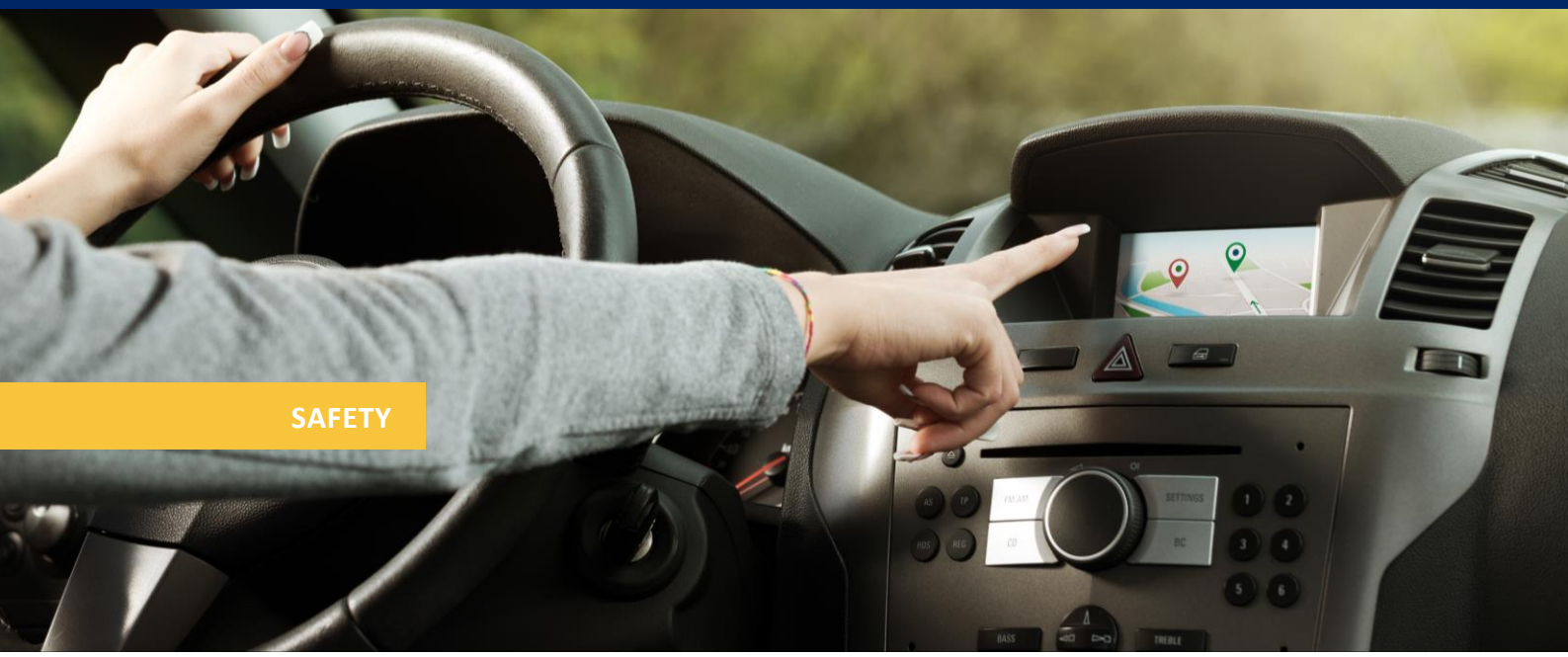
FEDERATION INTERNATIONALE DE L'AUTOMOBILE
REGION I - EUROPE, THE MIDDLE EAST AND AFRICA

POLICY POSITION ON THE GENERAL SAFETY REGULATION



SAFETY

Executive Summary

With the upcoming revision of the General Safety Regulation, the European Union has the opportunity to further improve road safety by upgrading its technical and legal framework to take new safety technologies into account. The FIA encourages the European Commission to support ambitious safety targets through its policies.

Active in-vehicle safety:

- The mandatory introduction of Autonomous Emergency Braking systems in passenger cars
- The fitment of Seat-Belt Reminders to all seats in passenger cars

Passive in-vehicle safety:

- The adoption of the new standard for pole-testing (UNECE R 135) in the crash-testing of passenger cars
- An improved rear underrun protection of Heavy Goods Vehicles

Introduction

The FIA urges the European Commission to support ambitious safety targets in its policies. High vehicle safety standards do not only contribute to better safety, they also place European motor vehicles amongst the safest in the world. These standards promote research and development, thus contributing to long-term competitiveness of the European automotive industry.

