Editorial

Is intelligent speed adaptation ready for deployment?

A B S T R A C T

There have been 30 years of research on Intelligent Speed Adaptation (ISA), the in-vehicle system that is designed to promote compliance with speed limits. Extensive trials of ISA in real-world driving have shown that ISA can significantly reduce speeding, users have been found to have generally positive attitudes and at least some sections of the public have been shown to be willing to purchase ISA systems. Yet large-scale deployment of a system that could deliver huge accident reductions is still by no means guaranteed.

© 2012 Published by Elsevier Ltd.

Road user compliance with the law and with regulations is a vital element in the delivery of a safe road transport system. The European Transport Safety Council has observed that progress in achieving reductions in road fatalities has been fastest in those countries that have prioritised increased compliance with France being a notable example (European Transport Safety Council, 2007). The need to improve compliance has been acknowledged at a political level. Thus the European Commission in its recommendation of 21 October 2003 on enforcement in the field of road safety stated: “The main causes of fatal accidents are speeding, driving under the influence of alcohol (hereafter referred to as drink-driving) and non-use of a seat belt. Cutting back these causes of deaths on the roads would achieve more than half of the intended 50% reduction in fatalities.”

Traditionally compliance with speed limits has been achieved by a combination of persuasion and enforcement, with the risk of actually being caught for any single act of speed infraction being quite low. Speed cameras increase the risk of being caught and subsequently punished but only for equipped locations. Other tools in speed management from the infrastructure side are traffic calming, which is generally more suitable for lower-speed roads, and increasing driver awareness of road function and of expected interactions through the use of “self-explaining roads” (Theeuwes and Godthelp, 1994).

Intelligent Speed Adaptation shifts the provision of information on momentary speed compliance into the vehicle. In addition to information on the speed limit or even on appropriate speed and warnings about excess speed, intervention can also be provided such that the vehicle is limited to the speed limit either permanently or with the possibility of override. That such technology has large potential for delivery of a safer road network might seem obvious, given the knowledge about the close relationship between speed and accident risk (e.g. Elvik et al., 2004). Research on ISA can be said to date from 1982 when the first study of driver behaviour with a variable speed limiter (actually a driver-set one) appeared (Saad and Malaterre, 1982). Since then there has been a flood of research on ISA, so that it can be argued that ISA has been more systematically investigated and evaluated than any other driver assistance system.

The wave of research on ISA culminated in a variety of Field Operational Tests (large-scale trials in real-world conditions) on various forms of ISA conducted in countries across the globe. Thus there have been trials of advisory and intervening ISA in Sweden and France (Biding and Lind, 2002; Ehrlich et al., 2006; Romon et al., 2006), of advisory ISA in Denmark (Lahrmann et al., 2012a; Lahrmann et al., 2012b) and the United States (Reagan, 2011), of intervening ISA in the UK and Belgium (Carsten et al., 2008; Vlassenroot et al., 2007) and of non-overrideable intervening ISA in The Netherlands (Duynstee et al., 2001). Most of those studies ISA in isolation, sometimes with additional financial incentives to encourage compliance, but in a few countries trials were conducted examining ISA in comparison to and in conjunction with other systems. Examples here are the Belonitor trial in The Netherlands which looked at an informative ISA combined with headway information and with incentives to comply (Mazurek and van Hattem, 2006) and the TAC SafeCar project in Australia which investigated intervening ISA in conjunction with headway warning and seatbelt reminder (Regan et al., 2006).

These trials have generally produced rather positive results in terms of behaviour, showing that the use of ISA in all its forms brings about a significant reduction in speeding. They also indicate a reasonable level of acceptance by users, even though users might feel somewhat disadvantaged by having ISA in that they can see other drivers travelling faster than they are. The prediction from the speed changes observed in the ISA-UK project is that an ISA system targeted purely at compliance with existing speed limits could, in its strongest variant (i.e. a non-overrideable version), deliver a 29% reduction in injury accidents (Lai et al., 2012). Applying the power model of Elvik et al. (2004), that translates into a 50% reduction in fatal accidents. In other words, shifting drivers from their current state of compliance with speed limits to virtually full compliance can cut the number of fatal accidents in half in a country that has quite good current compliance in international terms. For countries with poorer performance, the impact would most likely be greater.
From the papers in this issue we learn that ISA can bring additional benefits. It could serve as an assistive device to promote safe driving by those with an acquired brain injury (Klarborg et al., 2012). It can change drivers’ attitudes to speeding, acting as a kind of medicine to improve attitudes, so that experience of driving with ISA reduces intention to speed (Chorlton and Conner, 2012). Acceptability of ISA is reasonably high. From a survey of a representative sample of British drivers, we learn that “there is a . . . large part of the population that, if given the right incentives, would be willing or even keen to equip their vehicle with an ISA device” (Chorlton et al., 2012). And ISA technology can be enhanced so that it warns drivers about inappropriate speed on the approach to curves on rural roads, thus addressing the problem of loss-of-control accidents on such roads, which are a significant contributor to fatalities and serious injuries (Jiménez et al., 2012).

