TRAFFIC INJURY RESEARCH FOUNDATION

ALCOHOL INTERLOCKS: EFFICIENCY THROUGH AUTOMATION

PROCEEDINGS OF THE 15TH INTERNATIONAL ALCOHOL INTERLOCK SYMPOSIUM

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The knowledge source for safe driving

The Traffic Injury Research Foundation

The mission of the Traffic Injury Research Foundation (TIRF) is to reduce traffic-related deaths and injuries. TIRF is an independent, charitable road safety research institute. Since its inception in 1964, TIRF has become internationally recognized for its accomplishments in identifying the causes of road crashes and developing program and policies to address them effectively.

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Traffic Injury Research Foundation

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In loving memory of Marita Löytty

FOREWORD

Dear Readers,

On behalf of the Traffic Injury Research Foundation, I am pleased to present the proceedings of the 15th International Alcohol Interlock Symposium that was hosted in Brussels, Belgium on September 13th to 15th, 2016.

Since the last Symposium in Finland in 2012, there have been many changes in the field of traffic safety. Continued technological advances have provided greater opportunities to improve road safety, and recent increases in crashes in some countries have indicated that more concerted efforts are needed to leverage these technologies through policies and programs with proven effectiveness. Moreover, in light of the growing availability of increasingly automated vehicles, and the recognized challenges associated with driver behaviour, careful planning is needed to maximize the benefits of innovation. It was with these developments in mind that the theme of the 2016 Symposium was "Efficiency through Automation".

The 2016 theme highlights the importance of embedding ever-advancing devices in efficient and streamlined programs to keep pace with the growing needs of government to deliver sustainable services, as well as new vehicle functions and features. As technology evolves it will become increasingly important to emphasize the value of programs, given that users of interlocks or potential users alike may believe that the availability of more sophisticated technology will negate the need for good quality programs with appropriate levels of monitoring and servicing.

This misperception may unintentionally erode road safety as it can be expected that, for those offenders most in need of using an interlock, appropriate levels of monitoring will remain a priority. This is clear from recent research and program evaluation as well as practical experience which suggest that a proportion of offenders require more structured management and supervision to encourage behaviour change. As such, strong programs remain necessary for offenders and commercial applications given that it is incumbent upon drivers, businesses and licensing authorities to ensure the safety of all road users.

In addition, due to the length of time it will take to fully renew the vehicle fleet with automated vehicles, and the fact that only semi-automated vehicles will be available in the coming years, it can be expected that drivers will continue to be required to take over driving at intermittent periods. As such, interlock programs with good monitoring will continue to be a needed countermeasure in the future.

The theme of this year's symposium also underscores the need for high quality and efficient programs with appropriate levels of monitoring that are commensurate to levels of risk posed by different types of drivers. More sophisticated technology – even full automation – does not necessarily negate this need. Researchers at TIRF have been studying public perceptions in relation to automated vehicles, and results suggest that driver expectations are incongruent with the capabilities of current technology, and can lead to unintended negative consequences.

Based on a representative sample of 2,500 Canadians, TIRF found that if drivers would use an automated vehicle today, 9% of respondents indicated they would drive impaired. This is a significant increase in comparison to the estimated 3% of drivers who currently self-report driving when they believed they were over the legal limit. Even the most advanced automated vehicles that are available today are certainly not fully autonomous and these misperceptions or misunderstanding of the technology of semi-autonomous vehicles may have very dangerous consequences. This was recently painfully illustrated when a fatal crash happened in North America when the driver mistakenly assumed his car was truly autonomous and did not require any intervention from the driver at all, at any time.

The reality is that today, vehicles have some combined-function automated features, and will be increasingly semi-automated. It is not anticipated that fully automated vehicles will become readily available to individual drivers for at least a few more years. Of concern, the desire of people to drive, regardless of whether fully automated vehicles become available should not be underestimated. Findings from our 2016 study also revealed that 70% of Canadians reported that they enjoy driving (for the most part). Notably, trust in automated technology is low, particularly among some segments of drivers, and drivers prefer to be in control.

