



SafetyCube

Infrastructure Risk Factors and Measures

Stakeholders consultation workshop

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Vision



- To create an **inventory of evaluated road safety measures related to the road infrastructure**, with results from accident risk factors analysis and measures cost-efficiency assessment, to be integrated in the European Road Safety Decision Support System (DSS)



Objectives

- The in-depth understanding of infrastructure related **accident causation factors** and the identification and evaluation of the most appropriate related **measures**.
- Exploit a large amount of existing accident data (macroscopic and in-depth) and knowledge (e.g. existing studies) in order:
 - *to identify and rank risk factors related to the road infrastructure,*
 - *to identify measures for addressing these risk factors,*
 - *to assess the effects of measures.*



A taxonomy of risk factors and measures



More than 90 risk factors and 95 measures in 15 infrastructure areas

Exposure

Traffic flow

Traffic composition

Road safety management

Road safety audits, inspections etc.

Blackspots treatment

Speed management

Horizontal alignment

Road curvature (curve radius, curve frequency, transition curves etc.)

Vertical alignment

Gradient

Vertical curvature (sight distance)

Cross-section

Superelevation, cross-slopes

Lanes (number, type, width)

Shoulder (type, width)

Median / barrier

Roadside

guardrails, obstacles, visibility

Sidewalks, cycle lanes

Road surface

Friction

Uneven surface

Oil, leaves, ice, snow etc.

Road type

Junctions alignment

Roundabouts

Interchanges & ramps

At-grade junctions

Channelization (left turn lanes, traffic islands)

Rail/road crossings

Traffic control

Speed (speed limits, section control, speed humps)

Traffic signs

Delineation and Road markings

Traffic signals (installation, timing)

ITS (VMS, V2I)

Lighting

Workzones

Weather

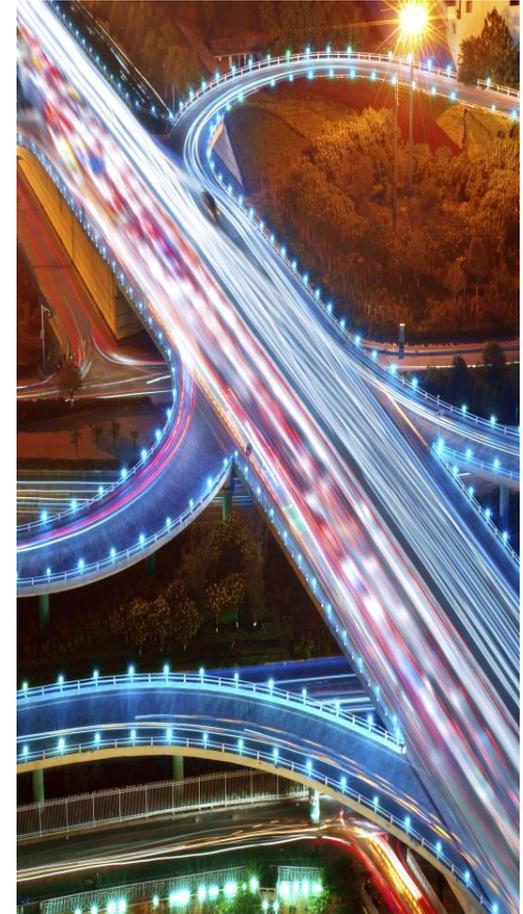
Infrastructure 'hot topics'

- **Road safety management:** Road safety impact assessment, Road safety audits, Roads star rating, etc.
- **Self-explaining and forgiving roads:** simpler and more readable road design standards, related traffic arrangements for VRUs, etc.
- **ITS applications:** Vehicle to Infrastructure communication (V2I), cooperative systems, etc.
- **Urban road safety measures:** interventions developed to reduce the number of VRUs casualties in urban settings, e.g. stop-advanced-zones for motorcycles, traffic calming measures, bicycle lanes etc