In particular, intelligent driver assistance systems can help avoid collisions or minimise their consequences. The EU has a decisive role in speeding-up their deployment. Electronic Stability Control (ESC), estimated to save 4,000 lives a year, was introduced in cars in the early 1990's but the technology only reached its full life saving potential in 2014, when it was made mandatory in all vehicles.

In the upcoming revision of the General Safety Regulation by the Commission, the FIA offers an assessment of a number of optional stand-alone in-vehicle technologies, and proposes recommendations for improving the passive safety of vehicles. Cooperative technologies, because they are currently not regulated under vehicle type-approval, are not addressed here despite their safety potential.

The list of in-vehicle technologies considered in this document is based on:

- Vehicle based 'priority systems' identified by the iMobility Forum[1]
- Systems promoted by EuroNCAP as part of its 'Advanced Rewards' for driver assistance systems
- The most promising systems identified by the eIMPACT European project[2]
- The FIA's Automobile Clubs' accident research data on the causes of accidents

The FIA believes driver assistance technologies need to be brought to end-users. Therefore it has conducted various technology roadshows - such as the eSafety Challenge[3] and iMobility Challenge[4]. A key success factor in the implementation of technology is informing users on the technology's benefits as consumers can easily switch off features or ignore warning signals. Regulators should also consider the level of consumer acceptance and demand for systems.

Systems or functionalities are considered in isolation by the Regulation. However, systems that use the same components can and will likely be bundled by manufacturers. For example, some sensors used for autonomous emergency braking can also be used for functionalities such as adaptive cruise control and

[1] http://www.imobilitysupport.eu/library/imobility-forum/2528-imobility-forum-stakeholders-list-july-2014/file
[2] Last project to date to conduct a socio-economic assessment of various systems across all of Europe concluded in 2008
[3] www.esafetychallenge.eu
[4] www.imobilitychallenge.eu

lane departure warning, or traffic sign recognition. This spill-over potential is often not factored into various safety analysis and cost/benefit calculations.

Adaptive Cruise Control (ACC)

ACC systems can have a favourable effect on road safety when used on motorways with non-congested traffic. ACC can have negative safety effects if used in busy traffic and on rural or urban roads[5]. While ACC can be found on a range of vehicle models, the equipment rate within the entire vehicle fleet is still low today. It is a technology that will likely continue being promoted by the industry sector however as it is one of the building blocks for automated vehicles.

Conclusion

ACC is an option that could benefit users who often drive on motorways. It currently has a small market penetration. The FIA sees no compelling safety case nor cost/benefit analysis for mandating this technology. ACC should be available to users as an option and its cost could decrease if Autonomous Emergency Braking was mandated, since the technology uses the same sensors.

Adaptive Headlights

Reliable safety gains estimates for this technology are hard to establish. Fatalities occurring at night are overrepresented when considering the total amount of traffic at night versus day. However, the total safety outcome also depends on how drivers adapt to improved visibility conditions (i.e. gains could be mitigated by higher driving speeds thanks to better visibility). This technology is currently popular among users; it has the highest deployment rate in newly registered vehicles among the systems monitored by the iMobility Forum[6]. In 2011, already, 59% of respondents were willing to pay to have this feature in their next vehicle, which made it the most popular feature after ESC[7].

Conclusion

The FIA believes that evidence of the safety benefits is not sufficient to justify mandatory fitting. However the deployment of this technology and it safety impact should continue to be monitored as it is proving popular and can reach a high vehicle penetration.

