Institute for Transport Studies

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Intelligent Speed Assistance

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Automated vehicles: the safety promise in the long term

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Eno Center for Transportation (2015)

AVs may be assumed to [be] 90 percent safer at the 90 percent market penetration rate (reflecting the near-elimination of human error as a primary crash cause, thanks to greater use of V2V communications and improving AV technologies).

- The issue is actually not so simple, but…
- Can we use the same technologies to deliver real safety benefits now?

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The research evidence on speed

Speed

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"Speed remains a very important risk factor. It has a greater effect on the number of accidents and injury severity than almost all other known risk factors."

Rune Elvik, *The Power Model of the relationship between speed and road safety: Update and new analyses* (2009)

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We know a lot about speed and risk

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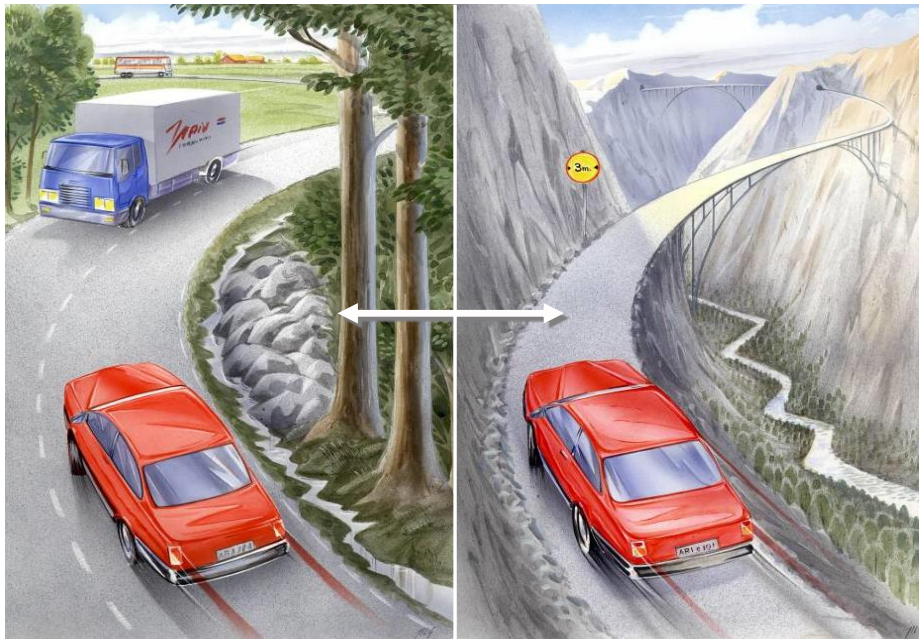

