Developing the European Road Safety Decision Support System

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SafetyCube project

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Coordinator: Pete Thomas, Loughborough University

Start: May 2015

Finish: April 2018

17 partners from 12 EU countries
SafetyCube concept

- **Problem**
  - *Evidence based road safety policies are becoming more usual and there is much better availability of national data and state of the art knowledge*
  - *Effective road safety policies need good information about accident risk factors and about measures*

- SafetyCube will meet this need by generating new knowledge about accident risk factors and the effectiveness of measures relevant to Europe

- It will structure this information so it can be incorporated in the European Road Safety Observatory
Vision

- To develop an inventory of evaluated road safety measures related to human behaviour, road infrastructure and vehicle, 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

• Description the background, methodology and design principles of the European DSS within the SafetyCube project

  – comprehensive common methodology is designed and applied in existing and new studies of road safety measures effectiveness evaluation

  – extensive consultation of road safety stakeholders is carried out, by means of several workshops, in order to define the user needs for the DSS

  – presentation of the structure and the functioning of the DSS together with the first results of the application of the common methodology for the evaluation of road safety measures effectiveness

Safety Conference, Tampere, 18th -21st September, 2016
Methodology - A taxonomy of risk factors and measures

- Complete taxonomy of 3 categories: human behaviour, infrastructure and vehicle.
- Specific risk factors and measures were assigned to the respective category.
- More than 90 risk factors and 95 measures in infrastructure areas, more than 115 risk factors and 250 measures for behaviour, more than 60 risk factors and 60 measures for the vehicle area have been identified.
- A detailed and recorded literature research is carried out so that key studies are identified (at each detailed level of the taxonomy, i.e. for each specific risk factor or measure)
Example: taxonomy of infrastructure risk factors and measures

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

Exposure
- Traffic flow
- Traffic composition

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 type

Road surface
- Friction
- Uneven surface
- Oil, leaves, ice, snow etc.

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
Methodology-Guidelines and tools

- A taxonomy of study designs
- Different estimators of effects
  - Crash Modification Factor (CMF)
  - Absolute difference
  - Regression coefficient / slope
  - Odds ratios
  - Accident rates ratios
Coding template and database

- A template for coding research studies and existing results (excel)
- A template for summarising results / meta-analysing
- The templates of coded studies will undergo a thorough checking and debugging process, in order to be eventually stored in a relational database, which will serve as the back-end of the DSS
DSS-Analysis of user needs

- Stakeholders from government, industry, research, and user associations.

- 3 workshops
  - June 2015, Brussels
  - October 2015, Ljubljana
  - February 2016, Brussels

- The DSS should be suitable for use by a wide range of end users, not be limited to EU policy makers, but also local authorities.

- The DSS should have the following characteristics:
  - include robust data which allow for critical analysis and transparency
  - access to the studies used and to all results as well
  - information of the best quality studies and recommendations

Safety Conference, Tampere, 18th -21st September, 2016
DSS design principles and inclusion criteria

• Design Principles
  – A Modern web-based tool
  – High Ergonomic interface
  – Simple structure
  – Powerful Search Engines
  – Fully Documented information
  – Easily Updated
  – SafetyCube DSS Website: a strong and easily found address

• Inclusion Criteria
  – Quantitative results required
  – Information completeness
  – A set of priority criteria
  – Meta-analyses are preferred over simple analyses
  – Methodological soundness and high clarity (adequate sample size, appropriate statistical methods)
  – Recent studies are preferred
DSS development - Methodology

1. Analysis of current road safety DSS worldwide
2. Analysis of User Needs (stakeholder workshops, on-line surveys)
3. Development of common methodology and contents collection (WPs 3-7)
4. Design of the DSS
5. Development of the DSS

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DSS User Interface Design (2)

- **Home Page**
  - Five entry points: Risks / Measures / Road User Types / Accident scenarios / Text search

- **Search Pages:**
  - Search from list of risk factors and / or measures (Level 1)

- **Results Pages: Risk factors / Measures**
  - Refine search criteria (e.g. countries, road user types, road types, accident types)
  - Results in Table form with synopses and studies - several items (Level 2)
  - Individual study results form - one item (Level 3)

- **Tools pages**
  - CBA calculator
  - Serious Injuries
  - Methodology, Glossary

The SafetyCube DSS is the European Road Safety Decision Support System, which has been produced within the European research project SafetyCube, funded within the Horizons 2020 Programme of the European Commission, aiming to support evidence-based policy making.

The SafetyCube Decision Support System provides detailed interactive information on a large list of road accident risk factors and related road safety countermeasures.
DSS Search Engine

• **Fully linked** search
  – search a road safety problem alone or through the measures
  – search a measure alone or through the road safety problems

• **Fully detailed** search
  – search by any parameter in each data table (road safety problems, measures)

• **Fully flexible** search
  – adjust search according to results

• **Fully documented** search
  – access background information at any stage (links, etc.)
Progress to date

- **Wealth of risks, countermeasures and studies** related to behaviour, road infrastructure and vehicle (CMF approach).
- Already analysed approx. **500 studies**, and many more in progress.
- Updated more than **20 existing meta-analyses**, about 65 more in progress.
- The **design of the DSS** is finalized and the first static prototype of the DSS is available.
- The **DSS testing phase** (with test tables) is ready till the end of 2016.
- The **DSS Pilot Operation** is starting on January 2017.
- The **final opening of the DSS** is starting on September 2017 and will be constantly updating from April 2018 and onwards.
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