[5] http://www.swov.nl/rapport/Factsheets/UK/FS_ACC_UK.pdf
[6] http://www.imobilitysupport.eu/library/imobility-support-activities/its-deployment-deliverables/monitoring-priority-systems/reports-12/2210-fsd-executive-sumamry/file
[7] eSafety Challenge 2011 http://www.esafetychallenge.eu/download/pdf/study_brochure_2011.pdf

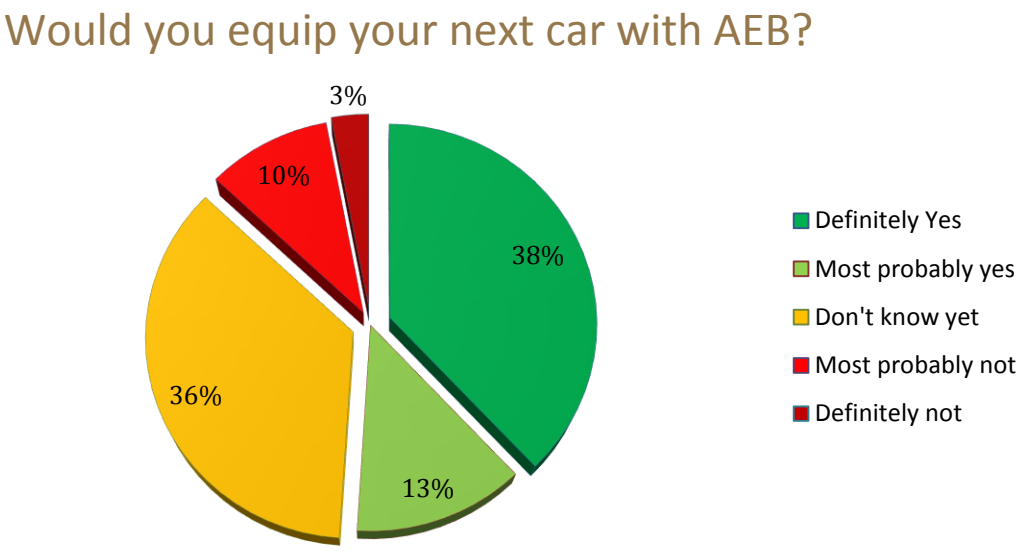
Autonomous Emergency Braking (AEB) systems

Rear-end collisions are very frequent. In Germany the ADAC conducts extensive accident investigations, and has recorder that they represent 24% of accidents. In the UK around 70% of insurance claims for whiplash injuries arise from such accidents[8].

The speed range over which an AEB system operates depends on the type and complexity of sensors used. The vast majority of collisions happen at low speed in 'city' environments. In such scenarios, AEB uses cost-effective Lidar technology, for which the manufacturer price has steadily decreased over time and is estimated at less than €100[9]. This type of systems may enhance traffic safety in urban areas. Radar and camera sensors are used for more advanced systems, and combining different types of sensors in fusion allows for complex functionalities such as pedestrian detection.

Cost/benefit studies for the technology typically show a cost/benefit ratio close to 1 (break-even)[10], but rarely consider that the hardware used by AEB also enables additional driver assistance functionalities that further enhance safety benefits.

City/urban AEB systems are now widely available across all vehicle ranges (and on some vehicles AEB comes as standard). This has brought about a good level of consumer awareness. A recent iMobility Challenge consumer survey indicated that 55% of car drivers are aware of the technology, 38% would 'definitely like to have it' and 13% would 'most probably' like to have it in their next vehicle[11].



[8,8,9]: TRL, Benefit and Feasibility of a Range of new technologies and unregulated measures in the fields of vehicle occupant safety and protection of vulnerable road users, 2015.
[10]: iMobility Challenge project : Users' awareness and demand for in-vehicle technologies, 2014
http://www.imobilitychallenge.eu/files/studies/iMobility_Challenge_D2.3.1__User_Awareness_and_Demand_for_iMobility_systems_version_1.0.pdf

AEB was also the system for which the highest share of respondents (56%) were willing to pay for in their next vehicle.

While literature reveals wide variations about AEB benefits[12], effects are always deemed positive. One study considers AEB could cut fatalities by 7% in the EU 25[13]. Insurance data also shows how car models equipped with AEB systems report a lower collision frequency compared to non-equipped vehicles[14].

According to the eIMPACT project results, advanced AEB systems with pedestrian detection could save billions of Euros by preventing casualties[15]. The most optimistic figure is 4.5 billion Euros saved by 2023. The project highlights how gains should increase in time, with future generation systems expected have better performing sensors.

EuroNCAP started testing AEB systems in 2014. While it confirms that performance varies depending on the systems, all of the systems tested have a positive impact in real world critical situations.