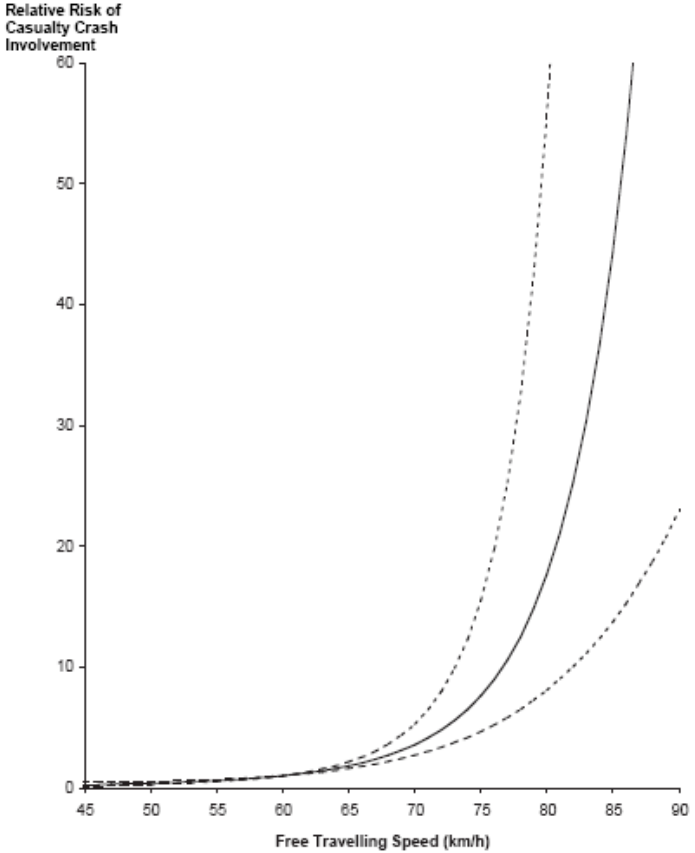

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Severity: the power model

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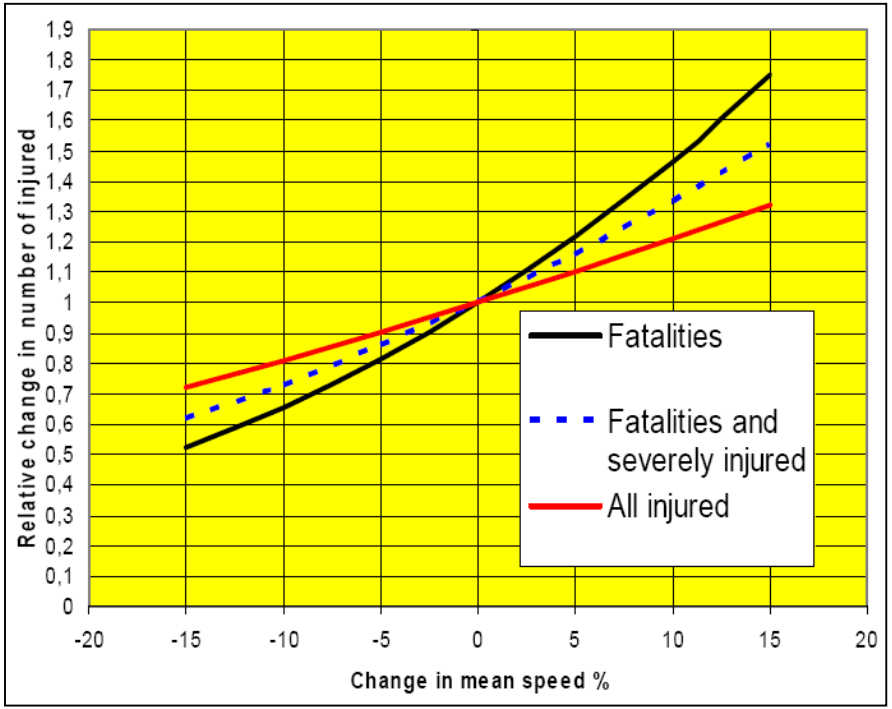
Andersson and Nilsson,1997; Nilsson, 2004; Elvik et al., 2004; Elvik, 2009:

- Injury accidents go up approximately with the proportionate change in speed squared for a length of road
- Serious injury accidents with speed cubed
- Fatal accidents with speed to the fourth power



Source: Nilsson, 2004

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Intelligent Speed Assistance (ISA):

Bringing the speed limit into the vehicle

How does ISA work?

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1. **Information:**
   - GPS + a digital road map with speed limit information
   - An electronic camera on the vehicle that can “see” the speed limit signs
   - Or both

2. **HMI:**
   Tell the driver the speed limit and typically beep when the limit is exceeded

3. **Assistance (if wanted):**
   Limit vehicle speed to the limit, but typically allow the driver to override

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Many real-world trials of ISA

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Sweden 1999-2002

Denmark (2000-2001 and 2005-2008)

Finland (2001-)

ISA-UK (2001-2006)

Two projects in Belgium (2001-2002)

France (2002-2006)

Austria (2003-2004)

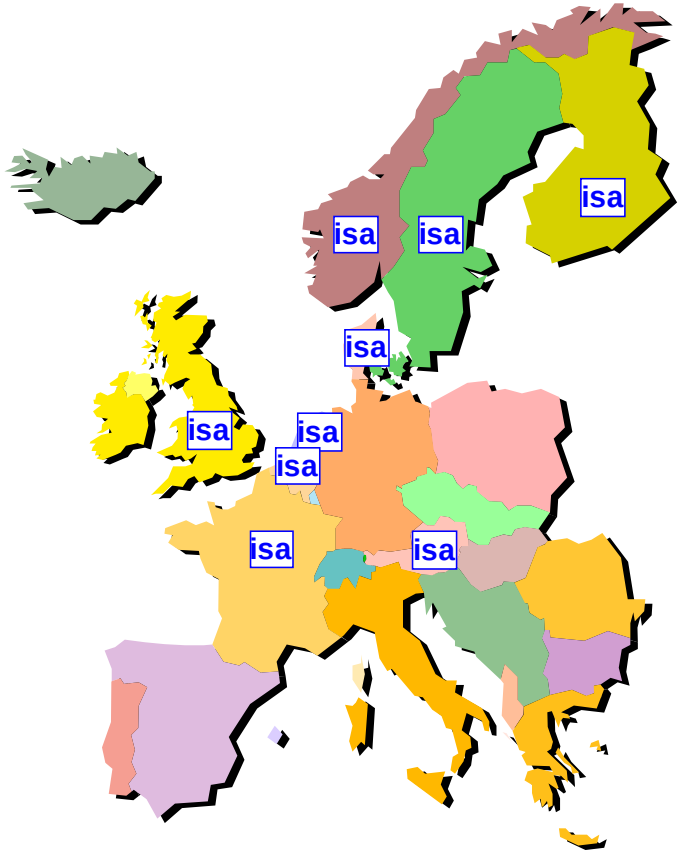
Norway (2005-)

