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Strategies for Reducing Driver Distraction from In-Vehicle Telematics Devices:

A Discussion Document

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Executive Summary

"In-Vehicle Telematics" refers to devices incorporating wireless communications technologies in order to provide information services, vehicle automation and other functions. Transport Canada is concerned that in-vehicle telematics devices are a threat to road safety because they increase driver distraction and cause an increase in distraction-related crashes. This concern is based on a substantial and mounting body of evidence indicating that using these devices impairs driving performance.

While cellular phones are currently the most common type of telematics devices used in vehicles, other technologies and applications, for example, navigation, adaptive cruise control and Internet access, are increasingly entering the market. While provincial and territorial governments have an important role in this area, many of these devices will be offered as original vehicle equipment and thus be subject to the Motor Vehicle Safety Act.

The issue warrants urgent and close scrutiny as many such devices are in intensive development. One objective of the proposed consultation is to obtain detailed information on what industry is currently doing or planning. A second objective is to understand what federal interventions are feasible, appropriate and expected by Canadians.

A number of complementary efforts are envisioned, including the publication of this discussion document defining the problem and outlining possible regulatory and non-regulatory responses. The status quo may not be viable since there appears to be insufficient effort on the part of the industry to manage the risk. Non-regulatory approaches could include public awareness initiatives and a Memorandum of Understanding (MOU) between government jurisdictions and industry. An MOU might require manufacturers to implement a driver-system integration design process to minimize the potential adverse safety consequences of in-vehicle telematics. Alternatively, the Department could publish an advisory outlining the driver-system integration design process that manufacturers should adopt.

Regulatory initiatives could include requiring the disabling of access to entertainment systems (e.g., DVDs), telecommunication or other telematics devices in moving vehicles, having safer limits on visual distraction, and prohibiting open-architectures that would allow the use of untested after-market 'plug-and-play' type applications.

The information obtained from the responses to this discussion document and follow-up consultations will help the Department to understand the need for, and characteristics of, potential government intervention and initiate appropriate interventions.

Strategies for Reducing Driver Distraction from In-Vehicle Telematics Devices: A Discussion Document

1. Introduction

Telematics devices are becoming increasingly popular in vehicles and their functionality is expanding. While these technologies have great potential to assist drivers in the driving task, lack of consideration of the human element in design can lead to impaired driving performance and increased risk of collision. Experience from aviation, military and complex industrial systems indicates that technology-centred designs can lead to user rejection and system failure, resulting in accidents. Transport Canada is concerned with the potential adverse consequences of in-vehicle telematics and wants to explore intervention strategies for limiting the risk of crashes associated with their use. The purpose of this document is to outline Transport Canada's concerns with driver distraction and explore some potential industry and government initiatives for limiting this problem. The objectives of the subsequent consultation are to obtain detailed information on what industry is doing or planning and understand what federal interventions are feasible, appropriate and expected by Canadians.

2. The Problem of Driver Distraction

The leading human causes of collisions include driver distraction, inattention and improper lookout. Distraction is the diversion of attention from the driving task by a compelling activity or event.[1] The U.S. National Highway Traffic Safety Administration (NHTSA) has defined four dimensions of distraction based on the nature of the interference experienced by the individual: cognitive, visual, auditory, and biomechanical.[2] Driver distraction is estimated to be a contributing factor in 20% to 50% of all collisions.[3] Recent Canadian research indicates that distraction from cell phone use while driving can increase the risk of collision by 38% to 400%, depending on the study.

Driver distraction is a concern to Canadian road users. The extent of public concern is reflected in the results of recent surveys conducted by the Traffic Injury Research Foundation. The latest survey found that 37% of Canadians currently believe that distracted drivers represent a "serious or extremely serious problem".[4] Public concern is focused on the use of cellular phones while driving, with 64% of respondents rating them as a serious or extremely serious problem.

While cellular phones are currently the most common type of telematics devices used in vehicles, other telematics technologies and applications are poised to enter the market[5]. In-vehicle telematics is a more general class of devices that feature information- and computer-based technologies. Within the category of in-vehicle telematics a distinction is made between technologies that are intended to support the driver (driver assistance systems) and technologies that are intended to increase driver productivity or support information and entertainment demands (infotainment systems). Infotainment systems include navigation systems, warning systems, and a variety of telecommunications devices and services that deliver information and entertainment to drivers (e.g., email, Internet access, and location based information such as gas stations, restaurants, traffic and weather). Automated driver assistance systems include collision warning, adaptive cruise control, lane departure warning, lane change aids, and parking aids. The distinction between infotainment and assistance systems is becoming increasingly nebulous as telematics functions grow ever more intertwined. Moreover, while distraction is often cited as a criticism of infotainment systems, the potential for distraction from driver assistance systems is no less important.

The trend towards a proliferation of telematics devices is a particular concern for road safety. Other sources of distraction in vehicles may also be unsafe (e.g., talking with passengers, eating), however these are not set to increase and are not within the jurisdiction of the federal government. Telematics devices, installed by vehicle manufacturers as original equipment, fall under the purview of the federal government pursuant to the *Motor Vehicle Safety Act*. Transport Canada is concerned that in-vehicle telematics will cause an increase in distraction-related crashes. Others have expressed similar concerns about the impact of these devices. For example, the executive committee of the U.S. Transportation Research Board (TRB) warn of the risks of telecommunications and information technologies in their discussion of critical issues in transportation. [6]

Canada's Road Safety Vision 2010[7] is to have the safest roads in the world. Although it is the responsibility of provincial and federal governments to promote road safety, drivers must assume responsibility for the safe control of the vehicle, including appropriate use of telematics devices. Moreover, manufacturers and suppliers have a duty of care to ensure their products are reasonably safe for their intended and foreseeable uses. NHTSA recently saw a need to remind manufacturers of their fundamental responsibility to assess the hazard potential of the new technologies they install in vehicles.[8]

The Department's concern over distraction from in-vehicle telematics devices is based on a substantial and mounting body of experimental research indicating that using these devices can impair driving performance.[9] [10] A study by Transport Canada found that even hands-free devices can have negative effects on driver scanning patterns and braking performance.[11] Also, a recent UK study found that talking on a cell phone impaired drivers' reaction time significantly more than having a blood-alcohol level over the legal limit.[12]

Studies of in-vehicle telematics other than phones are few in number, but they mainly report similar adverse effects on driving performance. For instance, Tijerina, Parmer, and Goodman (1998) compared drivers' performance while using four commercially available route guidance systems.[13] Drivers took over a minute on average to perform a destination entry task while driving on a test track. By way of comparison, a common task such as operating the wiper/washer controls takes approximately 4 seconds and it takes approximately 20-30 seconds to dial a cellular phone. Three of the four navigation systems controlled by manual input had significant visual demands. Approximately 75% of the 1-minute task was spent looking away from the road. An important impact on driving safety was observed with almost one lane departure per entry for several of the navigation systems. The authors point out that this unacceptably high value was 14 times greater than that for dialling a cellular phone. Although these results clearly demonstrate destination entry tasks on route guidance systems are an unsafe distraction, they also indicate it may be possible to limit distraction through improved interface design. The significant variations in distraction among the four route guidance systems were attributed to design differences in their interfaces. This emphasizes the essential need to consider human factors and the safety of driver-vehicle interactions when designing in-vehicle telematics devices.