In summary, it is unknown at present whether and how much drivers may drive in the future. This will be determined by a whole range of factors, some of which may have nothing to do with technology. This means that we should anticipate that drivers will continue to have control over vehicles in the next decade, and we should remain focused on the risks associated with drinking and driving.

It is with this in mind that TIRF chose to focus on automation as the theme for the 2016 Symposium. Speakers were invited to share their insights into these developments and the agenda was structured accordingly.

On behalf of TIRF, we extend our thanks to all of the sponsors who made this event possible, including, Alcohol Countermeasures Systems Corp., Drager Safety and Smart Start, Inc.

Sincerely,

President & CEO
Traffic Injury Research Foundation

ACKNOWLEDGMENTS

The Traffic Injury Research Foundation (TIRF) gratefully acknowledges the ongoing support of these international symposia that has been provided by manufacturers over the past 15 events. Their generous contributions have facilitated the development of new knowledge, advances in technology and program implementation, and the establishment of diverse partnerships which have enabled us to achieve considerable progress to advance research, demonstrate technological innovations, strengthen interlock program delivery and reduce impaired driving.

TIRF would like to recognize the financial support provided by the following sponsors:

- Alcohol Countermeasure Systems Corp.;
- Drager Safety Diagnostics, and;
- Smart Start, Inc.

The continued commitment of these sponsors and the many exhibitors encourages the pursuit of innovative ideas, the sharing of perspectives and the strengthening of initiatives to advance interlock programs.

TIRF also acknowledges the participation of the many presenters and moderators for their cooperation and support in this year's event. Their contributions made it possible to exchange ideas and practices, and create new opportunities to advance the field of alcohol interlocks. Lastly, TIRF extends its appreciation to all of the attendees who offered their insights and engaged in discussion throughout the event.

The content of this report is based on the summary of the ideas and perspectives emerging from the symposium and does not necessarily reflect the views of individual presenters, participants, or sponsors.

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INTRODUCTION

The 15th International Alcohol Interlock Symposium was held in Brussels, Belgium from September 13th to 15th, 2016. The Symposium was attended by delegates from across several European Union (EU) countries and knowledgeable stakeholder organizations both within Europe and across the globe.

Declining levels of impaired driving enforcement in many European countries as well as Western countries was a focal point of discussion as delegates explored opportunities for alcohol interlocks to provide a viable alternative to resource-intensive enforcement. Dialogue also centered around the role of alcohol interlocks to aid the transition to automated vehicles and prevent alcohol-impaired driving during this challenging period. More generally, emerging research about the effectiveness of the interlock device in reducing fatal crashes was also a key topic in terms of the additional public health benefits that can be accrued with the more widespread deployment of these devices in all types of vehicles as a vehicle safety feature.

The limited success achieved to date in introducing interlock legislation, and also implementing it, particularly in relation to impaired driving offenders, was noted as a barrier to overcome. Although more countries have conducted pilot programs to demonstrate the benefits of these devices, the results of these studies have not often been translated into full-scale operational programs. In addition, although receptivity to the use of devices is high among the public, actual uptake has been low, indicating it may take more time for the public to become accustomed to the use of interlocks as a standard vehicle safety feature. In this regard, the significant progress achieved to date with interlock programs in many countries can help inform best practices to successfully overcome such barriers and increase awareness about the public safety benefits of interlocks on road ways.

IMPAIRED DRIVING ENFORCEMENT & ALCOHOL INTERLOCKS

Since the 1980s and 1990s there have been substantial reductions in alcohol-impaired driving reported in many countries around the world (Sweedler et al 2004; AVV 2002; Stewart and Fell 2002; NHTSA 2016; Perrault 2016; Terer and Brown 2014). However, despite intensive education campaigns and sustained enforcement, alcohol-related crashes and drink-driving offences continue to occur and pose a significant threat to the safety of all road users. For instance, it is estimated that alcohol contributes to approximately 25% of all road deaths in Europe (Adminaite et al. 2016). In fact, compared to other global jurisdictions, the prevalence of impaired driving in Europe is significant, although testing rates among fatally injured drivers are low (Adminaite et al. 2016). As such, this issue is a top priority in European countries and is particularly concerning due to the magnitude of the crash problem combined with documented declines in levels of impaired driving enforcement.

