ITS and Speed Management in Europe

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Presentation Structure

• Introduction
• Applied ITS Speed Management Measures
• In-Vehicle Safety Systems
• Telematics
• Vehicle Automation
Speeding

- Speeding - is a highly critical issue for road safety
  - increasing accident risk and severity
  - certainly highly misunderstood by all

- Observed vehicle speeds above the speed limit in the EU are (ETSC):
  - on urban roads: 35% - 75%
  - on rural roads: 9% - 63%
  - on motorways: 23% - 59%

- 2.100 lives could be saved each year in the EU if average speed dropped by 1Km/h
Speed Management

- **Steps** of effective speed management policies (restrictive or not):
  - Step 1: Setting speed limits
  - Step 2: Informing drivers about the speed limit
  - Step 3: Road engineering measures
  - Step 4: Enforcing speed limits

- ITS applications are particularly appropriate for **Steps 2 & 4**
Speed enforcement

- **Systematic enforcement** (low fines, high nr of controls)
- **Increased perception** of enforcement
- **Driver behaviour change**
- **Lower traffic speeds**
- **Improvement of traffic safety culture**
- **Reduction of traffic accidents and casualties**

*Your Road Safety is on our RADAR.*
Applied ITS Speed Management Measures

- Variable Message Signs (VMS)
- Variable Speed Limit Signs (VSLS)
- Automated enforcement: Cameras
- Automated enforcement: Section control
- ADAS (Cruise Control, Intelligent Speed Adaptation)
Variable Message Signs (VMS)

• Speed management messages can be communicated through text **VMSs**.

• Commonly used to inform drivers for speed limit reductions due to **unusual conditions** ahead:
  - Workzones
  - Incidents (e.g. crash)
  - Adverse weather conditions
Variable Speed Limit Signs (VSLs)

• Variable speed limits are adjusted according to the current environmental and road conditions.

• Posted limits are usually determined through Active Traffic Management (ATM), to maximize safety and stabilize traffic flow.
Radar Speed Signs

- **Radar speed signs** are a special type of VMS that aims to slow traffic by alerting drivers of their speed.

- The *immediate and personalized feedback*, as well as the impression of *speed surveillance*, causes drivers to respond by slowing down.
Automated Speed Cameras (1/2)

• Mobile speed cameras manually controlled by traffic police are gradually supplemented by **automated (fixed) speed cameras**.

• Fixed cameras have a **larger safety effect per location**, whereas hidden mobile cameras have a larger area of influence.

• Estimated effect of fixed cameras (Elvik & Vaa, 2004; Høye, 2014): **15% - 20% crash reduction**
Automated Speed Cameras (2/2)

Barriers for fixed automated speed cameras:

• Installation **cost**.

• Politically **undesirable measure**, due to low acceptance by road users

• Violation **processing** (usually manually) can be a challenge, often resulting in dismissed violations.
Section Control

- Estimates the **average speed** over a road section, by automatically identifying each vehicle when entering and leaving.

- Estimated **effect** (Stefan, 2006; Soole et al., 2014; Høye (2014)): approximately 30% reduction in injury crashes and 45% - 80% reduction in crashes with killed or seriously injured.

- Processing **challenges** as in speed cameras.
In-vehicle Safety Systems
Revised EU Policy
Adaptive Cruise Control

- **Adaptive Cruise Control** automatically adjusts the vehicle speed to maintain a safe distance from vehicles ahead.
- Based on **sensors**: radar or laser sensor or a camera setup.
- Available by most vehicle manufacturers.
- Studies on safety impact are **inconclusive** - largely affected by set parameters (Li et al., 2017).
Intelligent Speed Adaptation (ISA)

- In-vehicle technology that identifies the speed limit, advises driver and/or limits engine power.

- Uses speed sign-recognition video camera and/or GPS-linked speed limit database.

- Types of ISA:
  - informative: giving information to the driver
  - voluntary supportive: driver can choose to set the maximum speed
  - mandatory supportive – intervenes at all times when the vehicle exceeds the speed limit
Revised General Safety Regulation

- EU institutions have recently reached a provisional political agreement on the revised **General Safety Regulation**.
- As of 2022 new safety technologies will become **mandatory in European vehicles**.
- The Commission expects that the proposed measures will help save over **25,000 lives** and avoid at least **140,000 serious injuries** by 2038.
New Mandatory Safety Features

- **Intelligent Speed Assistance** is amongst the mandatory safety features for all vehicle types, from 2022:
  - cars
  - vans
  - trucks
  - buses
Telematics & Speed Management

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Project co-funded by European Union funds (ERDF, IPA, ENI)
Telematics & Speed Management

- **Telematics applications** may be used extensively in the future for speed management practices.

- Speed monitoring of drivers by means of **smartphone** technology is already used to inform, notify, motivate and train the drivers.
Telematics & Speed Management

- **Incentives** for obeying the speed limits can be provided in terms of insurance cost premiums, or other approaches (e.g. social gamification)

- In the future, big data from such applications could also be used for **dynamic speed management** schemes
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Vehicle Automation & Speed Management
SAE Levels of Automation

0: No Automation
- Zero autonomy; the driver performs all driving tasks.

1: Driver Assistance
- Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.

2: Partial Automation
- Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.

3: Conditional Automation
- Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.

4: High Automation
- The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.

5: Full Automation
- The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.
Speed Management - L4-L5 Automation

- Fully autonomous vehicles (Level 4 & 5) may eliminate the need for speed enforcement.

- They will obey the posted speed limit, or even decide on the most appropriate speed for prevalent conditions.

- The focus could be shifted from speed enforcement to the appropriate definition of the vehicle’s AI speed decision algorithm.
Connected Vehicles

• V2V and V2I communication will increase the precision and effectiveness of speed management.

• Examples of anticipated future:
  – Infrastructure communicates reduced speed limits to vehicles in case of incidents,
  – Vehicle in front informs following vehicles prior to sudden braking,
  – Platoons of connected vehicles operating in close headways increase the traffic efficiency of intersections, etc.
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