3. System Integration

The functions and information provided by in-vehicle telematics devices become a distraction when they divert the driver's attention away from the driving task. Distraction is less of a problem if the systems are designed in a way that makes their use support or be compatible with driving. For telematics devices to be compatible with driving, they must be properly integrated within the driver-vehicle system. It is evident from the research and available telematics devices that driver-system integration is not being widely or effectively practiced.

Effective driver-system integration requires the application of human factors, the scientific discipline concerned with the understanding of interactions among humans and other elements of a system. Human factors design guidelines are available for in-vehicle information systems (see Appendix A), however these are not sufficient in themselves. Operational experience with some telematics products indicates that user aspects are too often ignored. This suggests that designers and engineers often do not adequately understand user needs, capabilities and limitations with regards to in-vehicle telematics. Moreover, users may not behave in the way designers intend. User-centred design is an integral part of human factors and understanding driver needs, capabilities and limitations is fundamental to driver-system integration. What do the drivers want to accomplish, what are the physical and cognitive characteristics of the user population, what would users expect from the system, how would they prefer to interact with the system? These are but a few of the many questions designers must address early in the design process. Designers must formulate design concepts to address driver needs and characteristics. Today, there is heavy pressure to accelerate the introduction of technology in order to differentiate products in the marketplace.

At the current state of knowledge, the risks associated with advanced in-vehicle technology are not well understood and cannot be reliably predicted *a priori*. Driver distraction is only one hurdle for achieving safe in-vehicle telematics devices. Manufacturers also need to be concerned with other issues including behavioural adaptation, driver overload, loss of skill, and negative transfer. Negative transfer occurs when experience using one device is applied to another, even though the second device is different. Although it may be difficult to separate these risks, this discussion document will only focus on the issue of driver distraction.

There are several features of telematics devices that are considered problematic for distraction because they have considerable potential to hamper effective driver-system integration. These features include open architectures, configurable interfaces and multifunction interfaces.

3.1 Open architecture

The trend for ‘plug & play’ type aftermarket telematics devices represents a particular concern from a road safety perspective. Open computing platforms in vehicles will allow the electronics industry to offer many different ‘feature rich’ components that can interact with other peripherals and in-vehicle systems without modifying the original system. With wireless network technologies like Bluetooth™, vehicles will be able to conveniently access and display files from portable devices such as a nearby cellular phone, laptop or handheld computer. Some of these functions will not be suitable for use in cars or compatible with the driving task, for example displaying a spreadsheet in the instrument cluster. According to Allied Business Intelligence, wireless networks will become common in vehicles with 19% of all new vehicles being equipped with Bluetooth hardware by 2007.

The anticipated explosion of after-market applications made possible by open architecture platforms can have a considerable influence over the incidence of driver distraction. Because they are add-on, it will be a serious challenge to safely integrate these features with the driver-vehicle system. Unless controls are built into the vehicle to disable or at least manage devices that have not been properly designed and tested, open architecture may become a major safety issue.

3.2 Multifunction Interfaces

Multifunction telematics devices are becoming increasingly prevalent in road vehicles and these complex features are a distraction. The historical trend for an increasing number of controls and displays in vehicles has been reversed. Now manufacturers are offering systems with a single display and control that can provide access to an unlimited number of functions.

The multifunction display is a display surface, which through hardware or software controlling means, is capable of displaying information from multiple sources.[14] These displays have been promoted as a means of “layering” information in integrated formats and of using single display surfaces to present large amounts of data. These systems can use the same display and control for such functions as assistance, navigation, vehicle settings, phone, trip computer, audio and climate. The advantages with these systems are they conserve dashboard space and can be readily reconfigured to offer new and different functions. These multifunction systems are often controlled by an input device (e.g., multicontroller or stalk device) that performs different functions depending on its status and serves to consolidate numerous switches, dials, knobs, and buttons.

Systems that are fully integrated via multi-functional displays and several layers of menus may not be suitable for use while driving. Drivers may find it too difficult to navigate the menu system while driving, increasing the likelihood of distraction. Whether there are many displays and controls or just one, safe driver-system integration will be impossible without limits on the quantity of available functions and information.

3.3 Configurable Interfaces

A related feature of in-vehicle telematics that may distract drivers is the configurable interface. As display and control technologies advance, the application of fully programmable electronic multifunction controls and “glass” displays in vehicles will allow drivers to create their own personal interfaces. While this is not yet available and has no clear utility, the technology exists to permit drivers to customize the instrument panel to their own preferences the way they would their desktop on a personal computer. This possibility will become ever more feasible with the advent of drive-by-wire technologies. There are important questions about the possible impact of configurable interfaces on driver distraction, and by extension on motor vehicle safety.

Open architectures, multifunction interfaces and configurable interfaces are only part of the problem. Steps need to be taken to ensure all features of in-vehicle telematics devices are safely integrated with the driver-vehicle system without becoming a dangerous distraction.

4. Outline and Statement of Aims

The potential for in-vehicle telematics devices to contribute to driver distraction is real and of serious concern to the Department. The sections that follow discuss some of the strategies available to Transport Canada for addressing driver distraction from in-vehicle telematics in the context of on-going as well as new initiatives.

Transport Canada is concerned that current efforts by industry may not effectively control the amount of driver distraction from telematics devices. The Department invites input from vehicle manufacturers, system suppliers, and information service providers on their efforts to deal with this problem. We also invite stakeholders and the public to comment on these issues and provide feedback on alternative approaches for reducing driver distraction.

