





















Risk assessment Color Code ■ Risky ■ Probably risky ■ Probably not risky ■ Unclear				
Risky	Probably risky	Unclear		
 Influenced Driving: Alcohol Influenced Driving: Drugs (legal & illegal) Speed Choice: Speeding Traffic Rule Violations: Red light running Distraction: Cell phone use (hand held) Distraction: Cell phone use (hands free) Fatigue: Sleep disorders - Sleep Apnea 	 Risk taking: Overtaking Risk taking: Close following (headway) Insufficient Knowledge and Skills Functional Impairment: Cognitive impairment Functional Impairment: Vision loss Diseases and Disorders: Diabetes Personal Factors: Sensation seeking Personal Factors ADHD Emotions (Anger/Aggression) Fatigue: Sleepiness/ sleep deprivation 	 Functional Impairment: Hearing loss (few studies) Observation Errors (few studies) Distraction: Music – entertainment systems (many studies – mixed results) Distraction: Operating Devices (many studies – mixed results) 		







Vision

 To create an inventory of evaluated road safety risks 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.

SafetyCube workshop, Brussels, September 27th , 2016

Research team

NTUA, Greece

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- Loughborough University, UK
- KfV, Austria
- CTL, Italy
- BRSI, Belgium
- TOI, Norway
- SWOV, Netherlands
- AVP, Slovenia
- ERF, Belgium







Methodological approach

- • **Taxonomy** of infrastructure risk factors
- Exhaustive literature review and rigorous study selection criteria
- Template for coding studies
- Studies analysed for carrying out meta-analyses to estimate the effects of risk factors.
- Synopses summarising results / meta-analysing risk factors
- Systems approach: links between infrastructure, user and vehicle risks
- Assessment of the quality of the data / study methods



Traffic flow	Traffic volume congestion secondary accidents traffic composition (share of pedestrians, cyc distribution of flow over arms at junctions	S taxonomy lists, PTW, HGV)
Road type Road surface deficiencies (risk of ran- off road)	Road type inadequate friction uneven surface ice, snow oil, leaves, etc.	*
Poor visibility and lighting	poor visibility - darkness poor visibility - fog	
Adverse weather	rain snow / ice / low temperatures wind	To the second
Workzones	small workzone length high workzone duration insufficient signage	
Horizontal/vertical alignment deficiencies	low curve radius absence of transition curves frequent curves densely spaced junctions poor sight distance - horizontal curves high grade vertical curve radius	

Superelevation / cross-slopes (risk	superelevetion at curve
of ran-off road)	cross-slope
Lanes / ramps deficiencies	number of lanes
	narrow lane Dicker to yoo pool
Median / barrier deficiencies (risk	undivided road
of crash with oncoming traffic)	narrow median
Shoulder and roadside deficiencies	absence of shoulder
(risk of ran-off road or crash with	narrow shoulder
obstacle)	absence of guardrails or crash cushions
	absence of clear-zone
	roadside obstacles (per type of obstacle e.g. trees)
	sight obstructions
Poor road readability	absence of traffic signs
	misleading or unreadable traffic signs
	absence of road markings
	absence of rumble strips
Interchange deficiencies	inadequate ramp capacity
	insufficient ramp length
	insufficient acceleration / deceleration lane length
	absence of channelisation
	absence of access control
	poor sight distance
At-grade junctions deficiencies	high number of conflict points
	type of junction
	skewness / junction angle
	poor sight distance
	gradient
Rail-road crossings (risk of collision	uncontrolled rail-road crossing
with train)	up controll of the holders' consultation workshop, Brussels,
	micloading or unreadable traffic cian
	misleading or unreadable tranic sign
	absence of road markings

Main challenges

- Difficulty in separating risks from measures effects (e.g. median, guardrails)
- Combined effects of infrastructure design elements
- Complexity of 'hot topics' (e.g. road readability)
- Methodological issues:
 - Outdated studies (e.g. alignment, cross-section)
 - Limited studies (e.g. interchanges, road surface)
 - Various forms of Accident Prediction Models
- Transferability
 - Lack of European studies





Synthesis of results Ranking of risk factors 						
Red (Risky)	Yellow (Probably risky)	Grey (Unclear)	Green (no risk)			
 ! Traffic Volume ! Traffic Composition ! Road Surface Deficiencies ! Small workzone length ! Low Curve Radius ! Absence of Shoulder ! Narrow Shoulders 	 Secondary incidents / accidents Absence of Transition curves Road type High grade Tunnel Narrow lane Undivided road Narrow median Absence of guard rails / clear zone & roadside obstacle Sight obstructions High number of conflict points Type of junction Skewness / Junction angle Poor sight distance Gradient Uncontrolled rail-road crossing Absence of road markings / marked crosswalks Uncontrolled junction 	 ? Congestion ? Distribution of flow over arms at junctions ? Frost and snow ? High workzone duration ? Frequent curves ? Densely spaced junctions ? Insufficient acceleration / deceleration lane length 	✓ Superelevation at curves			

Stakeholders' involvement

- The activities are supported by the consultation of road safety infrastructure stakeholders:
- At the beginning of the project, assist in the identification of user needs and "hot topics" and provide related data and knowledge
- At Mid-Term, provide additional data and feedback on the analyses results and DSS development

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Workshop objectives

- To present the project activities to date and plans for the coming research steps, and to receive feedback concerning:
- **the DSS prototype**: is it user-friendly? is the structure clear? is the presentation of results appropriate? how could the system be accessed?, etc.
- the infrastructure / behaviour topics in the DSS: is the information presented useful? is the presentation helpful? how could it be improved?, etc.