So, if ISA has so much to offer and if public attitudes are reasonably positive, why are we still waiting for the large-scale deployment of the system? The reason is not a technological one: a simple informative or warning ISA can be provided via a standard satellite navigation device or smartphone, so that for the consumer the cost of ISA is negligible. Many new vehicles come equipped with a driver-set speed limiter, to which the information on speed limits from a Satnav could easily be connected in order to create an intervening ISA.

It can also be conceded that there are some legitimate concerns about particular ways in which ISA might affect behaviour. Lack of short-term updates to the digital map providing the in-vehicle information combined with driver over-reliance could lead to lack of awareness of temporary speed limits at such locations as construction zones. However, this problem can be overcome through pushing out map updates at a high frequency. The paper by Jamson et al. (2012) reveals that there may be some learning issues associated with the use of a non-overrideable ISA in rural roads in terms of drivers not adapting their overtaking behaviour to the longer time required for overtaking manoeuvres when speed is governed. It is highly unlikely that non-overrideable ISA will be available or implemented soon, and when it is the provision of an overtaking support system should, as the authors suggest, address the problem.

Acceptance or public acceptance as perceived by politicians would seem to be the obstacle to deployment. It is worth recalling that such safety measures as breath tests and the compulsory wearing of seatbelts were not adopted without significant controversy. Speed compliance is not universally favoured. The paper by Lahrmann et al. on test driver recruitment reveals that young drivers in North Jutland, even when they could save out of pocket on insurance costs through the use of an ISA, are reluctant to have one fitted. When in 2005 a recruitment letter was sent to 6000 young drivers offering a 30% discount on insurance, only 40 drivers expressed interest. Admittedly, the drivers had to pay a fully refundable deposit of €700. A further attempt was made at recruitment, this time without any requirement of a deposit. Eleven thousand four hundred letters were sent out, only 180 replies were received and a mere 50 signed up. So, at least in that part of Denmark, young drivers would rather have freedom to speed than save around €720 a year.

One of the statements by a politician quoted in the same paper is rather revealing about some politicians’ attitudes. Politician A stated: “With this device in my car I found out that, actually, I do drive too fast. When I am in a hurry or when I start my trip 15 min too late, I would like to be able to exceed the speed limit. And this is exactly the situation where this voice becomes very annoying. . . I do not want this voice in my car at all. . . I want to be able to exceed the speed limit outside the cities. You don’t want to be the one delaying everyone because you abide by all the rules. You have to keep moving.”

The paper by van der Pas et al. (2012) reveals that even among experts there are a large number of uncertainties about the precise effects that ISA would have in wide implementation on driver behaviour and on the traffic system more generally. Whether any real-world intervention in the road traffic system takes place without such uncertainties is a moot point, but the authors do conclude that there are few barriers to the implementation of warning ISA. They also conclude that the absence of a digital road map containing accurate and up-to-date information on speed limits is a significant obstacle that needs to be overcome.

Some countries have moved forward on the map. The map for The Netherlands, which is claimed to cover every public road in the country, can be found at http://rws.nl/geotool/wegbeheerders.aspx?cookieLoad=true (accessed 3 May 2012). And there are other signs that ISA is finally moving from research and development to deployment. Euro NCAP now offers extra rewards to ISA-equipped under its “Assist” scheme for evaluating advanced safety systems. This should promote the fitment of ISA by vehicle manufacturers. At a political level one national leader has indicated his desire to take ISA forward. President Sarkozy, in his speech of 30 November 2011 to Association Prévention Routière, stated: “I am convinced that the Intelligent Speed Limiter system can bring us remarkable results. A roadmap for its deployment in our country is to be produced within three months. France must be a forerunner in this area.” Perhaps the 30 years of research on ISA will start to bear fruit.

References


Reagan, I.J., 2011. A field experiment to test the effects of automated feedback and monetary incentive on speeding behavior. PhD Dissertation, Old Dominion University, Norfolk, Virginia, USA.


Oliver Carsten
Institute for Transport Studies,
University of Leeds, Leeds LS2 9JT, UK