As part of our consultations, several steps will be taken to get input from stakeholders on these issues. Copies of this discussion document will be sent to the provinces and territories, Association of International Automobile Manufacturers of Canada (AIAMC), the Canadian Vehicle Manufacturers’ Association (CVMA), the Canadian Council of Motor Transport Administrators (CCMTA), the Alliance of Automobile Manufacturers (AAM) and numerous non-governmental organizations. Meetings or workshops will be held with stakeholders to obtain more detailed views. This discussion document will also be available to the public via Transport Canada’s Road Safety website.

A deliberative democracy methodology is being planned for consulting the public on these issues. The envisioned approach involves two phases. The first phase consists of a short public opinion survey on public attitudes toward the strategies being considered by Transport Canada for reducing the risk of driver distraction from in-vehicle telematics devices. The second phase includes the conduct of deliberative focus groups of participants from the general public. The purpose of these in-depth, educational groups will be to obtain participant's informed and considered views on the proposed options through additional polling and a summary of the discussions during the session.

5. Regulatory Mechanisms for Addressing Driver Distraction

In Canada, the federal government has responsibility over manufactured or imported motor vehicles, their original equipment, tires, infant and child restraint systems, restraint systems for the disabled, and restraint systems for infants with special needs. The provinces and territories are responsible for motor vehicle registration, the licensing of drivers, the conduct of drivers on the roadways, the testing of in-use vehicle emissions, and the regulation of equipment that is installed in the vehicle after its purchase. The latter equipment is usually referred to as "after-market". Collision reporting is shared among police forces; however, statistical data are compiled by the provinces and territories and provided to Transport Canada for consolidation at the national level.

With regard to driver distraction, this division of responsibility gives the provinces and territories the authority to regulate driver behaviour and the use of after-market telematics devices, while that of the federal government is limited to telematics devices that are installed in the vehicle by the manufacturer as original equipment. Transport Canada has only limited authority under the *Motor Vehicle Safety Act* to regulate products that are not part of the original vehicle. These currently comprise child safety seats and replacement tires. However, the act is undergoing review and an amendment is being proposed to provide more flexibility to regulate additional products such as after-market telematics devices.

Transport Canada has been actively investigating the issues of driver distraction for a number of years. Some of this work has been performed collaboratively with other governments through, for example, the International Harmonized Research Activities Working Group on Intelligent Transport Systems (IHRA-ITS), of which Canada is the lead. Transport Canada also participates actively on research task forces such as those of the Canadian Council of Motor Transport Administrators (CCMTA). This is an inter-governmental organization comprising representatives of the provincial, territorial, and federal governments of Canada. The CCMTA coordinates administration and operational matters dealing with licensing, registration, and control of motor vehicle transportation and highway safety. The mission of the CCMTA is to provide a forum that supports the development and administration of measures that contribute to safe and efficient road transportation. Its goals include the development and promotion of Canada's Road Safety Vision 2010 and associated safety targets, the development and sharing of information on road safety factors, and the harmonization among jurisdictions of road safety related regulations and policies. In response to the concerns raised by research, the CCMTA has created a sub-committee specifically to address the issue of driver distraction, as part of the Strategies to Reduce Impaired Driving (STRID).

Transport Canada has been actively participating in committee work to develop ISO standards for road vehicles and guidelines for limiting driver distraction (i.e., AAM Driver Focus Group, SAE Safety and Human Factors committee). Transport Canada has also been conducting in-house research as well as contracting or supporting external research on driver distraction. Our own research has included studies on distraction from phones and telematics devices and work on collision data questionnaires to address the role of distraction/inattention in crashes. Transport Canada has also helped fund research on aging drivers and telematics devices[15], road safety surveys looking at driver distraction[16] and has published information on how to limit distraction on our website[17]. We are also currently participating in a multi-year European Commission project whose aim is to develop methodologies and guidelines for the assessment of In-Vehicle Information Systems (HASTE).

While there have been important scientific advances in our understanding of the mechanisms underlying driver distraction, the development of reliable and valid measures of distraction and its effect on safety remains elusive. A driver may appear to be attentive, but may in fact be preoccupied about matters other than the surrounding events and situation. In their attempts to evaluate the attentional state of drivers, researchers have resorted to indirect measures of distraction, such as the duration, frequency, and scanning patterns of eye glances; braking behaviour; headway distance; lane position; road scene awareness; task completion times; and subjective assessments of safety, workload, and distraction by experimental participants. While these measures give an indication of the extent to which a secondary activity may interfere with driving, they do not as yet provide an accurate, scientifically valid and direct measure of safety.

Co-operation between the federal and provincial/territorial levels of government is paramount in order to gain a better understanding of this problem, and to develop uniform control measures to reduce the incidence of driver distraction across all jurisdictions. A promising route to achieving these aims would be through co-operation with the CCMTA.

6. Performance-Based, Design-Based, and Process-Oriented Safety Standards

Broadly speaking, safety standards can be design-based, performance-based, or process-oriented in their approach. Design standards provide precise specifications for a vehicle or vehicle system in terms of, for example, physical attributes or geometry. Because they are design restrictive their use is limited to instances where compatibility or consistency is crucial, for example dimensional standards to ensure the proper fit of replacement tires and rims. Performance-based standards, as they apply to motor vehicles, set out the minimum level of performance that a vehicle or its components and equipment must meet when tested in accordance with the prescribed test method. The advantage of a performance-based standard is that it provides an objective basis for evaluating the safety of a product. Because this type of standard does not specify precise physical attributes, it allows design flexibility and, therefore, does not hinder innovation. However, performance-based standards rely on the existence of reliable and valid test procedures and criteria. Efforts to develop performance-based requirements to limit the potential for driver distraction are ongoing, for example limits on the amount of visual attention needed to perform an in-vehicle task. This approach may be futile given the pace of technological development and the uncertainty associated with projected telematics functionality.

In contrast to design and performance-based standards, a process-oriented safety standard does not set out requirements that apply to the end product, but rather it outlines the general principles and process elements that should underpin the product's design, development, evaluation, manufacture, and installation. This type of standard is concerned with the systems and procedures that a manufacturer should establish and follow during its development and implementation cycle in order to ensure that its products reflect best practice and minimize potential risk and likely misuse. Like their performance-based counterparts, process-oriented standards allow flexibility in product design and do not fetter innovation. An example of the process-oriented approach is the ISO 9000 family of standards, which represents an international consensus on good management practices that, when followed, can ensure consistent quality in an organization's products or services. Another example is the human-centred design process outlined in ISO 13407 that would apply to designing telematics devices. More detailed and perhaps more relevant human factors process standards have already been established for the purposes of designing safe medical devices (see Appendix A).