Research shows that Europeans are generally in favour of stricter rules and more intensive enforcement of drink-driving laws. For example, results of the 2015 international E-Survey of Road Users Attitudes (ESRA) revealed that a majority of EU drivers agreed that alcohol-impaired driving laws should be stronger, enforcement should be more consistent and the penalties more severe (Torfs et al. 2016). The most widely supported countermeasures related to impaired driving were: zero tolerance for alcohol for novice drivers (80%) and installation of alcohol interlocks for recidivist drivers (76%). In addition, a zero-alcohol tolerance ban for all drivers (60%) and ban on alcohol sales along highways (56%) were also supported by a majority of respondents (Torfs et al. 2016). In other words, the high level of support for interlocks underscores widespread acceptance among EU drivers of reliable technologies that are deployed for all drivers, rather than the randomness of traditional controls and systems.

Unfortunately, this support for interlocks has not resulted in well-designed legislative measures in most EU countries although alternative strategies to mitigate declines in enforcement are needed. At this time, expectations that police enforcement will remain at current levels or increase are untenable. Increasing the number of officers available to more consistently conduct impaired driving enforcement would require the allocation of additional resources to police budgets and many more officers. Undoubtedly, these costs would increase the burden on taxpayers which may be neither optimal nor practical.

The more consistent application of alcohol interlocks to impaired drivers may be a more viable alternative than spending resources on increased enforcement. Further, interlock use and installation can be accelerated if the public is receptive to this more efficient and lower-cost solution to enforce impaired driving laws in lieu of a more pronounced police presence. This option may be more palatable since the costs of interlock programs are largely borne by offenders, although the government does incur some costs associated with administration. For instance, in the United States interlock program costs are mostly borne by offenders, except in rare cases when offenders are declared indigent or unable to afford the cost of program participation (Robertson et al. 2017).

More importantly, the financial costs associated with the widespread use of alcohol interlocks can also help to offset the costs associated with impaired driving collisions (Kaufman and Wiebe 2016; McGinty et al. 2016; Vanlaar et al. 2017). As such, the potential value of expanding the use of interlocks to mitigate the negative consequences associated with declines in enforcement warrants exploration. To this end, research is needed to investigate whether the more consistent use of interlocks by drivers accrues benefits when the enforcement of laws declines, as well as to gauge any erosion in deterrent effects of impaired driving laws. Although a wealth of research proving the efficacy of interlocks is available, continued research is needed to investigate related impacts of new approaches to device use on road safety.

Positively, results of the ESRA survey clearly showed there is a high level of support for use of interlocks by recidivist impaired drivers. These results demonstrate the level of trust and confidence in these devices to prevent drivers from driving after drinking. Even in the countries where respondents indicated that the interlock device was the least popular countermeasure (Germany, Switzerland, and Austria) the level of support for this tool still surpassed 60% (Torfs et al. 2016). Specifically, in Germany, 63% supported the use of interlocks by recidivist drivers, and 64% of respondents said this in Switzerland and Austria. This high level of support is encouraging and demonstrates the public understands the value of these devices. As such, with more public education, the use of interlock devices to mitigate declines in enforcement may be possible.

**Based on a presentation given by Professor George Yannis of the National Technical University of Athens Department of Transportation Planning and Engineering.*

EXPANDING INTERLOCK USAGE & INDUSTRY PARTNERSHIPS

There are promising opportunities to expand the use of alcohol interlocks and build new industry partnerships in light of their potential value in shaping the larger transition towards automated vehicles. This is true both in terms of technology development and integration, as well as the establishment of legislation and regulations to manage this emerging environment. The rapid evolution of vehicle technologies has prompted new opportunities for partnerships with different technology manufacturers, and increased collaboration with manufacturers of new devices as well as governments.

