Monday
15
May
at 14:00

Workshop

in the framework of the

FOURTH UNITED NATIONS GLOBAL ROAD SAFETY WEEK
8-14 May 2017

Save Lives
#SlowDown

The future of road safety research

NTUA Zografou Campus, Athens
Railways Amphitheatre of the
Department of Transportation Planning and Engineering

Monitoring road safety risk factors and measures

SafetyCube

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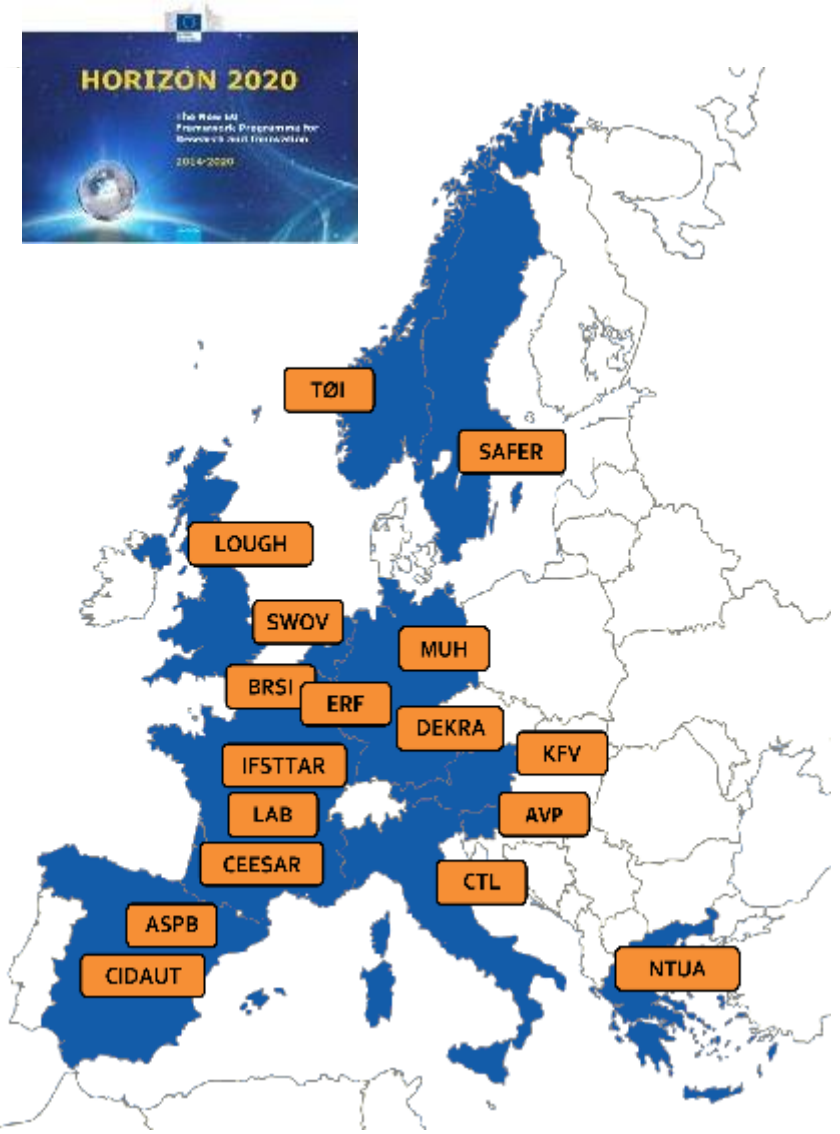
The SafetyCube project

- **SafetyCube** - Safety CaUsation, Benefits and Efficiency
  www.safetycube-project.eu
- May 2015 - April 2018

- Objective: to provide the European and Global road safety community a user friendly, web-based, interactive **Decision Support System** (DSS) to properly substantiate their road safety decisions for measures, programmes, policies and strategies to be implemented at local, regional, national, and European level.