7. Existing Safety Standards and Guidelines Governing Telematics Devices

A number of standards and guidelines that address the safety of telematics devices have already been published or are presently in development. Appendix A describes some of the existing safety standards and guidelines relevant to in-vehicle telematics devices including ISO standards, Human Factors process standards, UK guidelines, European Statement of Principles on Human-Machine Interface, Japan Automobile Manufacturers Association Guidelines and the Alliance of Automobile Manufacturers Statement of Principles.

Since a limited scientific understanding exists for the objective and accurate evaluation of driver distraction, few of these standards and guidelines attempt to set out performance-based requirements, and compliance with them is voluntary. The available guidelines and recommendations are not satisfactory at present. Many of them are unverifiable, incomplete and under-specified. Nonetheless, they offer some guidance to designers or evaluators of telematics devices and give direction for some initiatives to limit driver distraction.

8. Possible Strategies that the Department Might Undertake to Limit Driver Distraction

The Department has identified three general approaches it could take at this time to limit driver distraction; *status quo*, non-regulatory, and regulatory. The *status quo* relies on the industry to develop and apply voluntary safety standards for telematics devices. Alternatively, the non-regulatory approach could comprise several different or complementary initiatives such as education campaigns and entering into a Memorandum of Understanding with original equipment manufacturers (OEMs) concerning the design of telematics devices. Lastly, the department could undertake to regulate the safety of in-vehicle telematics devices, for example, by not allowing open architectures or disabling access to telematics devices when vehicles are moving. The remainder of this document describes some of the initiatives that could be taken to curb driver distraction and poses some questions about these initiatives. Some of these initiatives may be complementary. The Department is seeking answers to these questions and comments on the advantages and disadvantages of the various initiatives.

8.1 Status Quo

With the current state of affairs, Transport Canada would continue to study and monitor advances relative to the problem of driver distraction. More research is needed since the precise extent of the driver distraction problem is not clearly established at the present time and there are no test procedures readily available for adoption. These are still very much in the category of “work in progress” and results are not expected for several years. Future research topics would focus on collision reporting and analysis to investigate the extent of the problem and principle causes of distraction. The Department would also continue to work with stakeholders to develop tools and techniques for measuring driver distraction and define criteria and limits on driver distraction from telematics devices.

With the *status quo,* industry would be responsible for developing and applying voluntary safety standards for in-vehicle telematics devices. The AAM is expected to continue its work on developing the Statement of Principles, Criteria and Verification Procedures on Driver Interactions with Advanced In-Vehicle Information and Communication System (see Appendix A). This document was intended to be the basis for more fully defining design and performance requirements for telematics devices. Members of the AAM have agreed to follow these guidelines in the design and installation of telematics devices in their vehicles. More work is planned to develop performance criteria and verification procedures for some of the principles.

Transport Canada and NHTSA have not endorsed the AAM document because the guidelines currently allow unduly distracting tasks to be carried out by drivers while driving. Furthermore, there are indications that AAM statement of principles may not be sufficient to ensure all features of in-vehicle telematics devices are safely integrated with the driver-vehicle system. Thus, *status quo* may not be a viable option as the current situation with telematics devices is considered to be unsatisfactory. The potential adverse consequences are considerable unless something is done in the near term. Moreover, the longer these interventions are put off, the more difficult it will be to implement them. These are some of the concerns that initiated this present discussion. More needs to be done now to limit driver distraction from in-vehicle telematics devices.

Question 1: Is the *status quo* in dealing with this problem of driver distraction sufficient? We invite industry to provide us with a detailed description of their current and planned efforts to limit this problem of driver distraction from in-vehicle telematics devices.

8.2 Non-Regulatory Options

Non-regulatory initiatives that the Department could undertake include an awareness campaign to sensitize the public to the dangers of driver distraction, entering into a Memorandum of Understanding with the automotive industry, or issuing an advisory.

8.2.1 Public Awareness Campaign Warning of the Dangers of Driver Distraction

With the driving environment becoming increasingly complex, there is now a pressing need to inform the public on how to avoid distraction and stay focussed on the driving task. A public awareness campaign could cover both the traditional and the newer sources of driver distraction. It would warn the public to avoid certain distracting behaviours such as talking on the telephone, writing notes, and programming telematics devices. The Department already provides advice for the safe use of cellular telephones on its Web site. Some provinces also incorporate safety messages regarding driver distraction, including cell phone use, into their public education and awareness initiatives.

An effective public awareness campaign on the hazards of driver distraction would consist of extensive radio, television, and print advertisements; a video cassette and CD for distribution to schools, driver education programs, and public safety organizations; printed materials in the form of posters and a pamphlet; and information on the Government of Canada's Web site, as well as that of Transport Canada. The jurisdictions could participate individually or through the CCMTA. Industry would also be encouraged to participate. A fundamental message of the campaign would be that the ultimate responsibility for road safety rests with the individual driver, who must make informed decisions about what to attend to while driving. The use of common examples of distractions would be important in sensitizing the public to their potentially deleterious effects. Techniques for identifying when drivers have become distracted and for maintaining proper attention would also be provided.

Safety information on driver distraction is well suited to dissemination through a public awareness campaign because the dangers of driver distraction and advice on how to handle it can be effectively summarized in advertisements and pamphlets. In addition, specific safety messages could be tailored to different subsections of the population, such as young people, parents with children, and drivers who use telematics devices frequently.

On the other hand, public education campaigns can be very costly and their effectiveness is questionable. The problem of costs would be lessened if all stakeholder groups participated in the public education campaigns. The issue of effectiveness remains. It would seem that a public awareness campaign might alleviate some of the driver distraction problem, however it would be an incomplete and temporary measure. The problem of driver distraction from in-vehicle telematics devices relates more to device design than driver behaviour. Telematics devices become a distraction when they divert the driver's attention away from the driving task. Teaching drivers to ignore a built-in device that is flashing and beeping at them would be a considerable challenge for a public education campaign. Initiatives still must be taken to either design safer less distracting telematics devices or disable their unsafe features while driving.

Question 2: Should a public awareness campaign be initiated to warn people of the dangers of driver distraction from telematics devices?