In terms of technology development, during the past decade, there has been a growing reliance on vehicle technologies that automatically detect and even respond to unsafe or risky behaviours. These technologies, known as advanced driver assistance systems, have been largely designed to support drivers in relation to many functions of the driving task. These new technologies have spurred a revolution with regard to driver safety and mark the beginning of the integration of driver and vehicle responses to reduce crash risk and mitigate crash consequences. This cooperative alliance between drivers and vehicles has resulted in a paradigm shift that is essential to manage the transition towards semi- and fully-automated vehicles.

Semi-automated vehicles can be considered a precursor to achieve a much longer-term vision in which fully automated vehicles are a more robust solution to overcome the impaired driving problem. As such, alcohol interlocks have the potential to play an even greater role in preventing impaired driving in the coming years, and successfully shifting the application of devices from a public safety to a public health focus, in the same ways air bags and seatbelts have become standard on all vehicles. In this regard, in 2016, new standards were proposed to the European Committee for Electrotechnical Standardization (CENELEC) to help make installation of interlocks in vehicles more seamless (European Standard EN50436-7). This proposal aimed to increase coordination between interlock and vehicle manufacturers and prompt the development of a standard interface for interlock installation that could make widespread deployment of interlocks (as appropriate) more feasible. In particular, this proposal included the creation of standard

practices to install interlock devices, the provision of technical information from vehicle manufacturers in a standardized format, and vehicle type specific installation information for vehicle manufacturer type approval certification. In addition, this proposal required manufacturers to provide relevant information before vehicles can enter the market and share information through existing vehicle maintenance and repair communication channels. Vehicle manufacturers who failed to comply could be subject to certification withdrawal and penalties for non-compliance. This long-awaited development was finally achieved in 2018 (COM/2018/286) and represents an important milestone to ease of installation of these devices in new vehicles and assist governments in protecting all road users.

These legislative initiatives underscore the importance of continued communication and cooperation, and illustrate that historical silo approaches across industries and stakeholders in tackling new legislation and regulation are no longer practical. Further, as these policies, programs, and technologies develop there will still be a need for comprehensive research on safety and the effectiveness of interlock programs. New industry partnerships can also ensure that advances across sectors can be efficiently evaluated and integrated to increase safety for drivers, their passengers, and all road users (ERSA 2016).

In addition, while these developments are promising, they also indicate that, for the foreseeable future, the role of interlock devices will not change, and devices will be necessary as long as individuals are relied upon to complete a portion of the driving task. In the short-term, interlock devices may be a more affordable solution in the face of declining enforcement of impaired driving laws to avoid increasing taxpayers costs. In the longer-term, as this technology could be utilized as a standard or as-needed feature in all vehicles, it could raise new questions about the role of interlock devices as a primary means of enforcement among the general population, not just impaired driving offenders. Of course, extensive scientific research about the effect of the device on recidivists and the overall effect on fatal crashes if devices were applied to all drivers could be key empirical evidence to help define the role of the interlocks in the future.

As a consequence, the role of alcohol interlocks should be a primary consideration as part of the development of connected and automated vehicles. In particular, the availability of this feature on all vehicles as needed could help to detect and prevent cases of alcohol-impaired driving. Furthermore, the capacity of these devices to gather data about the frequency and prevalence of alcohol-impaired driving in the general population can greatly aid static and dynamic programming of automated vehicle safety features.

The integration of interlock devices into the development of automated vehicle technology represents an important partnership opportunity between interlock and vehicle manufacturers that could yield positive benefits for road safety. A standard interface for interlock devices in vehicles, and the active installation of devices as an additional safety feature as-needed can also lead to cost-efficiencies and overcome important barriers to widespread interlock use. In particular, this approach can contribute to the normalization of these devices and also result in more seamless operation and improved user experiences. Not only can the as-needed use of interlocks as a standard safety feature facilitate learning about impaired driving behaviour and inform road safety planning, but it can also be a valuable tool to guide insurance premiums, target driver improvement strategies, and enforce laws in relation to special categories of high-risk drivers (e.g.,

young drivers and recidivists impaired drivers), as well as safety critical positions (e.g., fleet and heavy vehicle operators).