- The **main contents** of the SafetyCube DSS concern:
  - road accident risk factors
  - road safety measures
  - best estimate of effects on casualty reduction
  - cost-benefit evaluation
  - all related analytic background

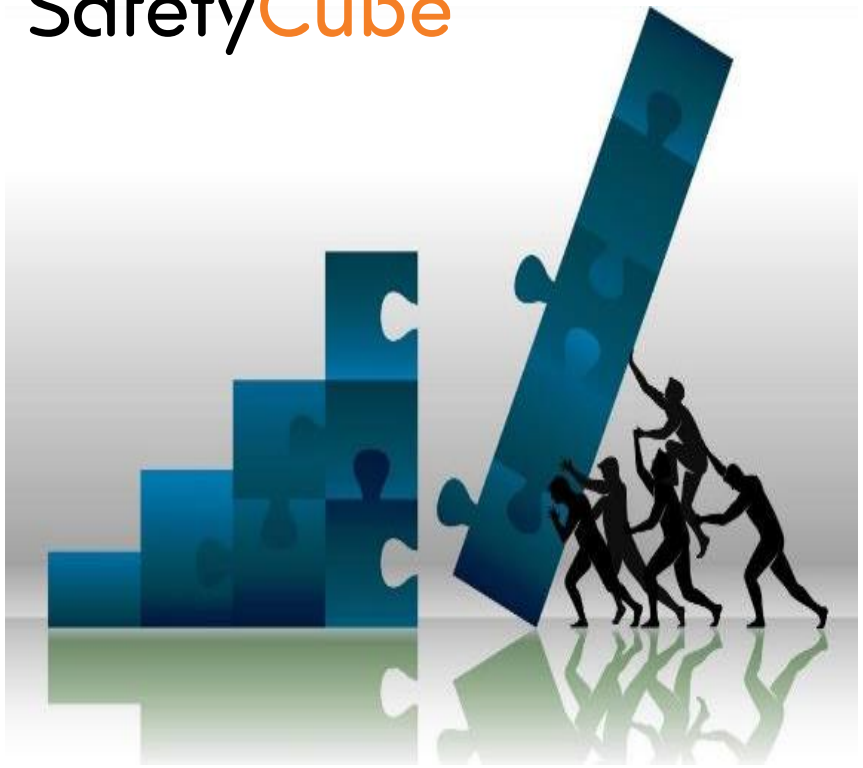


Risk Factors and Measures

- Problem:
  - **Evidence-based** road safety policies are becoming more widespread
  - **Linking** of risks and measures is imperative:
    - Specific effects are required,
    - Current knowledge is dispersed amongst several countries and repositories,
    - Effects are not comparable and reported in dissimilar manners

- Solution:
  - SafetyCube meets this need by generating new knowledge about risk factors and measures to be **integrated** in the Road Safety Decision Support System (DSS)
  - This knowledge is attained by gathering, assessing and **meta-analyzing** research

SafetyCube



A Comprehensive Taxonomy

The Taxonomy endeavours to:

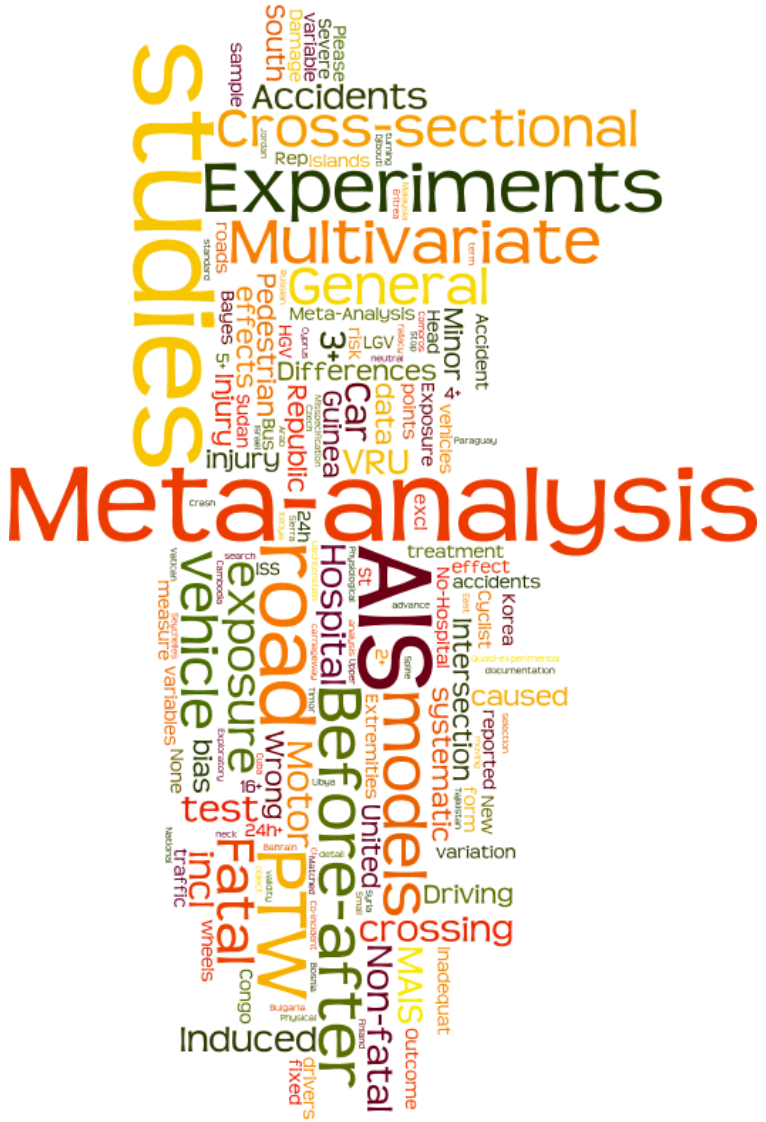
- Capture **all elements** of road safety studied worldwide
- **Systematic approach:** Road user behaviour, infrastructure and driving environment, vehicles
- Examine **parameters** on a risk factor or road safety measure basis
- **Link every risk factor with scientifically researched appropriate measure(s)** in a case-by-case approach

Behavioural element	*Risk factor*	*Specific risk factor*
Speed choice	Speeding	Built-up areas
		Rural roads
		Motorways
	Inapropriate speed	Too fast weather-realted
		Too fast traffic related
		Too slow
Risk taking	Risky overtaking	Risky overtaking: wrongside
		Without adequate visibility
		Without warning others
		Into oncoming traffic
	Headway distance	Misjudgement
		Tailgating
Infrastructure element	*Measure*	*Specific measure*
Infrastructure management	Speed management	reduction of speed limit
		weather-variant speed limits
		individual dynamic speed warning
		speed cameras
		section control
		speed humps
		woonerfs and narrowings
Lighting	Visibility / Lighting treatments	installation of road lighting
		improvement of existing lightling

Challenges and criteria

- Several **challenges** when examining road safety studies:
  - Considerable **variations** at study design levels (e.g. cross-sectional vs. case-control studies etc.)
  - Inclusion of all relevant parameters (e.g. different road users, scenarios), topic **complexity** (e.g. land use regulations)
  - Relevant outputs to road safety, **quantifiable impacts**

- Rigorous **criteria** for study inclusion:
  - Study **year**: 1990 or newer
  - Document **type**: Journal (unless needed)
  - Existing **meta-analyses** prioritized at all times
  - Good overall **quality**, verification and transferability of results



Synopses: summarizing outcomes

Every topic is presented in a **synopsis**:

- Pertinent studies are grouped and assessed; a relevant analysis accompanies the studies: (**Meta-analysis** conducted when possible, vote-count or review-type analysis alternatively)
- Synopses include assigning a colour code: **Ranking** of risks and measures
- Synopses contain **condensed knowledge** and can be used by all road safety stakeholders for reference and planning
- **Quality control** at all stages ensures verified and accurate outcomes

