Executive Seminar: Speed and Speed Management in Road Safety Policy
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Measuring Speeds

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Presentation Outline

1. Introduction
2. Why, What, When, Where and How to Measure
3. Data supported Measures against speeding
4. Future Challenges
Introduction
Speed – The major crash cause

**Speed** affects:
- the risk of being involved in an accident,
- the severity of an accident

"The higher the speed, the higher the accident risk and the more severe the accident consequences"

- Speed has been found to be a major contributory factor in around:
  - 10% of all accidents and
  - 30% of the fatal accidents
Speed Perception

- Both the Authorities and the road users underestimate largely the role of speed in road accidents
- Focus is given on positive effects of speed on travel time instead of its negative effects on safety and environment

- In road safety we work mostly in blind, as we have very little knowledge about the frequency of speeding and its real role on accident occurrence and severity

- Thus, road traffic safety measures are largely under-designed and even less accepted by the population
Need for Speed Monitoring

- Absence of *speeding monitoring* and accountability (both by the users and the Authorities) limits seriously road safety performance

- Decision making in road safety management is highly dependent on appropriate and *quality data*

- Different *purposes of speed data collection* imply different data and hence different methods of collection
Why, What, When, Where and How to Measure
Speed measuring techniques (1/3)

Fixed cameras
- The method involves recording the distance moved by a vehicle in a short period, then computing the speed.

Mobile cameras
- They may be hand-held, tripod mounted, or vehicle-mounted.
- Laser Guns are also included, which rely on the measurement of the round-trip time of the infrared light beam to reach a vehicle and be reflected back.
- Fixed cameras have a larger safety effect per location, whereas hidden mobile cameras have a larger area of influence.
Speed measuring techniques (2/3)

**Traffic counts**
- Measures the passage time of a vehicle between two detectors, a measured distance apart.
- Detectors can be pairs of pneumatic tubes, tribo- and piezo-electric cables, switch tapes, inductive loops and photo-electric or electro-magnetic beams, but also traffic cameras.

**Section control**
- Estimates the average speed over a road section, by automatically identifying each vehicle when entering and leaving.
Speed measuring techniques (3/3)

Smartphones / OBD
- Sensors on smartphones and/or vehicles are fitted with receiver units that pick up signals from the Global Positioning System (GPS) satellite network.

In-depth investigation
- Vehicle crash profile measurements for calculating crash energy and speed change at impact.
- Among data collected on the site of accident are initial speed and collision speed

Driver perception/attitudes
- Acceptability of driving over the speed limits
- Self-declared speeding
Speed measurement types

- Vehicle speed: The instantaneous speed of the vehicle

- Average speed of vehicle(s) at a specific point in time
  - on a road axis
  - at a network

- Average speed of vehicles over time:
  - by road type
  - by area type

- Traffic Police collects data on speeding from enforcement controls
- Data on speeding from sample counts are collected for the estimation of Speeding KPIs
Data Sampling

- **Sampling - Road type**
  (Urban, Interurban, Motorways)

- **Sampling - Traffic conditions**
  (junctions or not, weather conditions, week/weekend days, day/night)

- **Sampling - Vehicle type**
  (Passenger cars, Motorcycles, Trucks, Cycles (incl. e-scooters and e-cycles))

- **Sampling - Driver type**
  (Driver Age, Driver Gender, Distraction, Drink-and-drive, trip purpose)
Data supported Measures against speeding
Data for policy making support

- **Policy making support** by identifying properly the problem and taking prompt and customized measures

- **Measures** include road design, engineering measures, legislative initiatives, etc.
  - by Road Authorities (public and private)
  - by Ministries of Transport, Health, Education
The example of reducing speed limits in France

- Reduction of speed limits on rural roads from 90 km/h to 80 km/h since 01/07/2018

- Detailed data comparisons and analyses (crashes, exposure, speeding) led to significant conclusions:
  - Fatalities on rural roads decreased, while fatalities on the remaining road network increased
  - Overall road safety performance on rural roads improved more compared to the remaining road network
Predicting & benchmarking network’s risk

- Future short- and long-term predictions in time and space using spatial econometric models
  - e.g. Spatial error model, Spatial durbin model

- Benchmarking and efficiency measurement of road risk using benchmarking techniques (e.g. stochastic frontier analysis and data envelopment analysis)
  - for all existing levels (micro/ meso/ macro)
  - for all different dimensions (time/ space)
Analysis and feedback on driver speeding

- Continuous **driver support** with aim to improve driver behavior and develop better road safety culture at all road users

- Real-time collection from smartphone sensors and processing of speeding data to create **microscopic driving behaviour metrics and KPIs** to be used in:
  - Clustering algorithms for driving pattern identification
  - Classification techniques for pattern recognition of the dynamic driving behavior

- Develop **recommendation systems algorithms** to provide feedback to drivers on their behaviour
  - e.g. Knowledge graphs per trip, at all trips, etc.
Measuring driver behaviour – BeSmart project

- Assessment and improvement of *speeding behaviour* and safety of drivers in every day trips

- Development of measures by means of *smartphone applications* and a *web-platform*, allowing to inform, notify, motivate and train the drivers

- Personalised *speeding feedback* is communicated to drivers, allowing them to identify their critical deficits or unsafe behaviours

- Between the two phases of the experiment, *speeding by car drivers* was reduced by 28.39%

More info at: [https://besmart-project.gr/](https://besmart-project.gr/)
Data for enforcement and campaigns

- **Enforcement**
  - Design of an efficient road traffic enforcement plan with specific targets
  - Consideration of targeted groups of road users
  - Choice of enforcement operations location and time
  - Set-up and execution of police checks

- **Publicity campaigns**
  - Speed awareness campaigns by public and private organizations
  - Focused on specific driver groups or aiming at their social surroundings
  - Campaigns are more effective when combined with enforcement
Data for the vehicle industry

- **In-vehicle technology** identifies speed limits, advises driver and/or limits engine power

- **Types of Intelligent Speed Adaptation (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

- New technologies are also based on the possibilities of **vehicle-roadside communication**

- **Dynamic speed limits** take account of the real time traffic, road and weather conditions, reflecting better the safe speed
Future Challenges
Future Perspectives

- Speed is **highly misunderstood** by all and this must change.

- There is great need for:
  - more data and knowledge
  - better exploitation of current and future data
  - broader geographical coverage

- Data **focus** on:
  - more accurate road accident data
  - exposure data and performance indicators
  - measures and policies effectiveness evaluation
Road Safety Technology Perspectives

- **Digitalization** (AI, ML, etc.) opens great new data possibilities for more efficient speed management:
  - road user support and guidance
  - evidence based public and private road safety decision making at all levels

- New great potential for seamless **data driven procedures** from safety problems identification to selection and implementation of optimal solutions

- New increased **net present value of road safety data**, available for (real-time) early problem detection and prompt and customized decision support
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