Moreover, there is some debate whether automated vehicles would be able to achieve such a laudable goal as eliminating impaired driving. Even in the case of fully automated vehicles, a person would still be needed to start the vehicle, enter instructions regarding destination and route selection, and engage the self-driving function (ETSC 2016). Moreover, there are serious issues related to the potential for technology failure in these situations. Drivers of automated vehicles may have to intervene due to an emergency or system malfunction (ETSC 2016). Any such intervention constitutes driving, and if individuals are impaired by alcohol in either of these scenarios, then alcohol-impaired driving would occur. Therefore, even as vehicles become increasingly automated, individuals may still be relied upon to perform some component of the driving task, and if they are impaired by alcohol, this poses a safety risk. In sum, while automated vehicles can certainly mitigate alcohol-impaired driving, it may not entirely solve this problem and alcohol interlocks may still be needed to respond to these situations.

**Based on presentations given by Professor George Yannis of the National Technical University of Athens Department of Transportation Planning and Engineering, Illyas Daoud of the European Transport Safety Council, Karl Pihl Director of EU Public Affairs at Vovlo Group, Professor Herman De Croo of the ETSC and Member of Parliament and Minister of State for Belgium, Karin Genoe CEO of the Belgian Road Safety Institute, Juha Wallius of Kajon Oy, Peter Broertjes of the European Commission, and Dr. Stefan Morley of CENELEC.*

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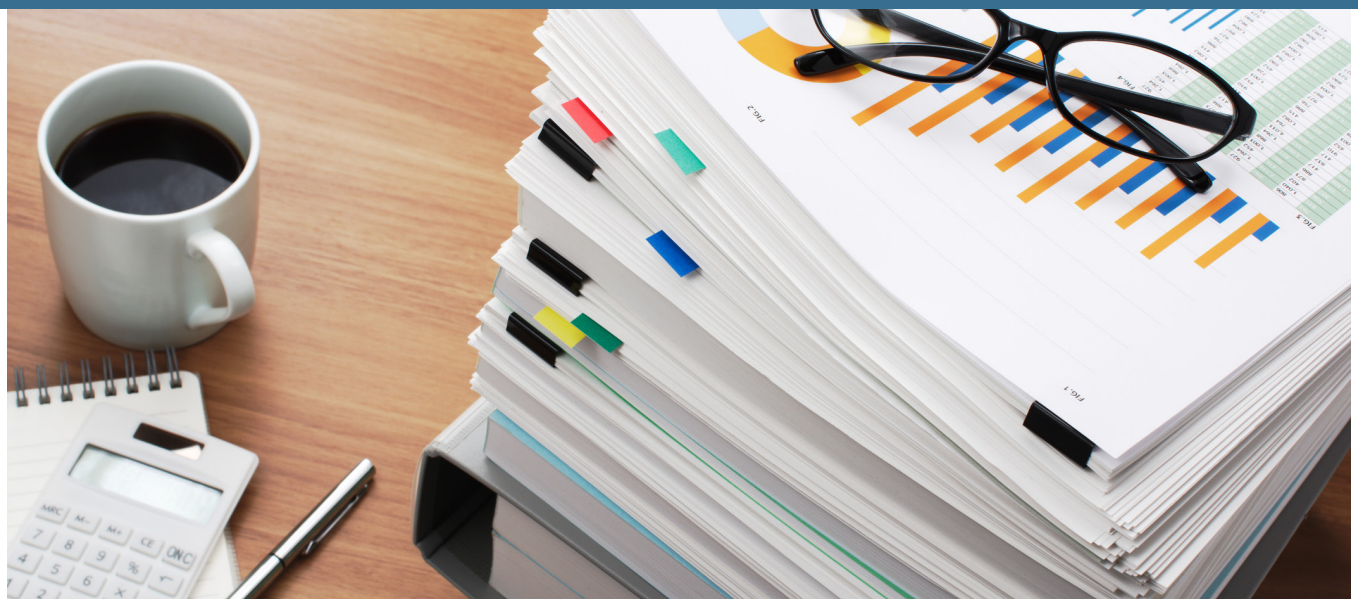