8.2.2 Memorandum of Understanding with Automotive Manufacturers

A Memorandum of Understanding (MOU) is a signed agreement between the government and industry in which the signatories undertake to voluntarily abide by stipulated conditions. As an example, Transport Canada currently has an MOU with industry where they have agreed to certain requirements for side impact protection in vehicles. Since adherence to the terms of an MOU is voluntary, signatories cannot be penalized for non-compliance with its requirements. Nonetheless, there is a strong moral obligation for industry to comply and an expectation on the part of consumers that it will. The use of a Memorandum of Understanding is particularly appropriate when an industry has a limited number of members whose operations are similar in scope.

There are several different strategies that could help improve the safety of telematics devices and these could be initiated as part of a single MOU or multiple MOUs with industry.

MOU on Human Factors Guidelines

In this instance, Transport Canada and the individual original equipment manufacturers would sign an MOU. It would be developed in negotiation with the associations that represent the major automotive manufacturers and importers in Canada, namely the Association of International Automobile Manufacturers of Canada (AIAMC) and the Canadian Vehicle Manufacturers' Association (CVMA). This MOU would voluntarily commit the automotive industry in Canada to comply with certain requirements when designing telematics devices. A basic requirement might be for the manufacturers to agree to follow the human factors design guidelines listed in the AAM document, JAMA guidelines and the EU statement of principles (described in Appendix A). It could also include agreement not to implement open architecture for telematics devices or offer re-configurable controls and displays.

MOU to include Telematics Device Status on Event Data Recorders (EDR)

Some manufacturers equip their late model vehicles with event data recorders (EDRs). These on-board electronic devices record information about the performance of vehicle systems during and immediately preceding collisions. The status of telematics devices at the time of collision and any driver-system interactions (i.e., information display, button presses) could be recorded on an EDR. With suitable mechanisms for data retrieval and analysis, this data would help to clarify the contribution of telematics devices to collisions. An MOU could be negotiated to have data about the use of in-vehicle telematics devices recorded on EDRs.

MOU to Develop a Vehicle Features Database

With the rapid pace of technological advances, new vehicle systems are proliferating in the fleet at an increasing rate. It is often difficult for collision investigators to determine the presence of various systems in motor vehicles, particularly embedded systems. Knowledge of the equipment fitted to specific models of motor vehicles is important for evaluating system performance and to gauge the effect of additional potential countermeasures in reducing the risks of collisions and associated injuries. Transport Canada is currently exploring the need for a comprehensive vehicle features database, including telematics devices, which would facilitate investigations of collision risk between vehicles fitted with systems of interest and those that are not. Provision of Vehicle Identification Number (VIN) or make/model/series information would allow vehicles equipped with particular systems to be identified in collision data files. A MOU with industry to support the further development of a unified database of new systems and features in late-model vehicles is proposed.

MOU on Driver-System Integration Process

In addition, an MOU could be signed with companies to implement a driver-system integration process. Such a process has appeal when performance-based requirements are not feasible due to rapid technological development and where regulators do not know the vehicle system's functional characteristics prior to market introduction. Rather than specifying the performance for such devices, it would identify the key process elements that a manufacturer would incorporate during system design and development to address safety and driver-system integration considerations.

The agreed input process could include the existing generic human-centred design process outlined in the ISO 13407 usability standard on "Human Centred Design for Interactive Systems" or a process specifically developed for the systematic application of human factors considerations in the design and development of in-vehicle telematics devices. For the purposes of specifying this process, much could be learned from the human factors process standards used for designing medical devices[18]. The principal goals of such a process standard would be to:

- Clarify the responsibility of manufacturers for telematics safety by placing design emphasis on driver-system interaction;
- Establish policies, programs and procedures by which manufacturers can incorporate and manage human factors input into the design and development of telematics in a systematic manner;
- Help establish a safety culture within organizations involved in the design and manufacture of telematics;
- Demonstrate industry's resolve to address public concerns about the risks associated with telematics;
- Facilitate dialogue between OEM's and their suppliers concerning system performance and safety; and

- Encourage future development of relevant safety metrics and specifications.

This driver-system integration process would complement the existing human factors guidelines for in-vehicle telematics devices. These guidelines would establish the goals and the driver system integration process would establish the means whereby these goals can be achieved. The process is not prescriptive in how these goals are to be achieved, rather it defines key organizational elements that are put in place to ensure that the goals are articulated and assessed. The key elements of a driver system integration process include:

- Management ownership & responsibility;
- Driver-system integration system formulation (roles, processes);
- User-centred design as core philosophy;
- Driver-system integration test records;
- Audit; and
- Human factors competencies and training.

As part of this, manufacturers that apply this driver-system integration process could be exempt from some other regulatory options. For example, if the manufacturer can demonstrate that his product was designed according to this human factors process, there would be no restrictions on access to the devices when the vehicle is moving.

Question 3: Should MOUs be negotiated to voluntarily commit the automotive industry in Canada to follow certain human factors design guidelines, provide telematics information on event data recorders, contribute to a vehicle features database and apply a driver-system integration process when designing telematics devices?

8.2.3 Advisory on a Human Factors Design Process

One alternative to this MOU would be for Transport Canada to issue an official advisory to industry. An advisory would formalize non-mandatory requirements and set consistent minimum expectations for the entire industry. This advisory could state that the federal government expects the automotive industry to follow the strictest available safety guidelines and a driver-system integration process when designing telematics devices. Widespread non-compliance would indicate to Transport Canada the need for regulation.

Question 4: Should an advisory be issued to industry stating the need to follow strict safety guidelines and a driver-system integration process when designing telematics devices?

8.3 Regulatory Options

8.3.1 Regulate a Process Standard for Human Factors Design

As an alternative to an advisory or MOU regarding process requirements for drive-system integration, a regulation could be developed to embody the key elements.

Process-oriented safety standards can be an effective regulatory tool, particularly when performance based standards do not yet exist. Transport Canada may not currently have the authority under the *Motor Vehicle Safety Act* to regulate process standards. However, the act is undergoing review and an amendment to provide such authority is being proposed. Human factors process standards are already in place for the design of medical devices (See Appendix A). With the passage of the *Safe Medical Device Act* of 1990, the Federal Drug Administration (FDA) in the United States was granted the authority to require manufacturers of medical devices to establish and follow procedures for ensuring that device design addressed the intended use of the device and its users. Similar standards for the analysis, test and validation of the human factors compatibility could also be required for in-vehicle telematics devices.

Question 5: Should a regulation be made requiring manufacturers to follow a human factors process standard for designing telematics devices?

