

TAC SAFECAR PROJECT – DEMONSTRATION OF NEW AND EMERGING VEHICLE SAFETY TECHNOLOGIES

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ABSTRACT

The vital role of vehicle safety, one of the main pillars of the Safe System approach, in combating road trauma is well recognised. The Transport Accident Commission (TAC) has undertaken a number of campaigns and projects to increase public awareness and demand for safer vehicles and vehicle safety technologies. One project that the TAC is involved in, is the research, development and demonstration of new vehicle technologies via the SafeCar Project. This project is a demonstration of new and emerging technologies that have promising road safety potential. The technologies selected for demonstration target some of the key issues associated with road trauma such as speed and fatigue. The technologies currently installed include Driver Drowsiness Detection, Lane Departure Warning, Intelligent Speed Assist, Seatbelt Interlock, Top Speed Limiter and Daytime Running Lights. The aim of the project is to further develop, demonstrate and promote these technologies to the community and key decision makers. This paper will discuss the rationale in selecting these technologies for demonstration and the communication strategy for the project.

INTRODUCTION

The Transport Accident Commission (TAC) in Victoria, Australia is a government owned compulsory third party injury insurer. Its role is to pay for treatment and benefits of people injured in transport crashes and to promote road safety in Victoria. In order to meet its legislative responsibility to reduce the incidence and severity of transport injury on Victorian roads, the TAC invests heavily in road safety initiatives, including vehicle safety.

The TAC recognised the potential that improving the crashworthiness and preventative capacity of vehicles could have in reducing road trauma. This is supported by research which indicates that if every vehicle could be upgraded to the safest in its class, serious trauma can be reduced by a third [1]. The TAC has undertaken a number of campaigns and projects to increase public awareness and demand for safer cars [2] and certain safety technologies such as ESC and curtain airbags [3]. In addition, the TAC also invest in the research, development and demonstration of vehicles safety technologies via its SafeCar project.

SAFECAR I

The TAC SafeCar project was a world first partnership between Ford Australia, Monash University Accident Research Centre (MUARC) and the TAC. The aims of the project were to evaluate the safety benefits, technical operation and driver acceptability of a number of Intelligent Transport Systems (ITS). The technologies investigated included:

- Intelligent Speed Assist (ISA)
- Following Distance Warning
- Seatbelt Reminder
- Reverse Collision Warning

In addition, each of the project cars were equipped with daytime running lights (DRLs).

The results of the project were positive and some of the main findings were:

- Mean speed of drivers was reduced
- Mean time headway (following distance) increased in most speed zones
- Reduction in the time vehicle occupants spent unbuckled

- Drivers liked the systems and found them useful [4].

The project was successful in promoting seatbelt reminders, with Ford placing the system in the new BA Falcon [4], and in creating interest in ISA across Australia.

SAFECAR II

Since the conclusion of the initial SafeCar project, the TAC has embarked on a second generation, SafeCar II, project. While the aim of SafeCar I was to evaluate ITS technologies in terms of safety, useability and acceptability, the main objective of SafeCar II is to demonstrate and promote new and emerging technologies that have promising road safety potential.

The technologies selected for demonstration in SafeCar II target some of the key issues associated with road trauma such as speed and fatigue. The aim of the project is to further develop, demonstrate and promote these technologies to the community and key decision makers. In 2008, the TAC commissioned a study to assess a range of vehicle safety technologies in terms of road safety benefits, readiness of the technology, regulatory and infrastructure requirements, costs, user acceptance and the potential influence of government initiatives on the uptake rate [5]. From this study, a list of technologies that would deliver the best returns for government promotional effort was developed [5]. In deciding which technologies to install in SafeCar II, the TAC took into consideration the findings of this study.

The technologies installed in SafeCar II are ISA, Seatbelt Interlock, Lane Departure Warning, Driver Drowsiness Detection, Top Speed Limiter and DRLs.



