SafetyCube - the European Road Safety Decision Support System

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Purpose of the workshop

- To introduce the Decision Support System to road safety community
- To explain the scientific basis of the DSS
- To invite feedback from users
- To open a discussion on the continuation of the DSS after SafetyCube ends
SafetyCube project

Funded by the European Commission under the Horizon 2020 research framework programme

Coordinator: Pete Thomas, Loughborough University

Start: May 2015

Finish: April 2018

17 partners from 12 EU countries
SafetyCube concept and vision

• 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, to be integrated in a European Road Safety Decision Support System (DSS)
Challenges of the evidence based approach

• Do we have a comprehensive method to identify risks?
  – *Road, road users and vehicles*
• Do we have a comparable method to evaluate measures?
  – *Road, road users and vehicles*
• How do we estimate the likely casualty reduction of a measure that has not been introduced to the real-world?
• Do we have a comprehensive method to evaluate cost-effectiveness?
• How do we handle the situation where there are many measures of effectiveness but they disagree?
Accessing the evidence base

• Much of the evidence on risks and measures is in the research literature – how can it be brought together?
• How can we assess transferability of measures from one country to another?
• How can the available information and data be synthesised?
• How can it be made accessible to stakeholders?
SafetyCube DSS Objectives

The SafetyCube DSS objective is to provide the European and Global road safety community a user-friendly, web-based, interactive Decision Support Tool to properly substantiate their road safety decisions for the actions, measures, programmes, policies and strategies to be implemented at local, regional, national, European and international level.

The main contents of the SafetyCube DSS concern:

- road accident risk factors and problems
- road safety measures
- best estimate of effectiveness
- cost-benefit evaluation
- all related analytic background

Special focus on linking road safety problems with related measures.
SafetyCube DSS Users

- Public Authorities
  local, regional, national, European and international
- Industry
  Infrastructure, Vehicle, Insurance, Technology
- Research Institutes, Experts
- Non-governmental Organisations
- Mass Media
- Everyone

The SafetyCube DSS is intended to have a life well beyond the end of the SafetyCube research project. It is developed in a form that can readily be incorporated within the existing European Road Safety Observatory of the European Commission DG-MOVE.
Current Road Safety DSS Worldwide

- Crash Modification Factors Clearinghouse ([www.cmfclearinghouse.org](http://www.cmfclearinghouse.org)) by NHTSA (USA) - 5,151 CMF on infrastructure only - on going

- Road Safety Engineering Kit ([www.engtoolkit.com.au](http://www.engtoolkit.com.au)) by Austroads (Australia) - 67 treatments on infrastructure only

- PRACT Repository ([www.pract-repository.eu](http://www.pract-repository.eu)) by CEDR (Europe) - 889 CMF and 273 APM on infrastructure only – high quality

- iRAP toolkit ([toolkit.irap.org/](http://toolkit.irap.org/)) by iRAP - 58 treatments (43 on infrastructure)

- Safety Performance Factors Clearinghouse ([spfclearinghouse.org](http://spfclearinghouse.org)) by Tatum Group LLC, Dr. Andrew Kwasniak (USA) - few SPF – subscribers only
SafetyCube methodology

- Consulting future users of the DSS
  1. Hot topics
  2. User requirements

- Methodologies and guidelines developed in SafetyCube.
  1. Creating **taxonomies** of risk factors and measures
  2. Exhaustive literature review and rigorous study selection criteria
  3. Use of a template for **coding studies**, to be introduced in the DSS back-end database
  4. Studies analysed for carrying out meta-analyses to estimate the effects of risk factors / measures.
  5. Drafting Synopses **summarising results** of risk factors / 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**
SafetyCube Taxonomies

Three-level taxonomies Separately for risks and measures

• **4 Categories**
  road user, infrastructure, vehicle, post impact care

• **88 Topics**
  e.g. distraction, roadside, crashworthiness

• **175 Specific topics**
  e.g. mobile phone use, no clear-zone, low pedestrian rating (NCAP)
Selection and Coding of Studies

Study search in key databases
(Scopus, TRID, Elsevier, Taylor & Francis, Springer etc.)

Study selection and prioritization criteria
- Studies with quantitative results
- Meta-analyses, or other high quality studies (peer-reviewed journals)
- Recent studies
- European studies

Coding of studies in a dedicated template
- Study design and methodology
- Results and their confidence intervals
- Study limitations
SafetyCube Synopses

139 Syntheses on risk factors / measures

Summary (2 pages)
- Effect of risk factor / measure and ranking (colour code)
- Risk / safety effect mechanisms
- Risk / safety effects size, transferability of effects

Scientific overview (4-5 pages)
- Comparative analysis of available studies
- Analysis results
  - Meta-analysis
  - Vote-count analysis
  - Qualitative analysis

Supporting document (3-10 pages)
- Literature search strategy and study selection criteria
- Detailed analyses
SafetyCube Links between Risks & Measures

Based on a dedicated methodology

- **Sequence of crash events**
- Pre-crash events → crash → consequences/outcomes

- Risk factors can be:
  - *Generic* (e.g. alignment deficiency)
  - *Circumstantial* (e.g. alcohol)

- Measures may address:
  - *Generic risks*: (e.g. road safety audit)
  - *Circumstantial risks* (e.g. enforcement)

Validated through studies and synopses results (ongoing)
SafetyCube 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
  - search for risks and measures related to specific road user groups or crash types (accident categories)

- Fully **detailed** search
  - search by any parameter in each data table in the database

- Fully **flexible** search
  - adjust and customize search according to results

- Fully **documented** search
  - access background information at any stage (supporting documentation, links, etc.)
SafetyCube DSS
Delivering a long waited powerful tool

• SafetyCube DSS is the first integrated road safety support system developed in Europe

• SafetyCube DSS offers for the first time scientific evidence on:
  - risks and not only measures
  - risks and measures not only on infrastructure
  - a very large number of estimates of risks and measures effects
  - links between risks factors and measures

• SafetyCube DSS aims to be a reference system for road safety in Europe, constantly improved and enhanced
Contact

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