Finally, the technology is designed to intervene at the very last moment through harsh/uncomfortable braking: it is reasonable to expect this should discourage driver adaptation (i.e. the risk that drivers over-rely on the technology to break for them).

[12] http://www.esafety-effects-database.org/applications_18.html
[13] Ecorys, Cost-benefit assessment and prioritisation of vehicle safety technologies, 2006. http://www.roadsafetyobservatory.com/Evidence/Details/10803
[14] TRL, Benefit and Feasibility of a Range of new technologies and unregulated measures in the field of vehicle occupant safety and protection of vulnerable road users_Active Safety Measures, 2015
[15] http://www.aspecss-project.eu/userdata/file/Public%20deliverables/ASPECSS-D1.3-FINAL-Benefit%20assessment%20methodologies-2014.04.30.pdf

Conclusion

The FIA believes that given the frequency of rear-end collisions, the affordable cost and pervasiveness of AEB systems, regulators should consider mandatory introduction of AEB systems to minimise societal costs of rear end collisions.

Blind Spot Monitoring (BSM)

BSM systems are optional on many modern cars and provide more support to larger vehicle drivers, where blind spots are greater. It is also reported that BSM may be particularly suited to motorways where there are frequent lane changes and collisions have much worst consequences.

BSM systems may not always detect all vehicles located in a car's blind spot. In particular, narrow and often fast moving vehicles such as motorcycles easy to miss. For this reason, the FIA believes in the importance of working further on the reliability of BSM systems, especially regarding the detection of motorcycles: the failure of motorists to detect motorcycles is a frequent pattern for accidents.

The potential of the technology to assist Heavy Goods Vehicles (HGVs) drivers to detect vulnerable users in their blind spot should also be investigated. Users such as cyclists are particularly at risk when they find themselves in the blind spot of an HGV. The FIA believes the development and deployment of reliable technologies enabling the recognition of pedestrians and cyclists while they are in the blind spot of HGVs should be a priority.

Conclusion

The FIA believes that BSM can assist some motorists, but does not believe in the need to mandate it on passenger cars. Motorists should not be led to believe current systems always detect vehicles present in their blind spots: Powered-Two-Wheelers in particular can be missed. The benefit of having BSM systems also varies for different types of M1 vehicles (passenger cars) for example, SUVs have larger blind spots compared to superminis. Consumers should therefore choose for themselves according to the type of car they drive, the environment they most often drive in or their own attitude towards receiving warning signals if they wish to equip their vehicles with the systems.

If deemed reliable enough, the FIA believes the technology could be introduced on HGVs that have significant blind spot and where vulnerable road users are particularly at risk in case of accidents.

Intelligent Speed Assistance (ISA)

Despite positive findings on the safety potential of ISA through many field operational trials[16], no country so far has established legal requirements for vehicles to be equipped with ISA.

Advisory ISA is in practice largely available to European motorists today through their navigation devices, but there is concern over the reliability of the speed limit information that is not always accurate. The alternative to ISA enabled by navigation devices, are camera based systems. These however, are only as good as the availability of speed limit signs on the road.

In Belgium and the Netherlands a survey indicated that among respondents who have positive attitudes towards ISA, seven out of ten respondents would prefer to have a notification/warning system over an intervening system.[17] In the UK, an AA survey of 17,481 respondents found 43% thought the compulsory introduction of 'controlling' ISA (i.e. an intervening system) would be acceptable compared to 49% who didn't.

Conclusion

The FIA believes that manually set speed limiters and advisory ISA are largely acceptable to drivers. However, up-to-date maps and speed limit data should be provided by public authorities and private stakeholders to ensure that users do not inadvertently infringe traffic rules. Road authorities should also ensure that speed limit signs are highly visible and present on road infrastructure.

Lane support systems

Lane support systems can help avoid a frequent cause of accidents: vehicles unintentionally leaving their lane, or changing lanes when it is dangerous to do so because of oncoming vehicle. In Germany the ADAC conducts extensive accident investigations, and has recorded that 36% of accidents are caused by a vehicle leaving its lane.

