



REPORT OF THE SEMINAR ON ADVANCING SPEED ASSISTANCE SYSTEMS

May 9, 2017, 10am – 3.30pm
Hosted by Global NCAP in cooperation with Euro NCAP and Australasian NCAP
on the occasion of the 4th UN Global Road Safety Week
at the FIA Foundation, 60 Trafalgar Square, London



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INTRODUCTION



The 4th United Nations Global Road Safety Week held from 8th to 14th May had speed management as its central theme. As a contribution to the Week, Global NCAP, Euro NCAP and Australasian NCAP held a seminar in London on May 9th on the role of vehicle-based advanced systems to assist drivers to drive within posted speed limits. The purpose of the seminar was to examine the state of the art of current speed assist system (SAS) technologies and how to encourage their greater use in vehicle fleets worldwide. A major focus of the discussions was the role of SAS in New Car Assessment Programmes (NCAPs) and how consumer awareness of the benefits of these systems can be encouraged. Euro NCAP has been a pioneer of the inclusion of SAS into their rating system and the seminar will consider how their innovative approach can be shared with other NCAPs. See: <https://www.youtube.com/watch?v=SoZLrZTnUGs> for an introductory film on SAS.

The seminar, chaired by Global NCAP's Secretary General, David Ward was held under 'Chatham House Rules' so that all discussion was non-attributable. The presentations and speakers at the seminar included:

STATE-OF-THE-ART - Overview of current systems & market availability by Richard Schram, Euro NCAP

NCAPs AND SAS - Promoting best-practice by Anders Lie, Swedish Transport Administration & Michael Paine, ANCAP

Removing the roadblocks to broader adoption by Stephen T'Siobbel, TomTom (map supplier), Yoni Epstein, MobilEye (sign recognition), Ulrich Veh, ACEA (vehicle manufacturers) and Natalie Schmid, CLEPA (automotive suppliers)

This report summarises the issues raised during the seminar and proposes practical recommendations to assist NCAPs that may consider including SAS in their future rating systems.

SPEED ASSIST TERMINOLOGY



This section is based on the Euro NCAP protocol for SAS and research papers. There are three main sub-systems of SAS:

1. Speed limit information function (SLIF), where the vehicle obtains speed limit information from traffic sign recognition (TSR), digital maps of speed limits or a combination of these technologies. This can be used to advise the driver of the prevailing speed limit, amongst other uses.
2. Speed limitation function (SLF), where the vehicle is prevented from accelerating beyond a speed selected by the driver (in a similar way to using cruise control).
3. Intelligent Speed Assist (ISA), where SLIF and SLD are combined to automate (or semi-automate) the setting of the speed used by SLD and/or an alert for the driver

ISA is further categorised into the degree of control:

- a) Advisory ISA - provides an alert to the driver if the vehicle exceeds the speed limit by a selected amount but does not physically limit the vehicle speed. The alert could be audible, haptic, visual or a combination and may have progressive levels of alert (this can earn up to 2.5 out of 3 points from Euro NCAP)
- b) Voluntary ISA - provides speed-limiting based on the SLIF but can be easily over-ridden by the driver (this can earn up to 3 out of 3 points from Euro NCAP)
- c) Mandatory ISA - provides speed-limiting based on the SLIF but cannot be over-ridden by the driver (the Euro protocol does not provide for mandatory ISA)



OUTCOMES

Overall observations

- In the European Union (EU), the vehicle industry and component/systems suppliers are on on-board with market available SAS.
- Euro NCAP is the world's leader among NCAPs in encouraging SAS
- It is likely that the EU will regulate for SAS pending final approval of the European Commission's draft General Safety Regulations which is currently being considered by the European Parliament and the Council of Ministers. See for background to the proposed legislation: http://ec.europa.eu/growth/tools-databases/newsroom/cf/itemdetail.cfm?item_id=902
- The technology works and is available on the market - it is mainly a matter of fine-tuning and data quality.
- Good quality speed data is essential when connecting to the speed limiter/adaptive cruise control.
- The main concerns are the initial and on-going accuracy of speed limit mapping and traffic sign recognition and the degree of control available to the driver
- One option is to encourage vehicles to be fitted with the technology but to delay activation until the necessary mapping and sign recognition capabilities are ready for reliable operation. This means that the technology can be swiftly introduced in other regions and progressively activated once accuracy improves.
- Lack of accurate data should not be used as an excuse for delaying the introduction of the technology on all types of new vehicles in all regions.
- Governments and other stakeholders, such as NCAPs, can speed up this process.

