of the role of distraction in crashes on Victorian roads, including a review of existing traffic crash reporting systems. Consultation should take place with other Australasian jurisdictions and the Australian Transport Safety Bureau on appropriate methods and classification of distraction.
3. That VicRoads undertake a comprehensive roadside observational study to determine the prevalence of both handheld and handsfree mobile phone use by drivers in Victoria that will provide a benchmark for future studies and a basis for measuring the effect of any countermeasures.
4. That VicRoads continue to monitor research on the effects of various aspects of mobile phone use on driving performance, with a particular emphasis on:
   - the context, duration and content of conversations;
   - experimental validity and repeatability;
   - age-related differences;
   - phone design and new technology; and
   - experience with using a mobile phone while driving.
5. That VicRoads and Victoria Police improve crash data systems on mobile phone use, including type of device and the context in which it was being used when the crash occurred.
6. That the state government work with the vehicle industry to encourage development of safer in-car mobile phone technology, including integrated speech-controlled phone communication systems.
7. That relevant state government agencies implement targeted publicity campaigns warning drivers of the dangers of mobile phone distraction, including
   - the use of hands-free phones in hazardous traffic conditions;
   - the dangers of text and video messaging; and
   - the greater risks associated with complex phone conversations

   In developing publicity campaigns, the Government should examine the recent '*Switch off before you drive off*' campaign undertaken in the United Kingdom.
8. That VicRoads review the results of the NSW Roads and Traffic Authority study of the distraction from in-vehicle videos and possible subsequent Australian Transport Safety Bureau investigations for their implications in addressing driver distraction in Victoria.
9. That VicRoads undertake a survey on the current use of video, audio and other electronic devices by drivers in Victoria to establish a benchmark for future usage surveys and a basis for measuring the effect of any countermeasures.

10. That VicRoads and Victoria Police improve crash data systems on video, audio, and other electronic device use, including the type of device and the context in which it was being used when the crash occurred.
11. That VicRoads and the Transport Accident Commission undertake a publicity campaign warning of the dangers of drivers being distracted by "everyday" activities and the need to remain alert to the driving task.
12. That VicRoads, in consultation with local councils, develop a set of guidelines to regulate the location, size, and content of all road authority and other signs within road reserves. Such guidelines will be designed to minimise potential driver distraction and will apply to individual signs as well as the total signscape along a road. That following the implementation of the above guidelines, VicRoads and local councils aim to remove superfluous and obsolete signs.
13. That VicRoads, the Department of Sustainability and Environment and municipalities develop a more consistent and stringent approach to the installation, use and content of scrolling, moving and video-style advertising within and adjacent to road reserves. Any installations should be monitored for their effect on road safety.
14. That VicRoads, the Department of Sustainability and Environment and municipalities develop more prescriptive regulations and guidelines controlling advertising in or near road reserves, including the need to control the content of advertisements.
15. That any future consideration of the laws dealing with mobile phone use while driving, take into consideration the potential safety and economic benefits to be gained from using handsfree mobile phones.
16. That VicRoads monitor, evaluate, and publish the results of the impact on road crashes and driver performance of a ban on all mobile phone use while driving by learner permit and first-year probationary licence drivers under Victoria's revised Graduated Licensing System.
17. That in relation to the road rule on the use of television and video-screen devices in vehicles, Victoria Police and VicRoads implement separate penalties for installations, which could distract the driver and those, which may distract drivers of other vehicles.
18. That VicRoads develop, in conjunction with the automotive manufacturer and aftermarket motor accessory industry, a verification process for the installation of video and TV screens in motor vehicles so that vehicle owners and potential purchasers can be assured that the installation satisfies Australian Design Rules.
19. That VicRoads review the intent of Australian Road Rule 299 (television receivers/visual display units) and Australian Road Rule 300 (use of handheld mobile phones) in view of emerging technologies and consider the appropriateness of having two separate rules.
20. That following the development of a clear definition and categorisations of driver distraction (see Recommendation 1), Victoria Police and VicRoads introduce an appropriate road rule to prohibit driving while undertaking activities, which could distract from safe driving.

21. That following the implementation and evaluation of the recently announced changes to the Graduated Licensing Scheme, the Government reconsider the issue of restricting the carriage of multiple passengers by novice drivers.
22. That VicRoads liaise with the Australian Transport Council with a view to further research and development into the potential benefits to be gained from various emerging driver assistance technologies including:
    - Electronic stability control
    - Driver workload managers
    - Speech recognition devices
23. That VicRoads liaise with the Australian Transport Council with a view to further research and development to ensure that driver assistance technologies minimise potential driver distraction through appropriate system integration, driver-machine interfaces, and the positioning of vehicle displays and controls.
24. That the Minister for Transport raise at the Australian Transport Council the need to undertake public and industry consultation leading to a memorandum of understanding between governments and industry to reduce driver distraction from in-vehicle electronic devices.
25. That the Government increase the profile of driver distraction as a road safety issue. This should include:
    - addressing the issue in the forthcoming Victorian road safety strategy;
    - school road safety programs; and
    - development of suitable publicity for use by the rental car industry.
26. That VicRoads develop a comprehensive and prioritised program of research and policy initiatives on driver distraction to improve road safety in Victoria.
27. That VicRoads and the driver training industry incorporate driver distraction material in driver training and licensing processes and publications.
28. That VicRoads and WorkSafe encourage an occupational health and safety approach to driver distraction for people who drive as part of their work.
29. That the state government implement vehicle safety policies to encourage government and vehicle fleet drivers, while driving, to:
    - minimise hands-free mobile phone use;
    - more safely use other electronic devices, such as navigation systems, and
    - avoid or minimise nonelectronic distractions.
30. That VicRoads and Victoria Police investigate how information from Event Data Recorders in modern motor vehicles can be used to provide new insights into the role of driver distraction in crashes and other information to improve road safety in Victoria. This should include data access, privacy, and resourcing issues.
31. That VicRoads investigate how video camera event recordings of driver behaviour and traffic conditions when collisions or near-crashes occur can be used to provide new insights into driver distraction and other aspects of road safety.

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DRIVER DISTRACTION

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