RESEARCH UPDATES

Research evaluating alcohol ignition interlocks and the performance of offenders using these devices continues to reach significant milestones, demonstrating the effectiveness of this tool to improve road safety. TIRF undertook a comprehensive evaluation of the effectiveness of the alcohol interlock program in Nova Scotia (Canada) to gauge the impact of the program on road safety. The objectives of that study were to determine the effectiveness of the program to reduce impaired driving when combined with counselling and other Addiction Services components, identify potential improvements to the program, and determine the use of the program through participation rates and attrition (Vanlaar et al. 2017).

Results from the Nova Scotia evaluation provided strong evidence that a reduction in recidivism rates was the result of the interlock program (90% reduction after devices were installed and 79% after devices were removed). Further, the study indicated that there was evidence of a permanent decrease in the number of alcohol-related crashes with fatal and serious injuries (Vanlaar et al. 2017). This is particularly notable because previous research has long suggested, but not confirmed, that there was a resulting decrease in fatal crashes due to the use of the alcohol interlock device. The evaluation also demonstrated that offenders were more likely to violate program parameters more frequently at the beginning of a program as they became accustomed to, and compliant with, the device. Over time, these violations generally decreased. This phase was coined the "learning curve" by TIRF.

Another evaluation conducted by Kaufman and Wiebe (2016) examined the impact of interlock laws in the United States and compared alcohol-impaired crash deaths in states that had all offender interlock laws and states that did not, using a difference-in-difference analysis. Results revealed a greater reduction in deaths in states with a law requiring alcohol interlock devices for all convicted drunk drivers (15.1%) as opposed to states without a law (Kaufman and Wiebe 2016). Further, the study showed there was no significant difference in the rate of deaths from crashes not involving alcohol. This evidence showed that approximately 915 lives were saved in states with the mandatory interlock law from the period of

2007 to 2013. It also reported that the interlock device could save an estimated 2,600 lives every year if a mandatory law was applied nationally (Kaufman and Wiebe 2016). Combined these studies add to the body of evidence demonstrating that the alcohol interlocks reduce fatal crashes involving alcohol, and that these devices have great potential as a public health tool.

New research has also provided more insight into the experiences of offenders in interlock programs. Specifically, it was reported that two-thirds of alcohol-impaired drivers in Sweden refused the option of applying for the alcohol interlock program (VTI 2016). Common reasons for refusal included cost, stigma and concerns that participants will be perceived as having a drinking problem (VTI 2016). This is concerning because the public health benefits will only be realized if devices are consistently applied to offenders. While many of these concerns are associated with perceptions about devices, they are a serious impediment to more consistent use of the device and undermine road safety benefits. As such, communication strategies that highlight the benefits of program participation, that mitigate shame, and that identify ways that interlock programs can be affordable are needed to encourage participation.

There is also research underway to investigate daily experiences of program participants in order to make devices more efficient and seamless for users. For example, Finland conducted a study in 2013 which indicated that although the interlock device helped offenders avoid driving while intoxicated, it was also reported that drivers often felt awkward using the device and regularly concealed the device from other passengers, including family members (Vehmas and Löytty 2013). Further, offenders requested more detailed information such as the location of vendors/installers, the duration of the probationary period, and more general information about alcohol interlocks and alcohol interlock-controlled driving rights. A follow-up study was to be completed in 2017. A 2017 evaluation of Sweden's interlock program revealed that while there were improved health benefits for participants, cost was a major barrier to participation and some offenders reported challenges in obtaining information about the application process and the mandatory parts of the program (Gustafsson and Nyberg 2017). The Netherlands also conducted a program evaluation in 2014 which revealed generally favourable opinions of the program among offenders, although there were some concerns about the cost of the device and the presence of only one vendor (Houwing 2016). Finally, the Vias Institute (formerly Belgian Road Safety Institute) is also undertaking an in-depth analysis of the Belgian program.