+

Australia (TAC SafeCar and NSW)

Japan (Soft Car)

USA



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Speed distribution on 30 mph (50 km/h) urban roads

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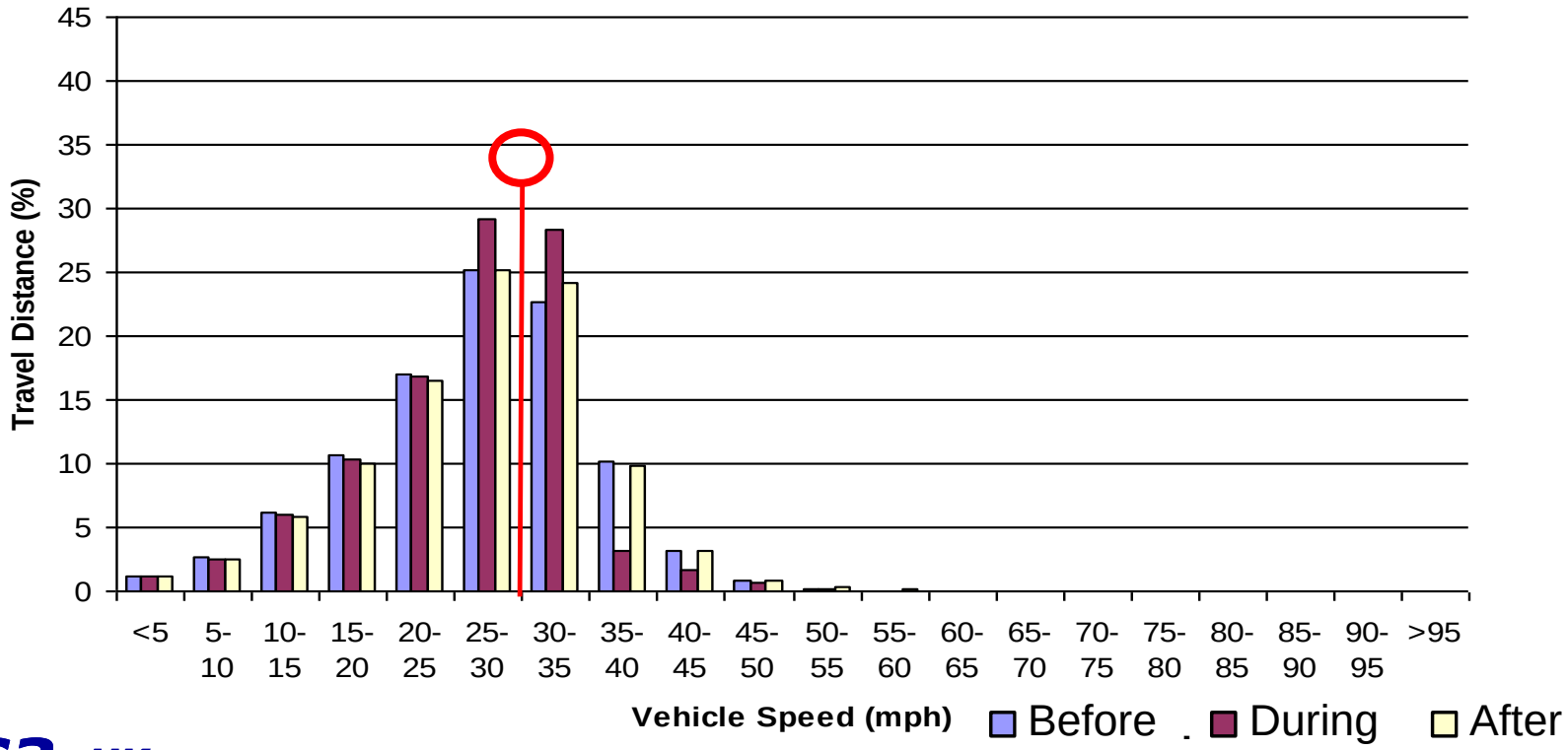