SAS Protocols and Uptake

- Euro NCAP published its first SAS test and assessment protocol in 2009 and it became an important part of the "Safety Assist" component of the star rating system from 2012. See: <https://www.euroncap.com/en/for-engineers/protocols/safety-assist/>
- Since 2012 there has been a rapid uptake of the technology in the EU with more than 90% of models rated in 2015 earning points for SAS, mainly for driver-selected speed limiting (SLF).
- Recently the Euro NCAP protocol has encouraged speed limit data to be provided for the information of drivers, either through digital maps of speed limits, traffic sign recognition or as combination of these technologies (SLIF).
- Several models have now earned Euro NCAP Safety Assist points for linked SLF and SLIF, where the car knows the speed limit and adjusts the speed limiting according to this limit (ISA). Note that SLF always has driver over-ride available ("Voluntary ISA").
- From 2018 the protocol will also encourage advanced SLIF where conditional and implicit speed limits are covered.
- No other NCAPs currently encourage SAS through their rating systems and it is evident that uptake is minimal outside of the EU.
- Australasian NCAP will align with the Euro NCAP rating system from 2018 and it is expected that there will be rapid uptake of SAS, using systems developed for Europe.
- During a transition period ANCAP is republishing Euro NCAP results but allows a concession for SAS - the vehicle must have the relevant functionality (SLF and/or SLIF) but it need not be activated. This is to allow time for digital maps of speed limits and traffic sign recognition to be developed for Australia and New Zealand.
- It is recognised that reliable SLIF is required for safe automated driving.

Speed Management in Road Safety Strategies

- Speed management is an important road safety tool and a key component of the Vision Zero model for safe traffic – see 'Managing Speed' published by World Health Organization in 2017. (See: <http://www.who.int/mediacentre/news/releases/2017/speed-management-cities/en/>)

- More and more drivers appreciate in-car knowledge about the speed limit. ISA trials over several decades have often changed driver attitudes to speeding.
- In some regions with strong enforcement of speed limits, safe driving workplace policies or financial incentives such as pay-how-you drive insurance there are many drivers who wish to not exceed speed limits.
- Successful programs for speed management have resulted in remarkable trauma savings. For example the recent Tutor speed management system for motorways in Italy has resulted a 51% drop in fatalities and a 27% drop in injury accidents.
- Humans are pretty bad at judging speed and injury risk - particularly in modern cars that tend to isolate the driver from the perception of speed.
- In addition to improved safety, speed limit compliance results in less emissions, less noise, lower running costs, better traffic flow and better targeted police enforcement. With SAS, less there is also less stress for drivers who are less likely to inadvertently speed or be bullied into speeding by other motorists ("This car obeys the speed limits" on the rear window).

Effectiveness of SAS

- Numerous trials of SAS, mainly in Europe and Australia, show positive road safety benefits and good user acceptance of the technology.
- Research associated with the SAS trials, and other sources, indicate a potential for remarkable savings in killed and seriously injured (KSI).
- It should be possible to apply these results to other regions, with adjustments for travel speed distributions, crash types and similar factors in order to predict potential savings.
- As an example. a recent pilot study of US National Accident Analysis System data by the University of Adelaide used detailed data from electronic data recorders to determine initial travel speeds and impact speeds. Cases where key vehicles exceeded the speed limit were re-analysed to predict injury outcomes if that vehicle had been traveling at the speed limit. This tentative analysis found that 33% of injury crashes in the USA would be avoided under this scenario. These early results indicate that KSI savings are likely to be much higher than this. Furthermore, 22% of crashes would have been avoided altogether, resulting in fewer major disruptions to traffic.
- The actual savings also depend factors such as SAS market penetration, user acceptance and degree of automated control
- Police reporting of speeding as the "cause" substantially under-estimates the contribution of speeding to the outcome of a crash. Reductions of a few km/h in impact speed can have a major effect on the risk of serious injury.
- An analysis of crash risk in metropolitan (urban) Perth, in West Australia, found that about half of all KSI could have been prevented if all key vehicles had not been speeding. The potential savings were estimated to be: 5% for 1-5km/h above the limit, 10% for 6-10km/h, 10% for 11-15km/h, 10% for 16-20km/h and 15% for more than 20km/h above the limit. This spread was due to the large number of vehicles exceeding the speed limit by a small amount. This suggests that measures which address low-range speeding, such as SAS, are worthwhile, particularly in urban areas. Vulnerable road users benefit the most.
- Telematics trials have shown that speeding in urban areas results in imperceptible savings in travel time. A study in metropolitan Sydney found the average saving through speeding was 30 seconds per day and that this was associated with a grossly disproportionate increased risk of loss of life or disabling injury.
- Another outcome from SAS research is that not all vehicles need to be fitted with SAS to achieve worthwhile crash savings because other vehicles in the traffic stream are less likely to speed.

Removing the road blocks to SAS introduction

- Availability of accurate speed limit information is crucial for successful ISA. This includes prominent, unambiguous traffic signs and up-to-date, accurate digital maps.
- Navigation map providers recognise that speed limits are an important component of the services they provide.
- In Europe, they are well advanced in mapping speed limits and in keeping them up-to-date. Mobile mapping (cameras on cars) is be used to detect speed-related traffic signs and improve map accuracy.