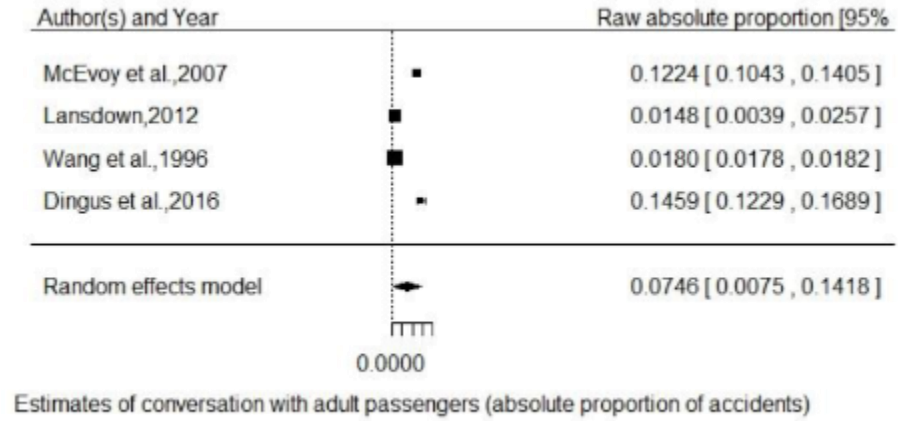


Figure 1 Forest plot for absolute proportion of total accidents that happen due to conversation

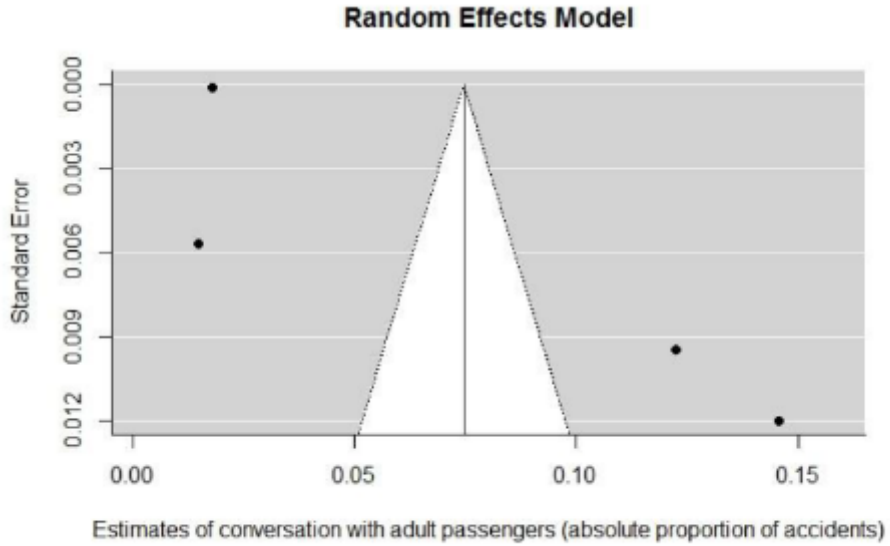


Figure 2 Funnel Plot for absolute proportion of total accidents that happen due to conversation

Main findings

- Risk factors – stage complete:
  - More than 670 **studies** have been coded (behaviour: 240, infrastructure: 300, vehicle: 130)
  - As a result, more than 3.500 **individual effects** for road safety are accessible in the DSS
  - 65 topic **synopses** have been authored, containing 10 original **meta-analyses**
  - Risk factors have been **ranked** based on the synopses

- Road safety measures – stage underway:
  - More than 750 **studies** are planned to be coded, finalizing this step at present
  - Findings similar to the risks are expected: 70 **synopses** planned with several meta-analyses