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Speed distribution on 70 mph (110 km/h) roads

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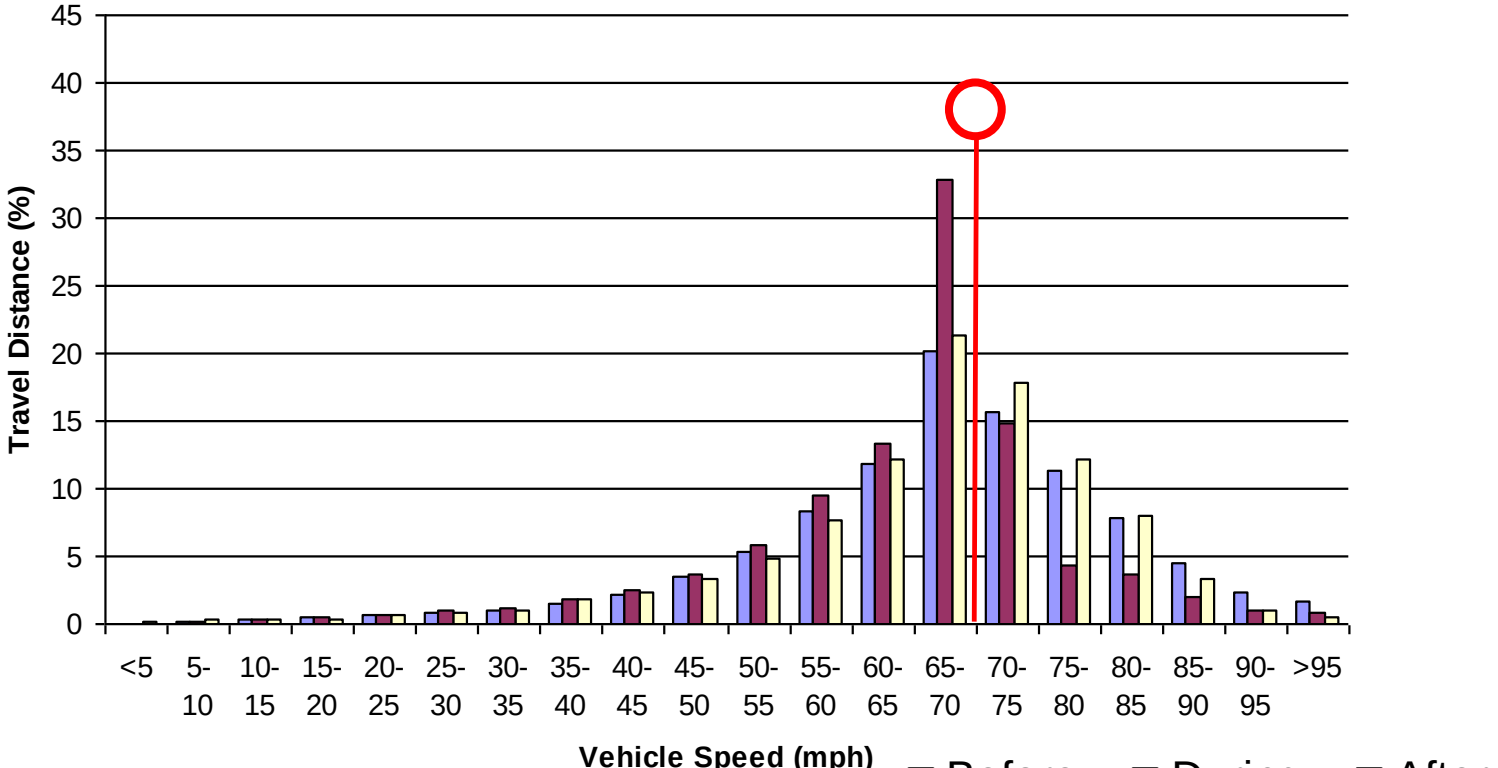