However, the systems have some limitations. Poor quality road markings can adversely impact on the operation and performance of such systems[18]. Consumer push back has also emerged against the technology in cases where it intervenes against the drivers' will: in particular when the driver intentionally changes lane without using his/her turn indicator. In fact, Automobile Clubs have been contacted by consumers asking them how to deactivate the system in their car.

[16] http://wiki.fot-net.eu/index.php?title=Category:ISA
[17] http://www.steunpuntverkeersveiligheid.be/sites/default/files/RA-MOW-2010-005.pdf
[18] http://www.eurorap.org/media/186774/roads_that_cars_can_read_2_spread.pdf

Conclusion

The FIA does not encourage regulators to mandate lane support systems in M1 vehicles (passenger cars) at this stage. In the future, systems are likely to incorporate a driver monitoring element to understand the driver's intention and avoid situations where the driver does not desire the systems to intervene. This is not yet offered on the market. In parallel, the FIA encourages sustained efforts to improve and standardise Human Machine Interfaces (HMIs) so that drivers are not surprised by the information provided by lane support systems.

Fitment of seat belt reminders to all seats

The mandatory fitment of seat-belt reminders to all seats would help enforce EU legislation from 2006 mandating the use of seat belts on all car seats[19]. All evidence shows that seat-belt wearing rates are consistently lower in the back seats compared to the front[20], and reports suggest how certain regions in Europe have extremely low seat belt wearing rates in the back seat: in Italy, a surveillance system called « Ulisse System » reported rates of only 10% use of seat belts on rear seats. This is based on direct observation of driving behaviour (i.e. not questionnaire-based survey) on over 800 sites throughout the country.[21] Where it is hard to change users mentality on such a basic safety feature, mandatory introduction of seat belt reminders may be the most efficient way to achieve higher wearing rates, especially on rear seats. The recommendation to fit reminders on all seats also figures in the CARS 21 Final Report[22]. It has been estimated that wearing the seat belt in the back seat reduced the risk of fatal injury by 25%[23].

EuroNCAP has a seat belt reminder protocol recommending the fitment of seat belt reminders on all seats. For rear seats the protocol only requires a visual signal to be given to the driver, in the absence of rear seat occupancy information. Vehicle manufacturers increasingly equip their vehicles with this feature, which contributes to their safety rating. The future protocol is likely to also encourage the detection of occupancy.

Conclusion

The FIA believes that seat belt reminders should be fitted to all seats in M1 vehicles (passenger cars).

[19] Directive 2003/20/EC
[20] TRL, Benefit and Feasibility of a Range of New Technologies and Unregulated Measures in the fields of Vehicle Occupant Safety and Protection of Vulnerable Road Users_ Car Occupant and Pedestrian Safety, 2015.
[21] http://www.oecd-ilibrary.org/docserver/download/7514011ec024.pdf?expires=1425552199&id=id&accname=guest&checksum=B58AE861D53CFB7248D9970B1CEA8583
[22] http://ec.europa.eu/enterprise/sectors/automotive/files/cars-21-final-report-2012_en.pdf
[23] http://www.roadsafetyobservatory.com/HowEffective/vehicles/seat-belts

Technology	FIA Assessment
Adaptive Cruise Control (ACC)	No compelling case to mandate, only suitable for uncongested highway driving
Adaptive Headlights	No compelling case to mandate, but high consumer demand.
Autonomous Emergency Braking (AEB)	Should be mandated: affordable cost, avoids rear-end collisions, high consumer demand AEB hardware also enables deployment of additional driver assistance systems.
Blind Spot Monitoring (BSM)	The technology is not infallible for detecting vehicles such as PTWs. More relevant for larger vehicles, should not be mandated across all passenger cars.
Intelligent Speed Assistance (ISA)	A safety case exists, but the technology still depends on up-to-date digital maps with reliable speed limit data, or physical traffic signs
Lane Support Systems	A safety case exists, but the technology has limitations due to lack of driver intention monitoring or poor road markings.
Seat Belt Reminders	Should be mandated on all seats.

Recommendations for the passive safety of vehicles

While the FIA believes in the great potential of active safety systems to prevent collisions from happening, the EU should continue to improve the level of passive safety technologies in vehicles for situations where crashes do occur.