Figure 1. SafeCar II

Intelligent Speed Assist (ISA) – ISA is a safety technology that alerts drivers when they exceed the speed limit. ISA activates when a driver exceeds the posted speed limit for a section of road by a predetermined limit (eg. 2km/hr or more). There are three categories of ISA systems: advisory, supportive and limiting. With advisory ISA systems, audio and visual warnings sound to remind the driver that they are going too fast. Supportive ISA systems prevents the vehicle from travelling above the speed limit but will allow for the function to be overridden, and in the limiting system, the override function is not an option. The ISA in SafeCar II incorporates the advisory and supportive functions of the technology, however, at this stage, the TAC is only promoting advisory ISA.

Speed continues to be a major cause of trauma on Victorian roads and a technology such as ISA can assist in reducing the mean travel speed. The road safety benefits of ISA has been demonstrated in a number of studies in Australia [4][6] and internationally [7]. Both advisory and active (supportive and limiting) versions of ISA feature highly on the list of technologies that would deliver good returns for government efforts [5]. However, despite the great potential of ISA in reducing trauma, penetration of the technology in the market has been limited. Further development and promotion of the technology is required

Seatbelt Interlock – The seatbelt interlock is a technology that takes the existing seatbelt reminder systems one step further and prevents the driver from starting the ignition of a vehicle unless seatbelts are engaged. The technology in SafeCar II is active for the driver and front passenger seats.

The safety benefits of seatbelts is well recognised and is one of the top performing safety features in the list of technologies that provide good return for government efforts [5]. Victoria was the first jurisdiction in the world to legislate the wearing of seatbelts in 1970 and boasts a high compliance rate with drivers and passengers (approximately 95%) [8]. However, approximately 15% of vehicle occupants killed are still unbelted, with many also intoxicated [9]. Seatbelts interlocks may have an important role to play in this regard, where intoxicated drivers who forget to put on their seatbelts are unable to start the vehicle. Anecdotal information received from manufacturers indicate that a seatbelt interlock is a simple and cheap technology to implement where there is already an existing seatbelt reminder system.

Lane Departure Warning (LDW) – The LDW uses a camera mounted inside the vehicle windscreen to scan the road for lane markings and give the system an indication of where the vehicle is positioned on the road. Visual, audible and haptic warnings (eg. vibration of steering wheel) are given to the driver when they begin to move outside of the lane if the indicator is not used.

In Victoria, run off road crashes account for approximately 40% of fatal crashes [10]. Some of the common causes of run off road crashes include driver fatigue, speed and inattention/distraction. LDW has the potential to reduce run off road crashes by providing drivers with a warning to correct any unintended lane movements before a crash occurs.

Driver Drowsiness Detection (DDD) – DDD utilises a driver's steering input to calculate their level of drowsiness. An alert driver in general will have more frequent movements, whereas a driver experiencing drowsiness will have less frequent inputs. When drowsiness is detected, a visual and/or audible alert is delivered to the driver to warn them of fatigue

In Victoria, approximately 20% of fatal crashes involve driver fatigue [11]. In the absence of an effective fatigue enforcement tool, vehicle safety technologies such as DDD will have a significant role to play in helping reduce fatigue related crashes.

Top Speed Limiter – In Victoria, the top legal speed limit is 110km/h, yet vehicles have the ability to travel up to more than double the limit. Recognising the discrepancy between what is legally permitted and what vehicles are able to do, the TAC implemented a top speed limiter to SafeCar II. The top speed limiter allows for SafeCar II to travel up to 120km/h. The extra 10km/h was included as a 'comfort' to drivers who believe they might need to use the extra speed in certain situations. Top speed limiting has the potential to limit the number of crashes involving excessive speeds and is a technology that can be implemented at point of manufacture.



Figure 2. Reconfigured speedometer showing top speed of 120km/h

Daytime Running Lights (DRLs) – DRLs are headlights that are illuminated during the day in order to make vehicles more visible and thus reduce their involvement in crashes. DRLs have the potential to reduce multiple vehicle daytime fatalities in Victoria by approximately 16% [12]. It is possible to fit vehicles with a device that will automatically activate DRLs when the ignition is switched on but is overridden by full strength headlights. DRLs can increase driver's peripheral perception of vehicles. It is also easier for drivers and pedestrians to see and estimate the distance to vehicles with DRLs. DRLs was the top performing technology on the list of technologies which would provide the best return for government efforts [5]. As DRLs are considered relatively cheap, simple and maintenance free [5], the technology warrants further promotions.