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Acceptability

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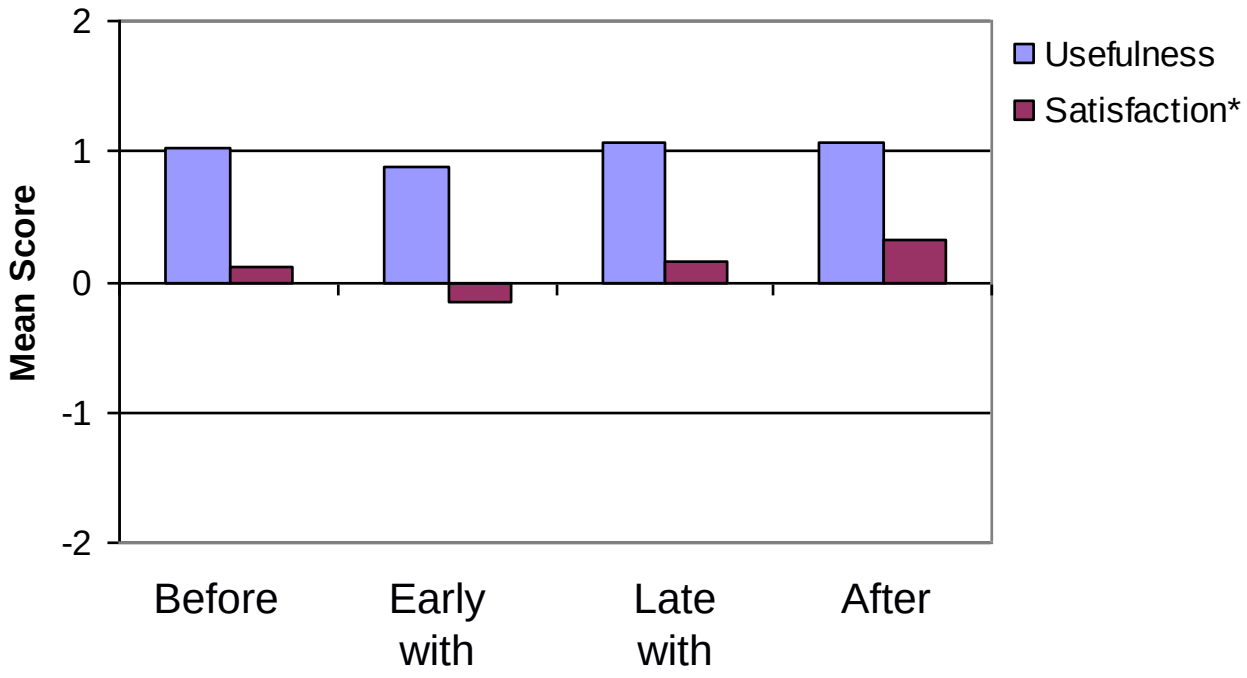

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Intention to speed

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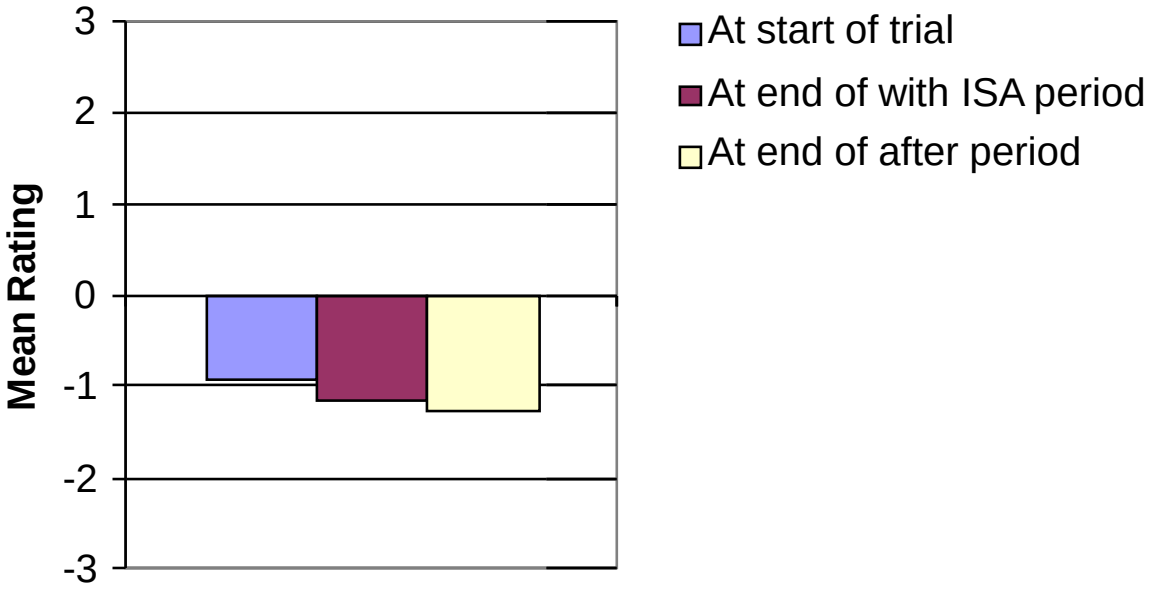

Mean intention to speed

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Method for estimating accident reductions with ISA

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- Based on models from the literature relating speed to crash risk (e.g. Kloeden et al., 2001, 2002)
- These models have been calculated from real-world data
- They are not drawn from the police reported contributory factors for accidents

Great Britain: estimated risk reduction by type of ISA

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Estimated Reduction in Injury Accidents for Vehicles with ISA

ISA Variant	Reduction
Advisory ISA	−2.7%
Assisting (Overridable) ISA	−12.0%
Assisting (Non-Overridable) ISA	−28.9%

= −50% for fatal crashes

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After all the research, what happened?