Passive safety of cars

Side pole testing simulates side-impact crashes with solid narrow objects such as trees and sign posts that can lead to severe consequences. A new standard for pole-testing was recently developed UNECE R 135 to replace UNECE R95. The FIA encourages the EU to adopt this new standard as the current EU type-approval regulation addresses side impact protection based on the previous UNECE regulation.

Passive safety of heavy goods vehicles

The crash compatibility of HGVs with other vehicles and vulnerable road users is an area where improvements should be made. In particular, rear underrun, the space under the rear ‘bumper’ of a truck, should be reduced. UNECE regulation 58 provides a definition of mounting height for rear under-run protective devices (RUPDs) and the test loads an RUPD must withstand. FIA judges the current

UNECE regulation to be insufficient: every year, some 40 car occupants suffer fatal injuries in rear-end collisions with HGVs on German roads alone, while approximately 400 are severely injured.

A crash test conducted by ADAC has shown that RUPDs are effective and life-saving only if they conform to the requirements below:

a) Specification to test loads of 150kN and 200kN respectively applied in three test points simultaneously – instead of consecutively.

b) Reduction of RUPD maximum mounting height to 450mm – both for HGV with hydraulic suspensions and steel-sprung vehicles.

c) RUPD maximum offset forward of the rear of 100mm – both for HGV with and without a lift platform.

RUPD optimisation would not cost more than €100 per vehicle[24].

[24] Data from the VC Compat project funded by the EU Commission; http://vc-compat.rtdproject.net

Active safety systems defined

Adaptive Cruise Control (ACC)

ACC maintains the driver-set vehicle speed, like standard cruise control, but also adjusts the vehicle's speed to that of a preceding vehicle, and helps maintain a headway time to the vehicle ahead.

Adaptive Headlights

This system consists of electromechanical controlled headlights to ensure optimum illumination of the road in bends.

Autonomous Emergency Braking (AEB)

AEB systems intervene to avoid rear-end collisions or reduce their severity in high risk situations. There are different types of systems:

- Urban environment systems intervene at low speeds in traffic jam situations. Typically they work at speeds up to 30 km/h.
- Interurban systems aimed at avoiding or mitigating higher speed impacts.
- Some systems are designed to detect pedestrians in critical situations. These typically function at low speeds.

Blind Spot Monitoring (BSM)

BSM monitors the blind-spot and help a driver change lanes. Some systems are camera-based, others rely on radar. They aim to reduce side collisions (the collisions of vehicles in parallel lanes by making the drivers more aware of vehicles in close proximity).

Intelligent Speed Assistance (ISA)

Speed alert or Intelligent Speed Assistance (ISA) systems help drivers to remain within the legal speed limits. Satellite navigation is used to provide speed limit information to the vehicle. However this calls for up to date digital maps being available at all times. Software which analyses images from a camera and recognises traffic signs can also be used. A distinction must be made between warning systems (advisory ISA) and intervening systems that prevent the vehicle from exceeding the current limit. Other systems (speed limiters) do not inform the driver of the current speed limit, they simply allow drivers to set a limit of their choice and warn or cap the vehicle's speed when that limit is reached.

Lane support systems

Lane support systems can assist the driver and issue a warning or intervene when he or she unintentionally leaves the road lane or changes lane without using the turn indicator. There are different types of lane support systems:

- *Lane Departure Warning* (LDW): technologies which warn the driver when the car is getting close to a lane marking, by audio or vibrating steering wheel.
- *Lane Keep Assist* (LKA): systems that proactively steer the car back into the lane.

Seat Belt Reminders

Seat belt reminders are intelligent, visual and audible devices that detect whether seat belts are in use and give out warning signals if they are not used. Today they are only mandatory on the driver seat of passenger cars. Sensors in the belt buckle are typically used to determine the seat belt status. About 70% of passenger cars already have this 'buckle monitor' solution even on rear seats. Advanced occupancy sensors are also used, mostly in front seats, to make the distinction between objects and occupants, to avoid false detection. In the future, these could be used in rear seats.

Fédération Internationale de l'Automobile (FIA) Region I office

FIA Region I is a consumer body representing 111 Motoring and Touring Clubs and their 38 million members from across Europe, the Middle East and Africa. The FIA represents the interests of our members as motorists, riders, pedestrians and passengers.

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