- Speed sign recognition is needed for mapping as well as camera-based SLIF. This is hampered by a wide variation in traffic signs and speed limit strategies (e.g. implicit speed limits) across countries and between regions.
- Systems developed for the EU can be used in other regions. Map providers are addressing other regions as there are demands for speed limit information beyond SAS (e.g. telematics and automated driving).
- EU governments are leading other regions by providing information about speed limit changes to map providers (part of the TN-ITS initiative)
- User feedback is also important for improving mapping and traffic sign recognition accuracy. This could be automated as cars become more capable of traffic sign recognition.
- The coming Euro NCAP protocol requires map updates every three months or less. Map providers are likely to be able to meet this requirement but uploading the updates to the vehicle could be an issue in the short term.
- Temporary speed limits, particularly a lack of signs to indicate the end of a temporary speed zone are likely to remain an issue.
- The vehicle industry expects that the cost of adding SAS to vehicles will be relatively high in the short-term. It is noted, however, that SAS is one of the lowest-cost components of the Euro NCAP Safety Assist assessment. Furthermore, technology such as cameras is also used for other functions such as autonomous emergency braking and lane support systems.
- There is agreement that ISA should always be over-rideable by the driver (“Voluntary ISA”). Although mandatory (non-overrideable) ISA likely has the strongest effect for reducing KSI the reality is that it would be unpopular, particularly in view of the false readings due to map data and sign-recognition limitations. In some high-speed circumstances such as motorways these false reading could be a safety issue.
- The vehicle industry would prefer subtle driver alerts such as haptic warnings rather than audible warnings (e.g. so that passengers are not aware of the speeding).
- The industry would also prefer that, for ISA, drivers acknowledge a change in speed limits before the system adjusts to the new limit. It was noted that numerous ISA trials have not found these measures to be necessary (provided the driver can easily over-ride the system) and that they could lead to much less effective ISA. Importantly, these features may make the ISA system unacceptable to potential ISA users such as fleet operators.
- Greater driver understanding of safety considerations when setting of speed limits and the risk from exceeding these speed limits would aid acceptance of ISA. Consistent, logical, evidence-based setting of speed limits would also assist in the acceptance of ISA.
- There is potential for SAS to help drivers choose appropriate speeds for the circumstances in addition to complying with speed limits. For example, ISA could recommend reduced speeds according to road conditions such as rain or ice. V2X technologies could recommend adjusted speeds due congestion ahead.

Steps to Global Implementation

In order to encourage the introduction and uptake SAS it is recommended that NCAPs worldwide and governments:

- Develop a suitable test and assessment protocol (preferably based on Euro NCAP protocol)
- Develop test capability for assessing SAS
- Support/encourage local and global activities in speed sign recognition (e.g. training the machine to recognise traffic signs) and standardisation of signs. That is, encourage a logical, machine readable speed limit system. Use of implicit speed limits (e.g. a town name sign instead of a speed limit sign) should be minimised.
- Support/encourage local activities in digital mapping of speed limits - includes notifying map providers of changes to speed limits. Where unavoidable, implicit speed limits should be logical and amenable to digital mapping.
- Arrange public demonstrations of SAS to allay concerns and point out (current) limitations
- Encourage authorities to take speed limits seriously and to enforce speed limits. With effective enforcement comes customer demand for SAS
- Encourage SAS functionality (e.g. using technologies developed for the EU) even if there is limited geographical implementation in early years (i.e provide for delayed activation of systems)

- Consider encouraging manual speed limiting for any new vehicle that has cruise control (can use same control buttons, as most French cars have done for several years under a voluntary agreement)
- Consider encouraging inclusion of speed limit data for any new vehicle that has a navigation system
- Consider encouraging smartphone apps that have SAS functions (to expose drivers of older vehicles to the technology)
- Include SAS in efforts to change driver attitudes to speeding
- Ensure that autonomous vehicles comply with speed limits

More details are contained in the individual presentations (see links below).

LINKS FOR MORE INFORMATION

EURO NCAP DESCRIPTION OF SAS

<http://www.euroncap.com/en/vehicle-safety/the-ratings-explained/safety-assist/speed-assistance/>

PRESENTATIONS AT THE SEMINAR

1. Richard Schram, Euro NCAP
<https://www.slideshare.net/secret/MwxvPdCA244Bgd>
2. Anders Lie, Swedish Transport Authority
<https://www.slideshare.net/secret/pyzQ3mm0Mi2Q2Z>
3. Michael Paine, ANCAP
<https://www.slideshare.net/secret/H1xFpab7uXTK8w>
4. Stephen T'Siobbel, TomTom
<https://www.slideshare.net/secret/nW5t8Em3GRZH6l>
5. Yoni Epstein & Yoel Krupnik, Mobileye
<https://www.slideshare.net/secret/doQYdSpUfjxuyt>
6. Ulrich Veh, ACEA
<https://www.slideshare.net/secret/GjpUD4pH0dWbgQ>
7. Natalie Schmid, Continental, on behalf of CLEPA
<https://www.slideshare.net/secret/3AfuAs2DwOIY4X>

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