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- Not much
- … for a while

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Euro NCAP Safety Assist

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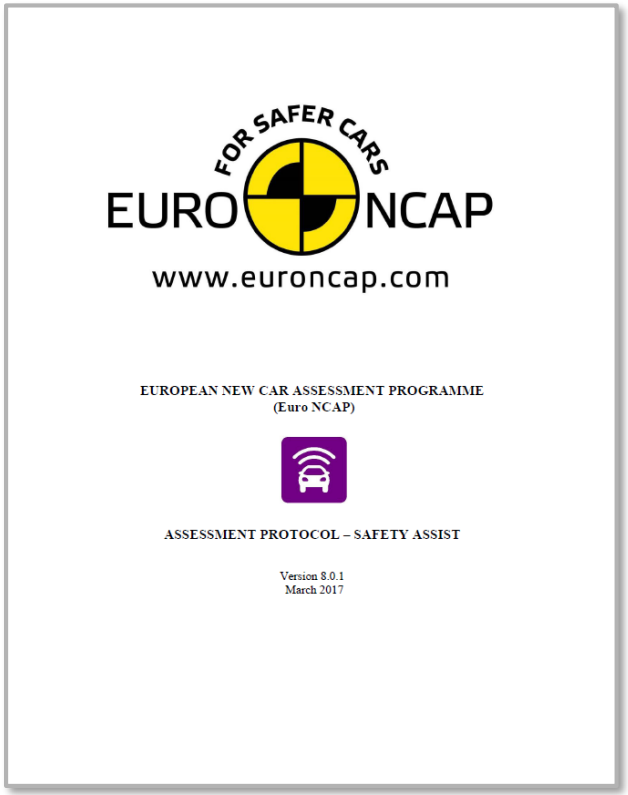
- From 2013 onwards, Euro NCAP has given points to cars with Speed Assistance Systems as part of its Safety Assist protocol
- More points are given to:
  - Vehicles that have both camera and map technologies to identify the speed limit
  - Vehicles that have an assisting (as opposed to just a warning) ISA
- The protocol has been revised more than once



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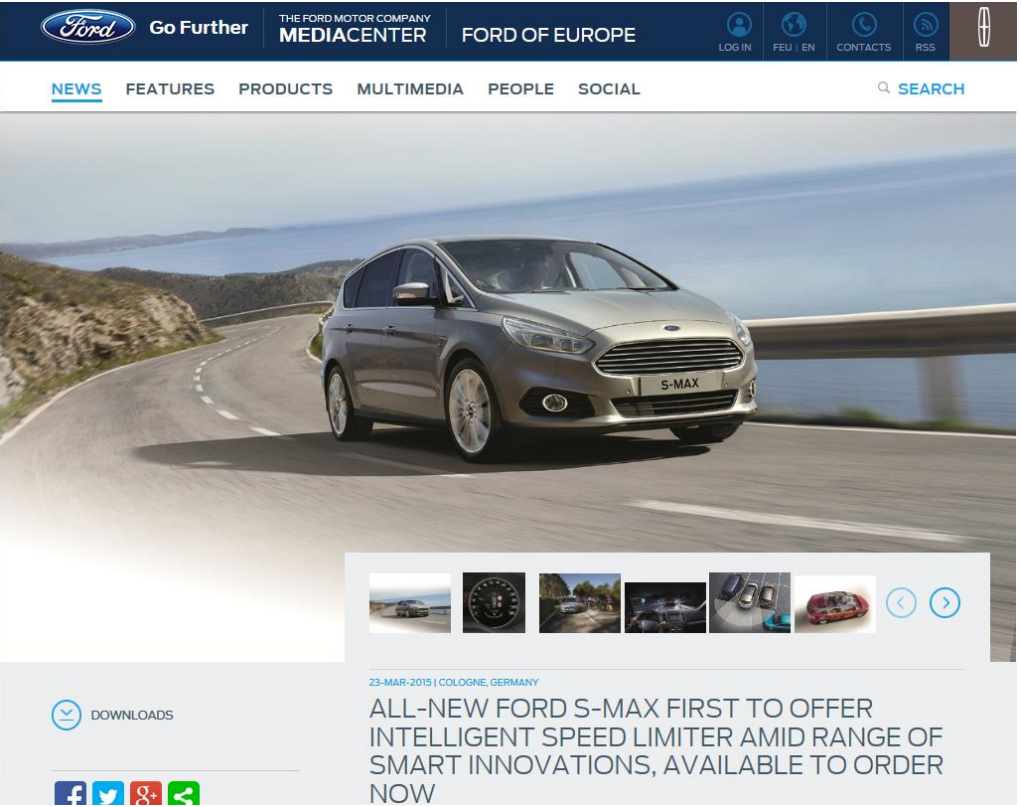
Announcement from Ford, March 2015