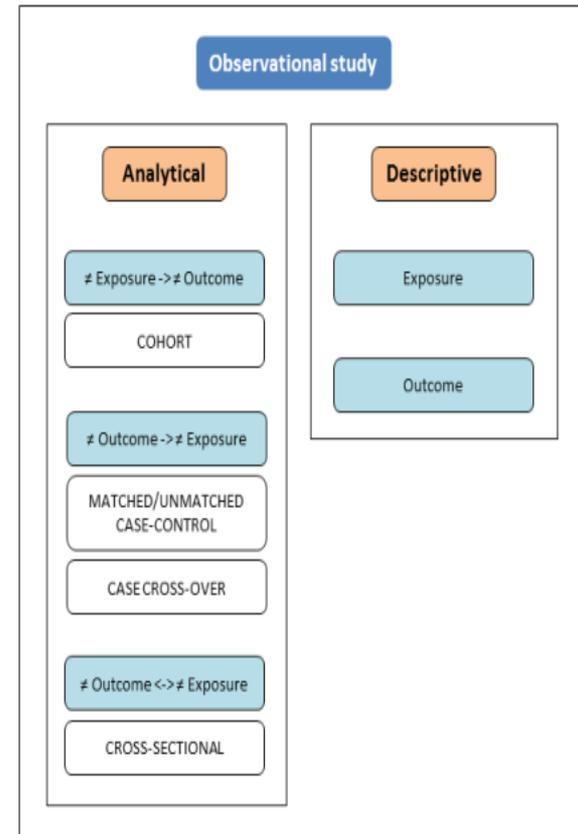
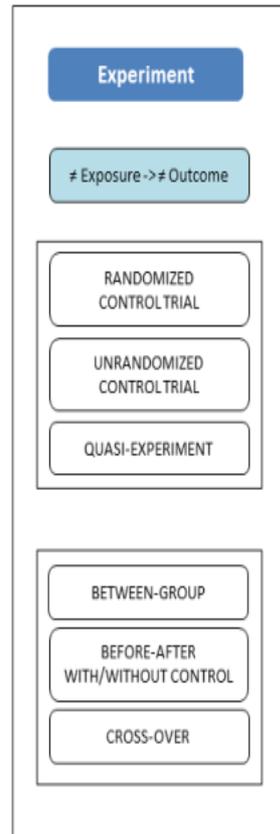
Methodological approach

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- **Methodologies and guidelines** developed in SafetyCube are implemented and tested in the analyses.
 - *Mixture of analysis & meta-analysis*
 - *Macroscopic or in-depth data will be used for carrying out original analyses.*
 - *existing studies will be examined for carrying out meta-analyses to estimate the effects of risk factors and the efficiency of road safety measures.*
- **Systems approach:** links between infrastructure, user and vehicle risks
- **Hot topics** & additional risk factors and measures
- Assessment of the **quality of the data / study methods**



Guidelines and tools

- A **taxonomy of study designs** and estimators of effects
 - *Crash Modification Factor (CMF)*
 - *Absolute difference*
 - *Regression coefficient / slope*
 - *Odds ratios*
 - *Accident rates ratios*
- A **template for coding research studies** and existing results
- A **template for summarising results** / meta-analysing risk factors



Progress to date

- **Wealth of measures and studies** related to road infrastructure (CMF approach)
- Selection criteria:
 - *Meta-analyses*
 - *Recent studies*
 - *High quality studies*
- Already analysed approx. **70 studies**, and many more in progress.
- Updated more than **15 existing meta-analyses**, about 65 more in progress.



Main challenges

- Implementation of systems approach
- **Combined effect of measures**
- Methodological issues:
 - *Outdated studies*
 - *Empirical Bayes method, Accident Prediction Models*
 - *Measures costs large discrepancies*
- CMFunctions - **transferability**
- Complexity of 'hot topics' (e.g. self-explaining roads)



Expected outcomes

- **Inventory** of road infrastructure safety measures.
- Information on the risk factor tackled, the safety effects related to the measure.
- Particular emphasis on the **quality of the studies** and data used to produce the estimates
- Special notes on the **conditions for transferability** of the measures effects
- **Efficiency assessment** of the proposed measures in different countries, settings etc.

The inventory will be integrated in the European Road Safety DSS



Stakeholders' involvement

- The activities will be supported by the **consultation** of road safety infrastructure stakeholders:
- **At the beginning of the project**, will assist in the identification of user needs and “hot topics” and will provide related data and knowledge
- **At a later stage**, will provide additional data and feedback on the analyses results and DSS development



Workshop objectives

- To present the project activities to date and plans for the coming research steps, and to receive feedback concerning:
- **user needs for the DSS** to make it useful - also over time: what information is needed? how should it be presented? how could the system be accessed?, etc.
- **“hot topics” on infrastructure safety** so that the DSS addresses key issues, e.g. policy and research priorities, areas in need of cost-benefit analysis or evidence, etc.





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