Red (Risky)	Yellow (Probably risky)	Grey (Unclear)
! Effect of Traffic Volume on safety	! Occurrence of Secondary crashes	? Congestion as a risk factor
! Risks associated with Traffic Composition	! Alignment deficiencies - Absence of Transition curves	? Risks associated with the distribution of traffic flow over arms at junctions
! Road Surface - Inadequate Friction	! Risk of Different Road Types	? Adverse weather - Frost and snow
! Workzone length	! Adverse weather - Rain	? Workzone duration
! Alignment deficiencies - Low Curve Radius	! Poor Visibility - Darkness	? Alignment deficiencies - Frequent curves
! Cross-section deficiencies - Number of Lanes	! Cross-section deficiencies - Superelevation	? Alignment deficiencies - Densely spaced junctions
! Shoulder and roadside deficiencies -Absence of paved shoulders	! Alignment deficiencies - High grade	? Interchange deficiencies - Acceleration / deceleration lane length
! Shoulder and roadside deficiencies - Narrow Shoulders	! Presence of Tunnels Cross-section deficiencies - Narrow lanes	
	! Undivided road	
	! Cross-section deficiencies - Narrow median	
	! Shoulder and roadside deficiencies - Risks associated with Safety Barriers	

Risky	Probably risky	Unclear
• Influenced driving – alcohol	• Risk taking – overtaking	• Functional impairment – hearing loss (few studies)
• Influenced Driving – drugs (legal & illegal)	• Risk taking – close following behaviour	• Observation errors (few studies)
• Speeding and inappropriate speed	• Insufficient knowledge and skills	• Distraction – music – entertainment systems (many studies, mixed results)
• Traffic rule violations – red light running	• Functional impairment – cognitive impairment	• Distraction – operating devices (many studies, mixed results)
• Distraction – cell phone use (hand held)	• Functional impairment – vision loss	
• Distraction – cell phone use (hands free)	• Diseases and disorders – diabetes	
• Distraction – cell phone use (texting)	• Personal factors – sensation seeking	
• Fatigue – sleep disorders – sleep apnea	• Personal factors – ADHD	
	• Emotions – anger, aggression	
	• Fatigue – Not enough sleep/driving while tired	
	• Distraction – conversation with passengers	
	• Distraction – outside of vehicle	
	• Distraction – cognitive overload and inattention	

Why we should all slow down

Save Lives #SlowDown

Speeding and inappropriate speed was examined as part of the risk factors:

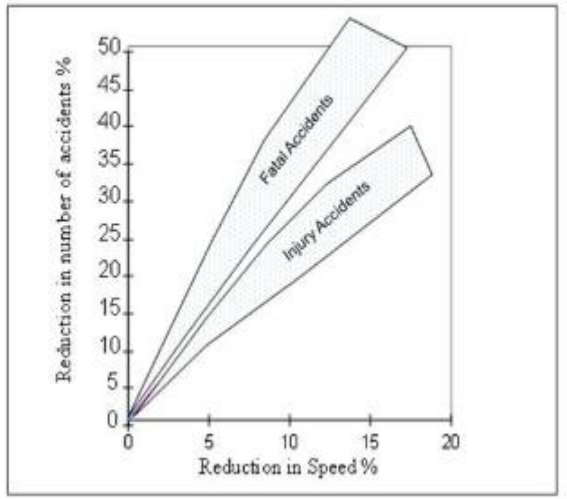
- Synopsis concluded that speed has a **clear negative effect** on road safety (color code: red) based on 13 studies
- The **Power Model** still stands (1981 to 2013); speed reduction entails crash and injury severity reduction
- **Risk** to be involved in a crash when speeding is 12.8 times higher, speeding over a limit of 70-90 km/h induces a 2 times higher risk to be involved in a fatal crash.
- Studies on speeding often reveal **several limitations** like availability of a control group or completeness of data
- Speeding can be **addressed** by enforcement, speed cameras, rehabilitation, and awareness raising

The power model

Example:

Reduction of mean speed from 60 km/h (37mph) to 55 km/h (34 mph) i.e. by 8% reduces fatal accidents by 25-35%.

Nilsson, 2004



Future Challenges

- Identification of existing **knowledge gaps** (especially in road safety measures) is a very important first step
- Complexities and **interdependencies** demand an approach both thorough and standardized
- Some aspects of road safety are **under-represented** (vulnerable road user groups, developing countries)
- The continuous updating of the SafetyCube DSS will lead to a **road safety encyclopaedia**

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