- Offered as an option on all new models
- According to Ford, take-up is very large
- Other manufacturers such as Volvo also offer similar systems

The role of regulation:

“Fitting safety as standard”

The importance of regulation

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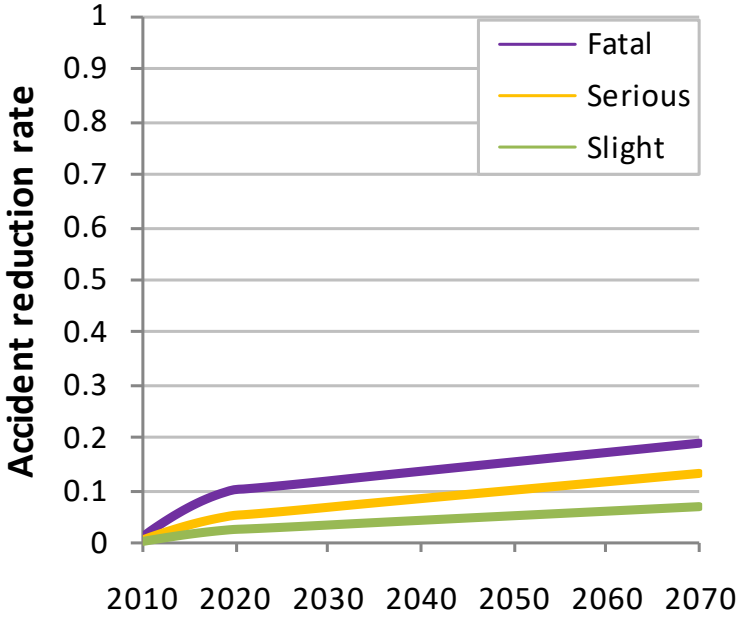
GB accidents saved over time for the Market Driven scenario



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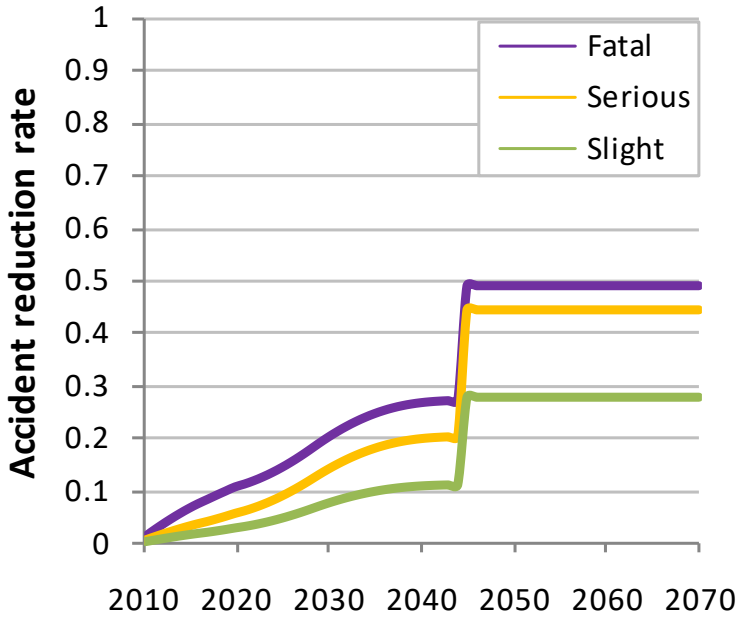
GB accidents saved over time for the Regulation scenario



More progress

A radical change in vehicle regulation

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http://bookshop.europa.eu/en/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-pbNB0714108/