Collectively, these evaluations are helpful to identify relevant features to better manage offender behaviour and to begin to formulate a continuum of driver monitoring to improve road safety outcomes.

**Based on presentations given by Marita* Löytty *of Trafi, Dr. Douglas Wiebe of the University of Pennsylvania, and Dr. Ward Vanlaar of the Traffic Injury Research Foundation.*

LESSONS LEARNED FROM EU PILOT PROJECTS

Many countries in the European Union have implemented alcohol interlock program trials. There are important lessons that have been learned during the course of these pilot programs which can inform future initiatives. Most notably, the ability to customize program features to jurisdictional laws and practices is essential. However, this means that there is not a "model" interlock program that will be feasible in all jurisdictions. All programs are unique and instead offer insight into different strengths and limitations that governments may consider as part of program development. Despite these differences, there are some common experiences and lessons that have emerged from pilot interlock programs in the European Union. These lessons are briefly summarized below.

Several countries have implemented mandatory interlock requirements for all offenders, including Belgium, Finland, and The Netherlands and their experiences have varied. In Belgium, outcomes indicated that the duration of the program should not be static for all offenders, and instead the length of program participation should be based on offender performance on the interlock and the prevalence of violations over time. This approach was based on research suggesting that persons who have violations on the interlock device will continue to attempt to drink and drive once the device is removed. In these instances, other sanctions may be necessary and appropriate for these offenders to change their behaviour. At the same time, experiences in Belgium suggested that the imposition of gradual or escalating sanctions was more effective in re-shaping behaviour. This approach has also helped to manage limited resources and avoid imposing sanctions on offenders whose behaviour did not warrant them.

Another lesson learned from Belgium was the importance of a robust data collection strategy and the reliance on accurate data to monitor offenders to establish an effective program. Similarly, results from Finland also reinforced this finding and showed that tailored responses to non-compliance can result in behaviour change. In this regard, stakeholders from Finland noted that the device helped most offenders

avoid re-offending, and approximately one-third of offenders who completed the interlock program chose to keep the device installed on their vehicle.

Results from pilot programs in the EU also highlighted the benefit of interlocks in comparison to other types of sanctions. For instance, in Austria, an anonymous survey was undertaken to measure incidents of impaired driving that were unreported to police. Results suggested that alcohol-impaired driving continued to occur despite the use of licence revocation for alcohol-impaired drivers. As a result, changes to impaired driving policy were introduced in Austria to incorporate the use of interlock installation. The new policy permitted convicted impaired drivers to install an interlock device immediately following an impaired driving offence. It is hoped that this approach will increase and encourage the use of interlock devices by eligible offenders and help curb unreported cases of impaired driving.

Collectively, these results demonstrate the positive attributes of these devices and their usefulness to improve road safety and reduce crashes. However, the positive outcomes that can be achieved often hinge on the passage of good legislation. Experiences from Belgium and other European countries have underscored the importance of a strong legal framework as a foundation for an effective interlock program. However, the passage of comprehensive legislation to support an interlock program is quite challenging to achieve. Debate and discussion related to legislation often results in key features of programs being changed or removed entirely which can be discouraging. Moreover, the legislative process is often resource-intensive and time-consuming. As a consequence, it appears that incremental change is more easily achieved than large-scale changes, and legislation should be drafted with opportunities to negotiate in mind. Based on these experiences, stakeholders have also found that once initial legislation is put in place, the addition of specific program features can be better coordinated and pursued in a more efficient manner. Such amendments are often more likely to be accepted and passed, as well as more easily implemented in practice.