8.3.2 Disable Access to Telematics Devices in Moving Vehicles

Access to the telematics device could be disabled in certain situations. Regulations could be made to restrict the operation of telematics devices when the vehicle is moving. For example, the regulation could require that telematics systems be automatically disabled when the vehicle is in gear. Alternatively, the ban could be limited to only the most distracting tasks. Candidate tasks for this type of ban might include destination entry for navigation systems, reading email and Internet browsing. Exceptions to this ban could be made for emergency situations. Another exception could be for telematics devices that were designed according to a standard process for driver-system integration.

Question 6: Should a regulation be made requiring telematics devices to be automatically disabled when a vehicle is moving? What should be included?

8.3.3 Regulate the JAMA Guidelines

Another option would be to regulate certain requirements contained in the Japanese Automobile Manufacturers Association (JAMA) guidelines. Some of the more clearly specified or quantifiable JAMA guidelines could be regulated. For example, moving pictures or images, advertisements and scrolling displays could be prohibited. Limits could be set on display positions and the number of characters on a display screen. The JAMA guidelines are currently the most demanding recommendations set by the industry internationally.

Question 7: Should a regulation be made requiring manufacturers to follow JAMA guidelines?

8.3.4 Regulate Safer Limitations on Visual Distraction

A regulation requiring manufacturers to limit the visual distraction from in-vehicle telematics devices could also be made. Based on the rationale that long and frequent glances away from the road are hazardous, in-vehicle telematics devices that require less visual attention to operate are safer than devices that demand more visual attention. A variety of potential limits on visual distraction have been discussed. Transport Canada would suggest that in-vehicle telematics tasks must require less than 10 seconds of visual attention to complete, of which no single glance shall be longer than 1.5 seconds. These limits would be more effective at restricting overly distracting telematics tasks than the AAM guideline's less stringent "2/20" requirement.

Question 8: Should manufacturers be required to limit the total glance time away from the road and maximum glance duration for in-vehicle tasks?

8.3.5 Regulate Open Architectures, Configurable Interfaces and Multifunction Interfaces.

As discussed in the introduction, there were several features of telematics devices that are considered problematic for distraction. These features include open architectures, configurable interfaces and multifunction interfaces. In order to prevent the installation of distracting telematics devices that are not compatible with driving, the Department could regulate these features. One measure would be to prohibit open architectures and configurable interfaces. Multifunction interfaces become a problem when there is no reasonable limit to the number of functions they can perform and the amount of information they access. A regulation would help to limit the number of different tasks that can be performed and the quantity of information available through multifunction interfaces.

Question 9: Should Transport Canada make a regulation requiring manufacturers to prohibit the use of open architectures and configurable interfaces and set limits on the design and number of functions available through multifunction interfaces on telematics devices?

8.4 Other Regulatory and Non-Regulatory Initiatives

There may be other possible initiatives for limiting driver distraction from in-vehicle telematics devices. One option that has not yet been discussed in this paper would be to introduce provincial/territorial restrictions on driver behaviour. At least 35 countries, and many more districts within countries, have prohibited using cell phones while driving, and several more countries are considering such legislation.[9] In Canada, Newfoundland and Labrador has introduced a legislative ban on hand-held cell phone use while driving. A *Private Member's Bill* was introduced in Ontario in 2001 but has not yet been passed. Alberta considered but did not pass a *Private Member's Bill* to ban hand-held cell phone use in April 2002. Prince Edward Island amended its *Highway Traffic Act* creating enabling legislation to develop regulations to prohibit use of cell phones; but has no plans to develop regulations at this time. All provinces and territories continue to monitor this issue of cell phones to determine the best approach.

There is some evidence that a ban on hand-held phone use in cars would be effective in reducing driver distraction and distraction related crashes. A 50% reduction in hand-held phone use was observed 3 months after New York's ban came into effect.[19] There was a 52% reduction in crashes caused by cell phones in Japan for the year after their ban.[20] An enforced restriction on driver behaviour might prove effective in limiting distraction from cell phones, however it is not certain that such a ban could be effectively extended to in-vehicle telematics devices. The situation with this broader category of devices is more complicated because they provide a diverse range of functions, some of which may be essential and entirely safe. If the devices, or certain telematics functions, were found to be too hazardous for driving, it would be more efficient and effective for manufacturers not to equip their vehicles with such devices rather than prohibit drivers from using them.

Question 10: Are there any suggestions for other regulatory initiatives, including provincial/territorial restrictions on driver behaviour, or non-regulatory initiatives that could be explored to limit the risk of collisions caused by driver distraction from telematics devices?

9. Summary

Transport Canada is concerned that in-vehicle telematics devices are a threat to road safety because they increase driver distraction and will cause an increase in distraction-related crashes. The Department's concern over distraction from in-vehicle telematics devices is based on a substantial and mounting body of research indicating that the use of these devices impairs driving performance. Steps need to be taken now to limit this problem of driver distraction from in-vehicle telematics devices.

Driver distraction from in-vehicle telematics devices would be less of a problem if these systems were designed in a way that made them support or be compatible with driving. This document has reviewed some of the possible initiatives that might be taken to limit the problem of driver distraction and facilitate effective driver-system integration. These initiatives are not mutually exclusive and some may be complementary. The *status quo* may not be a viable option given that the current situation with telematics devices is unsatisfactory and that there are few indications that this situation would improve without some intervention. An initiative to raise public awareness about the dangers of driver distraction was also discussed. A public awareness campaign might alleviate some of the problem, however the effect may only be temporary. To be effective, the initiatives need to target the telematics devices, which are the source of the distraction, and not the drivers.

A voluntary Memorandum of Understanding between government jurisdictions and industry is proposed as one possible initiative. This MOU would be developed through negotiation with industry and government jurisdictions. It would require manufacturers to agree to follow the leading human factors guidelines for the design of in-vehicles systems and implement a design process for driver-system integration. This process would involve the systematic application of human factors considerations in the design and development of in-vehicle telematics devices. As part of this MOU, manufacturers would enable their event data recorders to record details on the status of telematics devices at the time of collision. This data would help to clarify the contribution of telematics devices to collisions. A comprehensive features list of equipment fitted to specific models of motor vehicles would also help to gauge the risk of these devices. This MOU could help to gain further commitment to develop such a comprehensive vehicle features database.

Several other variations on this MOU are discussed. One of these initiatives is to make a unilateral advisory to the automotive industry that the federal government expects them to follow the strictest available safety guidelines and a driver-system integration process when designing telematics devices. Another initiative is to take this a step further and develop a regulation that would embody the key elements of the MOU and advisory. Regulatory initiatives disabling access to telematics devices in moving vehicles, having safer limits on visual distraction and prohibiting open-architectures are also discussed.