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DG Growth

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- The General Safety Regulation and the Pedestrian Safety Regulation set the minimal safety standards for new vehicles sold in Europe
  - Last revision was in 2009
- General Safety Regulation (GSR) study to consider the potential of *crash avoidance* technologies to supplement *crash mitigation* technologies (published March 2015)
- Sets the European regulatory agenda for future vehicles
- Actual outcome in terms of legislation is co-decision of Commission, European Parliament and Council

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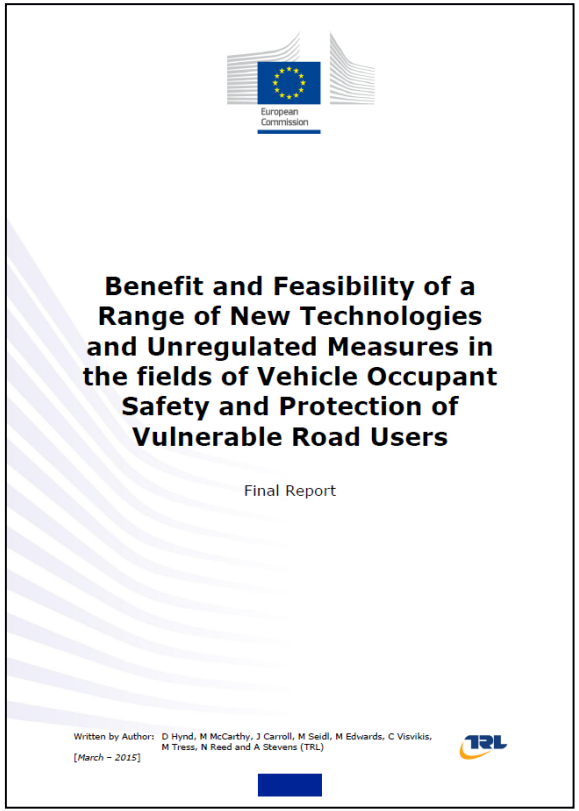
The GSR study report



Active Safety

"Based on the evidence reviewed, the following measures were considered to be likely to be cost-beneficial and could on that basis be taken into consideration:

- Enhanced AEB with collision mitigation
- Intelligent speed adaptation
- Lane keep assist
- Reversing detection and reversing camera systems
- Emergency brake light display"

GSR study recommendations

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Active Safety

Code	Measure	Feasible?	BCR	Legislate?	Recommendations/Notes
AEB	Expansion and enhancement of AEB, BAS and LDW to avoid or mitigate collisions, including inter-urban, city and those with VRU	✓	~1	●	Greatest casualty benefit for AEBS is for M1 then N1 vehicles, although cost-benefit less clear than for N2/N3. System cost estimates suggest 'city safety' systems may be getting to the breakeven cost point
ISA	Speed limiters controlled by road speed limit (speed assist, intelligent speed adaptation)	✓	>1	●	BCR>1 for 6 Member States, for voluntary activation (switched on/off by the driver) and mandatory activation, and public acceptability of the systems considered to be growing. BCR higher for mandatory activation system, but both have positive BCR

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Further consultation on GSR revision: European Commission workshop with stakeholders, 2016

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GSR-2: Intelligent Speed Adaptation (ISA)

TRL

Intelligent Speed Adaptation (ISA)

ISA describes a range of technologies which are designed to aid drivers in observing the speed limit. The three main forms of ISA are:

- Advisory - alert the driver to when their speed is greater than the speed limit;
- Voluntary - the driver chooses whether the system can restrict their vehicle speed and/or the speed it is restricted to; and
- Mandatory - the driver's speed selection is physically limited by the ISA system.

Make ISA mandatory for all M and N vehicles (to be decided what form of the above):

- 01/09/2020 new approved types
- 01/09/2022 for new vehicles

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ETSC input to the workshop

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- The ISA system to be introduced should be **Assisting** (i.e. intervening and overridable) and **default to being on** with vehicle ignition
- **ISA + AEB** will work together in synergy
  - By curtailing excess speeds, ISA will help AEB reduce collision severity
  - Particularly important for **pedestrian and cyclist** AEB

ETSC European Transport Safety Council

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So…

- New vehicles sold in Europe from around 2022 are likely to have Intelligent Speed Assistance as a required fitment
- It remains to be seen exactly what type of system the Commission will propose

FOR SAFER CARS
GLOBAL NCAP
www.globalncap.org

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Workshop on Speed Assist Systems

in London

next week

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Conclusions

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- ISA is a well-proven technology with very significant safety benefits
- Benefits are probably even larger for countries that are performing less well in safety
- NCAP can encourage take-up
- Fleets can use ISA as a safety management tool
- It is available as a tool for national implementation, if there is the political will

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Thank you for your attention!

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