Looking forward from pilots with full-scale implementation in mind, and the emerging possibilities associated with the transition towards semi- and full-automated vehicles there are some important issues to consider. The pace of new legislation and regulation is often slow and will ultimately affect the dynamics of partnerships between interlock and vehicle manufacturers (i.e., to what extent greater coordination across industries can help to move cooperation and legislation forward). At the same time, public attitudes towards impaired driving and strategies to address it will have a strong influence on the development of legislation and regulation. This is already evident to some extent, as a result of pilot programs and initial implementation efforts in the European Union. For instance, challenges have been encountered in Belgium and France with the use of interlock programs for commercial vehicles. In particular, unions of heavy transport vehicle drivers have expressed serious privacy concerns and concerns about the protection of individual drivers. This has occurred mainly due to misunderstandings by fleet owners regarding the use of data to identify risks and related liability as well as to improve the health and safety of drivers.

Privacy issues are an important barrier to the implementation of interlock programs, particularly for commercial drivers in the European Union. More work is needed to educate governments and fleet vehicle owners about the collection and use of data to protect companies, support drivers, and reduce crashes and

injuries. At the same time, the move towards increasingly automated vehicles has also prompted privacy concerns and questions regarding the collection and use of data about drivers and vehicles. In this regard, stronger cooperation and partnerships between interlock and vehicle manufacturers can help to more precisely define and address privacy concerns, and ensure safeguards are put in place to instill confidence among governments and citizens about data integrity.

While some countries may ultimately choose not to implement an interlock program, and those that do may encounter unforeseen barriers, these experiences are not different from other types of legislative initiatives or the implementation and adoption of other new technologies. As such, these instances should not deter continued progress and growth for interlock programs. Jurisdictions that have not previously used interlocks will continue to conduct trials and begin to use the device, and this should be applauded and encouraged. Countries that have already implemented an interlock program are an important source of knowledge to assist these new jurisdictions and guide them in implementing interlock programs more efficiently and effectively to achieve the wealth of benefits demonstrated by research.

**Based on presentations given by Marita Löytty of Traffi, Annick Billard of Prévention Routière, Liza Jakobsson of the Swedish Transport Administration, Grete Mathisrud of the Norwegian Ministry of Transport, Petra Feustel-Seidl of Dresden International University, Joachim Seidl of the Association for Education, Patrick Magnusson Sweden, Dr. Majda Zorec Karlovsek Slovenia, Gudbrand Rustaden Norway, and Professor George Yannis of the National Technical University of Athens Department of Transportation Planning and Engineering.*

CONCLUSIONS

When examining the progress made in reducing alcohol impaired driving in Europe and other Western countries, the results are encouraging. High levels of enforcement, effective education campaigns, and the use of sophisticated technologies have had a substantial impact on the issue. Nonetheless, alcohol-impaired driving remains a persistent road safety problem that requires continued study and attention. Improved vehicle technology can offer avenues to further curtail incidents of alcohol-impaired driving.

The advancements in automated vehicle technologies have been impressive. These technologies offer safety features that can dramatically improve road safety. However, such technologies are still in the early stages of development. Specifically, fully-automated vehicle capabilities are unlikely to be developed, let alone widely available, in the immediate future. Even when they become available, drivers may prefer maintaining control of the vehicle or simply feel like driving themselves from time to time. This demonstrates that although vehicle automation can have road safety advantages, the expectation that this technology will be able to significantly reduce alcohol-impaired driving, or eliminate it altogether, is impractical at this time.

As technology evolves it may become increasingly important to emphasize the value of interlock technology embedded within interlock programs, given the misperception that automation will solve the problem of alcohol-impaired driving. Even those who do not necessarily believe this to be the case may still believe that the availability of more sophisticated technology will negate the need for good quality programs with appropriate levels of monitoring and servicing. This misperception can potentially erode road safety as it can be expected that, for those offenders most in need of using an interlock, appropriate levels of monitoring will remain essential. This is clear from recent research as well as practical experience. As such, strong interlock programs will remain necessary for offenders and commercial applications given that drivers will have to be able to maintain control over their vehicle. Given the current state of available technology, a 'fail-safe' in the form of a human driver will continue to be necessary in the

foreseeable future, meaning that interlock programs with good monitoring will continue to be a needed countermeasure for as long as this is true.

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NOTES

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