

How can intelligent vehicle safety systems be implemented?

Co-operation involving industry and road authorities

Despite targeted efforts to improve road safety over the past few decades, road accidents are still one of the major causes of fatalities across the world. To help address this issue, the European Commission, in its White Paper on Transport 2001, set the goal of reducing road accident fatalities 50% by 2010. Clearly, achieving such an ambitious goal depends on various factors, such as the upgrade of European road infrastructure, consistent improvements to driver training and behaviour, as well as new technologies in vehicles. The development and application of these new technologies - often called Information and Communication Technologies (ICT) - in road traffic has led to the emergence of new intelligent vehicle and infrastructure-related safety systems, which have the potential to dramatically reduce the number and consequences of road accidents. Now, the big problem is how to accelerate the implementation and take-up of these systems so that their safety potential can be fully exploited.

One such initiative helping to progress ICT implementation is eSafety, a joint industry-public sector action aiming to reduce the number of accidents by using new intelligent vehicle safety systems and related infrastructure systems utilising ICT. It includes the eSafety Forum, which was established in 2003 as a joint platform of road safety stakeholders promoting implementation. The Forum has created several Working Groups focusing on priority topics in its action plan.

Founded in July 2003, the Forum's Implementation Road Map Working Group (WG) was given the task of investigating how to promote the roll-out and deployment of vehicle- and infrastructure-based as well as co-operative systems in order to contribute to the overall goal of reducing road accident fatalities by 50% by 2010.

Its objectives included to:

- Identify the industry's technical and economical potential, as well as the topics and timetable for infrastructure improvements by the public sector with regard to eSafety systems capable of affecting road fatalities in Europe by 2010.
- Develop a regularly reviewed road map, which focuses on the technological steps and economic implication models for introduction of intelligent integrated road safety systems, as well as the required improvements in road and information infrastructure.

The inclusion of both vehicle- and infrastructure-based systems in the WG's focus caused special problems as there were strong differences between the actors involved, the development timelines and financial issues. In addition, the decision processes were quite different and especially problematic for truly co-operative systems, since they are based on communication between vehicles and the infrastructure. As such, the WG involved actors from wide range of domains, with strong representation from the car manufacturers and road authorities. The WG also had members from user- or customer-related organisations, implementation road map experts, vehicle inspection, and industry. A close link was established to

the Conference of European Directors of Road (CEDR). The chairing of the WG was also arranged to reflect the orientation of both the road authority and the vehicle industry.

All intelligent systems investigated

The WG’s activities started with data collection about eSafety systems and continued with an assessment of them in a common framework which considered the following aspects:

- accidents / fatalities to be affected
- percent change in accidents expected
- other side effects / comfort functions
- cost of in-vehicle systems
- cost for infrastructure systems (investment / maintenance)
- cost for information infrastructure (investment / maintenance)
- year of technical readiness
- year of implementation readiness
- user acceptance and willingness to pay
- year of implementation by regulation
- specific implementation issues
- estimation of cars equipped with at 2010 / 2020
- other actors involved for implementation

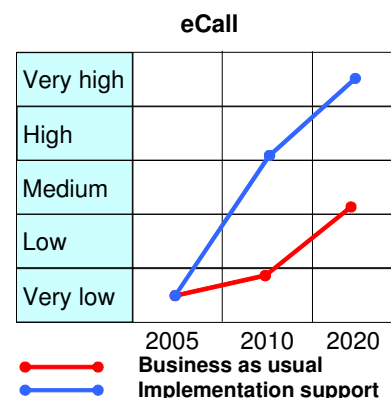
Priority systems to be promoted

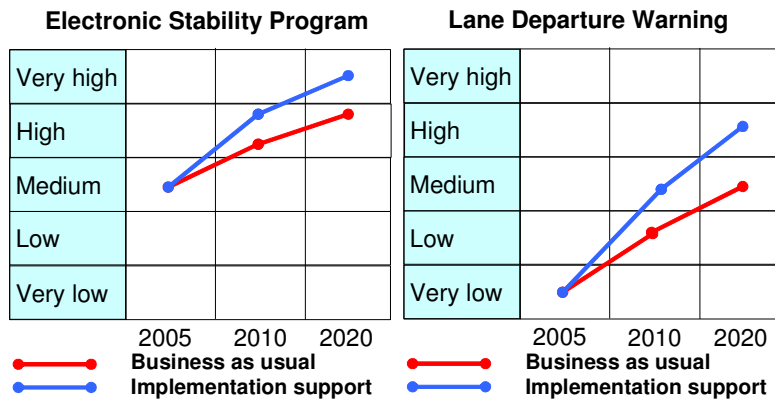
The assessment resulted in the identification of the following 11 priority systems:

Vehicle-based systems	Infrastructure-related systems
<ul style="list-style-type: none"> • ESP (Electronic Stability Program) • Blind spot monitoring • Adaptive head lights • Obstacle & collision warning • Lane departure warning 	<ul style="list-style-type: none"> • eCall (automatic in-vehicle emergency call system) • Extended environmental information (Extended FCD) • RTTI (Real-time Travel and Traffic Information) • Dynamic traffic management • Local danger warning • Speed Alert

The potential safety effects of the systems were first estimated based on research, as well as expert assessments using German accident statistics and the European CARE accident database. This was followed by discussions on how to promote the future deployment rate of these systems.

The results showed that feasible differences between vehicle-based systems and more infrastructure /or mixed systems were evident within the business case. It also found that different types of incentives could possibly enhance the customer awareness for eSafety features. For each priority system, two market penetration forecasts were estimated: one based on “business as usual” conditions and the other based on incentives and other measures to promote the deployment of the system. Example of market penetration scenario:





The number of fatalities between 2010 and 2020 were estimated for the priority systems based on the market penetration scenarios and the expected safety impacts of each system. The most effective of the systems in the near future - electronic stability control (ESP, ESC and other brand names) - was estimated to

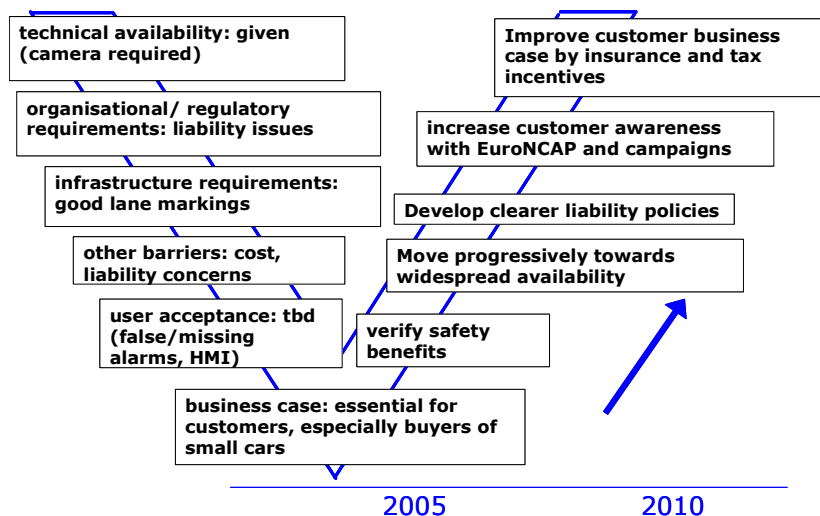
reduce fatalities in “business as usual” case to 2,000 - 2,700, with 2,900 - 3,900 fatalities in the “implementation support” case in the EU 25 in 2020. The monetary value of the fatality and injury savings is estimated to be nearly €10 billion.

Implementation road maps

The WG wrapped up its work with the development of an implementation road map for each of the priority systems, which included the following parts:

- System description
- Technology availability
- Road and information infrastructure need and availability
- Organisation requirements
- Regulatory requirements / barriers
- Business case / Customer awareness and acceptance
- Key success factors
- Feasible deployment strategies

The key part of the road map identifies the feasible deployment strategies for each system. These strategies are described in the form of V models, as illustrated in the example below.



Deployment strategy for Lane Departure Warning systems.

Time to implement the road maps

The Implementation Road Maps Working Group's full report is publicly available on the eSafety Support website:
www.esafetysupport.org/en/esafety_activities/esafety_working_groups/implementation_road_map.htm

The WG is now concentrating on monitoring the deployment of the priority systems and the take-up of the implementation road maps. It is also making the implementation road maps more detailed and concrete to ease their take-up.

Now it is up to the stakeholders involved in the deployment of intelligent vehicle safety systems to utilise the implementation road maps so that everyone can benefit from their positive effects.

Reference

Kulmala, R. & Mäurer, H.-J. 2005 (eds). Final Report and Recommendations of the Implementation Road Map Working Group. eSafety Forum, Brussels, 18 October 2005.
http://www.esafetysupport.org/download/working_groups/Final_Report_181005.pdf