Questions are raised during this discussion in order to solicit feedback on these various potential initiatives. The Department invites industry, the provinces and territories, road safety interest groups and the public to comment on these issues and initiatives and to provide feedback on alternative approaches for reducing driver distraction. With sufficient input and commitment from the stakeholders, it is hoped that suitable initiatives can be identified, further specified and that real progress can be made on limiting the serious problem of driver distraction from in-vehicle telematics devices.

10. Contact

The department invites input from stakeholders on their efforts to deal with this issue, including answers to the various questions posed throughout the document. Please forward your comments to the address below by September 10th, 2003.

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Appendix A: Existing Safety Standards and Guidelines Governing Telematics Devices

ISO International Standards

The standards published by the International Organization for Standardization (ISO) are developed by expert committees comprised of representatives from some 140 countries, and therefore they represent a world-wide consensus on acceptable practice in a given area. In developing these standards, the views of all interests are taken into account, including those of industry, users, consumer groups, testing laboratories, governments, engineering professions, and research organizations.

The ISO is in the process of preparing international standards that treat different aspects of what it refers to as "transport information and control systems". One of these standards has been accepted, two are drafts, and a fourth is still in development. Two other standards apply to telematics devices even though they were not written with the latter specifically in mind (ISO 13407 and ISO 9241-3). These ISO standards are the following:

> ISO 15007-1-2, International Standard: Road vehicles — Measurement of driver visual behaviour with respect to transport information and control systems — Part 1: Definitions and parameters; Part 2: Equipment and procedures;
>
> ISO/DIS 17287, Draft International Standard: Road vehicles — Ergonomic aspects of transport information and control systems — Procedure for assessing suitability for use while driving, voting terminated on February 21, 2001;
>
> ISO/DIS 15006.2, Draft International Standard: Road vehicles — Ergonomic aspects of transport information and control systems — Specifications and compliance procedures for in-vehicle auditory presentation, voting terminated on July 30, 2002;
>
> ISO/DIS 15005, Draft International Standard: Road vehicles — Ergonomic aspects of transport information and control systems — Dialogue management principles and compliance procedures, in preparation;
>
> ISO 13407, International Standard: Human-centred design processes for interactive systems;
>
> ISO 9241-3, International Standard: Ergonomic requirements for office work with visual display terminals (VDTs) — Part 3: Visual display requirements.

These standards, which represent good ergonomics practice for each subject covered, vary slightly depending on the topic. For instance, the draft standard on in-vehicle auditory presentation makes recommendations and sets out specific requirements, while the draft standard on assessing the suitability of telematics devices for use while driving lays out an exhaustive evaluation process. None define the specific characteristics of a safe telematics device, although the ISO 13407 usability process standard on

"Human Centred Design for Interactive Systems" has some relevance to telematics devices.

The human-centred design process outlined in ISO 13407 aims to ensure that products will be effective, efficient and satisfying for users. The standard describes four activities: 1) understand and specify the context of use; 2) specify user requirements; 3) produce design solutions; 4) evaluate designs against requirements. This ergonomic standard is relevant to the design of in-vehicle telematics systems because they are interactive systems. However, ISO 13407 is insufficient because it neglects to address problems specific to the vehicle context and road safety. Thus a more specific or complementary standard is required to ensure that in-vehicle telematics systems are designed with a process that ensures the proper consideration of safety, user needs and the problems of driver distraction.

The systematic application of human factors in product development would help to ensure these telematics devices do not directly or indirectly increase the risk of collision or injury to vehicle occupants or other road users. The process would further enhance the usability and appeal of products because it would lead to the development of telematics devices that match user needs in a way that is compatible with and, suitable for, driving. A process standard would assist manufacturers in vetting the quality and safety of their suppliers' products. Such a process would also clearly demonstrate the manufacturers commitment to their duty of care to produce reasonably safe products.

Human factors process standards are already in place for the design of medical devices. With the passage of the *Safe Medical Device Act* of 1990, the Federal Drug Administration (FDA) in the United States was granted the authority to require manufacturers of medical devices to establish and follow procedures for ensuring that device design addressed the intended use of the device and its users. The FDA has emphasized the importance of human factors to manufacturers. There are now international human factors process standards in place for the design of medical devices.[18] These standards are for the analysis, test and validation of the human factors compatibility of medical devices. They require a human factors engineering process, including a risk analysis that includes a description and assessment of the operator characteristics and requirements, task requirements, and potential use errors.

Guidelines in the United Kingdom

The British Standards Institution publishes the "Guide to in-vehicle information systems," DD 235: 1996, which was commissioned by the U.K. Department for Transport. First proposed in 1996, it was ratified in August 1999; however, as its name implies, the use of this guide in designing telematics devices is not obligatory in the United Kingdom. The Guide provides recommendations to "the designers, manufacturers, suppliers and installers of in-vehicle information systems" to be used by drivers while driving, and it applies to all information systems, except those giving information about the state of the vehicle or its equipment, such as the speedometer and fuel gauges.[21]

The guide lays out the fundamental steps that should be followed in the design process, including a list of the questions to be considered. It also gives guidance on the presentation of information to the driver, the design and location of controls and displays, user instructions, training requirements, and how to assess the telematics device at different stages of the design process. Although the guide imparts much useful information on good ergonomics practice, like the ISO standards mentioned above, it does not provide assessment criteria by which to gauge whether the device would be safe for use by a driver while driving.

In February 2002, the British Department for Transport produced a new document that was intended to replace the guide: "Design Guidelines for Safety of In-vehicle Information Systems." [22] This guideline document followed the "Safety Checklist for the Assessment of In-vehicle Information Systems: A User's Manual" published in 1999.[23] The purpose of the Guideline is to serve as "a 'user friendly' synthesis of current knowledge and provide up-to-date guidance on where to locate more detailed information". The Checklist, which includes an 11-page in-depth assessment form with boxes for scoring the suitability of the different characteristics of a device, is meant to serve as "a structured aid to an expert for the assessment of the safety-related features" of a telematics device. Together, these two documents contain a wealth of information on accepted codes and practice, but again no objective criteria upon which to base a safety evaluation.