ANCAP Road Map

The ANCAP Road Map sets out the details of what is required year by year between 2011-2017 in order for a passenger vehicle to achieve a 1-5 star safety rating [13]. The requirements become more stringent year on year and vehicles will need to have a certain number of Safety Assist Technologies (SAT) in order to meet the requirements. The Road Map lists out the technologies that are considered SAT. All the technologies installed in SafeCar II are included in the list of technologies that manufacturers can incorporate in order to achieve a 5 star rating.

COMMUNICATION STRATEGY

The aim of the SafeCar II project is to further develop, demonstrate and promote new and emerging technologies with road safety potential. The TAC, along with its road safety partners, have been successful in creating awareness and consumer demand for Electronic Stability Control (ESC) and Curtain Airbags (CA) via a range of public education

and partnership approaches [3]. In the first stage of the promotion of the new technologies available in SafeCarII, the partnership model utilised for the promotion of ESC and CA will be adopted. At this point in time, a mass media public education campaign is not warranted.

Promotion to Fleet Managers

Every new vehicle purchased without the best safety rating and features is an opportunity lost, as that vehicle will be operating at an increased risk to its occupants for its life on the road, which can be up to 20 years. With vehicles for commercial purposes accounting for over 50% of new vehicles sold, cited in [14], fleet managers can play a vital role in increasing the safety of the Victorian fleet by purchasing the safest cars possible and with the best safety features. This will also ensure cars that flow on to the second hand market are of a high safety standard, where some of the most high risk road users such as young drivers, are likely to purchase their car from. In addition, the mass buying power of fleet managers can influence the types of technologies manufacturers include as standard on their vehicle range.

Based on the above considerations, the TAC has been involved in a number of events to promote the SafeCarII project to fleet managers, educating them about the importance of vehicle safety and also technologies that they should be considering when making their fleet purchasing decisions. The TAC has also hosted a vehicle safety day to allow fleet managers to experience first hand on track, how some of the new technologies work. Opportunities to further promote new technologies to fleet managers will be investigated, with the aim of encouraging them to consider and request for some of these new technologies in future fleet purchases.

Promotion to Consumers

One of the first steps in creating consumer demand for a new vehicle safety technology is education. For consumers to start purchasing the technologies, they need to know the technology exists, its availability, how it works and the safety benefits. The TAC, VicRoads and RACV were able to effectively educate consumers and raise awareness of the safety benefits and availability of ESC through the use of the Bosch ESC simulator. With ESC now legislated to be in all new cars sold in Australia, the simulator will be reconfigured to allow demonstration of some of the new technologies available in SafeCar II. The

simulator will be involved in public demonstrations at events such as the Melbourne International Motoshow, with the aim of educating the public about the availability and safety benefits of the new technologies. The long term objective is to create enough consumer demand for manufacturers to start incorporating the technologies as standard at the point of manufacture.

Demonstration to Manufacturers and Key Decision Makers

The quickest way for new technologies to penetrate the vehicle fleet is for manufacturers to include them as standard features in their vehicle range. In Australia, road safety agencies have a history of working closely with vehicle manufacturers to improve the safety of their cars, such as through ANCAP. In developing SafeCar II, the TAC also consulted with manufacturers regarding the development and installation of some of the technologies. The TAC regularly makes SafeCar II available to its partners and providers to allow for demonstration of the technologies to manufacturers and key decision makers, with the aim of influencing the uptake of the technologies in as broad a range of vehicles as possible.

CONCLUSION

The aim of the TAC SafeCar II project is to further develop, demonstrate and promote new and emerging technologies with road safety potential. To date, SafeCarII has been fitted out with ISA, Seatbelt Interlock, Lane Departure Warning, Driver Drowsiness Detection, Top Speed Limiter and DRLs. The TAC will work closely with its road safety partners to further develop and actively promote the technologies to the identified audiences. Further work will also be undertaken to identify additional technologies with good road safety potential (eg. autonomous emergency braking) to be included as a part of the SafeCar II project.

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