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# ISA implementation and uncertainty: A literature review and expert elicitation study

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ABSTRACT

Each day, an average of over 116 people die from traffic accidents in the European Union. One out of three fatalities is estimated to be the result of speeding. The current state of technology makes it possible to make speeding more difficult, or even impossible, by placing intelligent speed limiters (so called ISA devices) in vehicles. Although the ISA technology has been available for some years now, and reducing the number of road traffic fatalities and injuries has been high on the European political agenda, implementation still seems to be far away. Experts indicate that there are still too many uncertainties surrounding ISA implementation, and dealing with these uncertainties is essential for implementing ISA. In this paper, a systematic and representative inventory of the uncertainties is made based upon the literature. Furthermore, experts in the field of ISA were surveyed and asked which uncertainties are barriers for ISA implementation, and how uncertain these uncertainties are. We found that the long-term effects and the effects of large-scale implementation of ISA are still uncertain and are the most important barriers for the implementation of the most effective types of ISA. One way to deal with these uncertainties would be to start implementation on a small scale and gradually expand the penetration, in order to learn how ISA influences the transport system over time.



## 1. Introduction

In 2007, approximately 42,600 people were killed in road traffic accidents in the European Union (EU) and over 1.7 billion people were injured (European Road Safety Observatory (ERSO), 2008). Research shows that roughly one-third of these accidents are caused by speeding (Organisation For Economic Co-Operation and Development (OECD), 2006). Although the number of traffic fatalities within the EU is declining, recent figures show that the current rate of decline is far from sufficient to meet the goals for 2010 (EU Press Office, 2006; ETSC, 2006).

Speed management policies can be categorized according to the three E's: Enforcement, Education, and Engineering (infrastructure and vehicle engineering). Analysis of speed reducing measures taken in the past shows that most of the three E measures are being used. The success of these measures has clearly been shown in practice, and different studies have made clear the costs and benefits of most of these measures (for an overview, see Elvik and Vaa, 2004). However, despite the fact that in-vehicle technologies might be able to replace other measures in a more effective and efficient way, vehicle design measures (vehicle engineering) aimed at reducing speed are underused.

A heavily researched and promising speed management measure that qualifies as a vehicle engineering solution is Intelligent Speed Adaptation (ISA). ISA is a system that supports drivers in avoiding speeding by continuously comparing the driving speed to the prevailing speed limit. In case of speeding, the ISA system can warn the driver (e.g. with audio visual signals), assist the driver (e.g. with a haptic throttle, which provides resistance above the speed limit), or even restrict the driver from going faster (e.g. the dead throttle, which makes it impossible to go faster than the local speed limit). In addition to categorization by the level of intervention the system gives, ISA can be categorized by the type of speed limit information it uses (static speed limits or dynamic speed limits), and whether it can be switched off by the driver (overridable vs. non-overridable). In this paper, we mainly use the level of inter-

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