The European Statement of Principles on Human-Machine Interface by the Commission of the European Communities

On December 21, 1999, the Commission of the European Communities issued a five-page recommendation that set out 35 fundamental principles for the design of safe in-vehicle information and communication systems. This recommendation, which was published in the *Official Journal of the European Communities*, invited original equipment and after-market manufacturers to enter into a voluntary agreement to abide by these principles for all telematics devices to be used by the driver while driving. The recommendation also invited the Member States of the European Community "to encourage industry to adhere to this statement of principles and to investigate the adherence to these principles by industry, including after-sales system providers." In addition, Member States were requested, within 12 months, to report to the Commission what steps they and their industries had taken to implement the statement of principles and to provide, within 24 months, an evaluation of the efforts that had been made by their industries to follow them.[24] The commission is currently reviewing these reports.

The principles cover the design, location, information presentation, interaction with displays and controls, system characteristics, and product information of telematics devices. They are clear, concise, and comprehensive; however, they are qualitative in nature and, therefore, lack a method for ascertaining whether a given telematics device complies with the requirements. In an attempt to provide such a method, the European Commission charged an independent expert group with expanding the principles "in sufficient detail for work to begin on procedures to test if a specific system conforms to the Principles". The result was a 52-page document called: "Report of an Independent Expert Group on the Expansion of the Principles laid down in the Commission Recommendation of 21 December 1999 on 'Safe and Efficient In-vehicle Information and Communication Systems' (2000/53/EC)". As the Introduction to the Report explains, "this expansion identifies research needs rather than specific solutions," and does not purport to be the basis of a safety regulation or standard governing telematics devices.

The Guideline of the Japan Automobile Manufacturers Association

Since Japan has the longest and most extensive experience with the use of telematics devices by drivers, its approach to the problem of distraction is of some importance to this discussion. In February 2000, the Japan Automobile Manufacturers Association (JAMA) published version 2.1 of the "Guideline for In-vehicle Display Systems," which is a revision of the initial Guideline that was established in 1990. The Japanese Government has approved the four-page Guideline, which is sufficient to ensure that domestic automotive and telematics device manufacturers abide by its requirements.

The fundamental approach of the Guideline is that telematics devices are to be used by the driver when the demands of driving are low and that in-vehicle display systems must not act as a distraction. This de facto regulation, which applies to all motor vehicles except motorcycles, specifies requirements governing the location of visual displays and the presentation of visual information for systems that operate while the vehicle is in motion. The JAMA Guideline does not treat the presentation of auditory information or the design or evaluation process. In summary form, the requirements of the Guideline are as follows:

- The downward viewing angle and upper edge of the visual display are specified in mathematical terms;
- Televised pictures and recorded video images are forbidden; only static, easy-to-read images that are relevant to driving are permitted;
- Dialling of a ten-key number on a cellular telephone is forbidden;
- Data input, search, and selection of addresses, telephone numbers, or other information are not permitted;
- With regard to navigation systems, maps may not scroll; they may not be searched by topic, area name, or point of interest; requirements are laid out governing the complexity and scale of maps; and a cursor may not be used to set or revise the destination;
- Addresses and telephone numbers of locations may not be displayed on maps, nor may descriptive information appear, such as advertisements, for hotels and restaurants;
- Travel time displays must be recognizable at a glance, without requiring complex calculation by the driver;
- When dynamic traffic information is superimposed on an electronic road map, the map must be automatically simplified to make comprehension easier;
- Cautionary information, such as travel or weather warnings, must be easily distinguishable from other information;

- For written traffic information, scrolling of text is not permitted and the information must not exceed 30 characters or words in length.

The approach of the JAMA Guideline is design restrictive; however, it tries to ensure that normal human limitations on the amount of information that can be processed at one time are respected.

The U.S. "Human Factors Design Guidelines for Advanced Traveler Information Systems (ATIS) and Commercial Vehicle Operations (CVO)"

In September 1998, the U.S. Department of Transportation's Federal Highway Administration published design guidelines that apply to telematics devices to be used by both private and commercial drivers.[25] The Guidelines, which were prepared for designers, engineers, and human factors practitioners, provide summaries of good ergonomics practice for 75 distinct design parameters. Detailed advice is presented for the design of device displays, controls, routing and navigation systems, motorist services, safety and warning systems, and augmented signage information. The Guidelines are clear and comprehensive; however, they do not address safety-related questions such as the amount of information that can be presented to a driver without causing undue distraction.

The "Statement of Principles, Criteria and Verification Procedures on Driver Interactions with Advanced In-Vehicle Information and Communication Systems" produced by the Alliance of Automobile Manufacturers

In July 2000, the U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) held a public meeting on driver distraction, one of the objectives of which was to obtain information on the efforts being made by motor vehicle manufacturers to limit the driver distraction caused by telematics devices. At that meeting, the Alliance of Automobile Manufacturers (AAM)[26] announced that it was creating a working group to develop voluntary guidelines for the design of telematics devices. In December 2000, the AAM produced a draft document entitled "Statement of Principles on Human Machine Interface (HMI) for In-Vehicle Information and Communication Systems," which it submitted to the NHTSA. The draft Statement was intended to be the basis for more fully defining design and performance requirements for telematics devices, a process that was to include extensive consultation with a wide range of interested parties.

In early 2001, the AAM established the Driver Focus-Telematics Working Group, which was comprised of representatives from the major domestic and foreign automobile manufacturers, the U.S. and Canadian public sectors, the insurance industry, the intelligent vehicle community, and the consumer electronics industry. The working group and its various sub-parts met several times over the following year and produced a draft document in April 2002 called the "Statement of Principles, Criteria and Verification Procedures on Driver Interactions with Advanced In-Vehicle Information and Communication Systems".

The Statement contains 24 principles, 11 of which are provided with measurement and performance criteria. Seven of the principles relate to the information provided by the manufacturer about the device; therefore, they are self-explanatory and do not require further elaboration. The AAM has pledged to continue to sponsor the Working Group, which will allow performance criteria and verification procedures to be developed for the remaining 6 principles. Members of the AAM have agreed to follow these guidelines in the design and installation of telematics devices in their vehicles.

NHTSA and Transport Canada have not endorsed the AAM document because they believe the guidelines currently allow unduly demanding tasks to be carried out by drivers while driving. There was particular concern with Principle 2.1, which sets the limits on visual distraction. The AAM document specified that in-vehicle tasks should not require glances longer than 2 seconds and more than 20-seconds of total visual attention. NHTSA have stated that the basis for the 20-second total glance time criterion is weak and there is little evidence than a task requiring 20 seconds of visual attention could be performed safely while driving. Another significant issue was the radio tuning reference task proposed by the AAM. This task was considered to be exceedingly difficult and unlike real radio tuning.

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