

SafetyCube

Vehicle: Risks and Measures



Co-funded by the Horizon 2020
Framework Programme of the European Union

How does the vehicle affect road safety?



- The vehicle is one of the pillars of road safety and one action in SafetyCube is to document risks that are attributed to the vehicle

Taxonomy of risk factor topics



Based on 3 levels :

1st level : Type of “vehicle”



HGV / Bus



LGV



Car



PTW



Bicycle



Pedestrian

2nd level: common topic

- Prevalence of factors in crash data
- injury severity in accidents
- Crashworthiness
- Visibility / Conspicuity
- Protective equipment
- Technical defects / maintenance

3rd level: specificities → 71 items

Measures



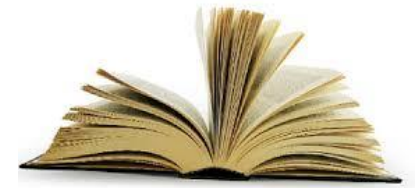
- There are opportunities for modifying the vehicle design to improve safety
- New technologies are enabling new safety functions
- Knowledge of the role of maintenance and vehicle inspections




Results



- More than **100 analysed individual studies**
no meta-analyses
- **13 synopses** on vehicle risk factors
- Use of **scenarios (Road Safety Diagnosis)**
- Deliverable 6.1 *Identification of Vehicle related Risk Factors*




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[Support](#)


Keyword
Search




Risk
Factors



Measures



Road User
Groups



Accident
Categories

Behavior	Infrastructure	Vehicle
Speed choice	Traffic flow	Crashworthiness 
Driving under the influence of alcohol	Road type	Injury mechanism
Driving under the influence of drugs	Road surface deficiencies (risk of ran-off road)	Protective equipment design
Risk taking	Poor visibility and lighting	Relevant factors in crash data
Fatigue	Adverse weather	Technical defects / Maintenance
Distraction and inattention	Workzones	Vehicle design
Functional impairment	Horizontal/vertical alignment deficiencies	Visibility / Conspicuity
Insufficient skills	Superelevation / cross-slopes	
Insufficient knowledge	Lanes deficiencies	
Emotions and stress	Median / barrier deficiencies	
Misjudgement and observation errors	Shoulder and roadside deficiencies	
Traffic rule violations	Poor road readability	
Personal factors	Interchange deficiencies	
Age	At-grade junctions deficiencies	

Specific Risk Factor

- ☐ Compatibility, Age & Underrun
- ☐ Compatibility, Age & Underrun
- ☐ Compatibility, Age & Underrun
- ☐ Compatibility, Age & Underrun
- ☐ Low Star rating (EuroNCap)
- ☐ Low Star rating (EuroNCap)

Road User Group

- ☐ BUS
- ☐ CAR
- ☐ CYCLIST
- ☐ LGV
- ☐ PEDESTRIAN
- ☐ [TRIPLE (US)]

Road Type

- ☐ ALL
- ☐ MOTORWAY
- ☐ URBAN ROAD

Countries

- ☐ CANADA
- ☐ FRANCE

Search Results

The following information on "**Crashworthiness**" fulfill your search criteria. Refine your search, view the SafetyCube Synopses, choose a study to obtain more detailed information, or go to the respective Road Safety Measures.



HGV - Risks resulting from the blind spot issue by right turning trucks: ● RED (VERY CLEAR INCREASED RISK) - [\[A\]](#)

This choice comes from the fact that most of these accidents result in a severe or fatal injury for the involved VRU. This is based on the big mass difference of the accident opponents and the high risk for overrun of the VRU.



HGV - Compatibility: ● RED (VERY CLEAR INCREASED RISK) - [\[A\]](#)

HGV compatibility is significantly risky for smaller collision partners

Light Goods Vehicle - Crashworthiness - Compatibility: ● RED (VERY CLEAR INCREASED RISK) - [\[A\]](#)

LGV compatibility is significantly risky; indeed, mainly due to LGV dimension and weight, most papers conclude that there is a negative effect on road safety; especially for the opponent vehicle. In spite of the improvement done to improve protection and aggressivity of LGVs, compatibility is still an issue. The color code is red.



Compatibility (self and partner protection) & age: ● RED (VERY CLEAR INCREASED RISK) - [\[A\]](#)

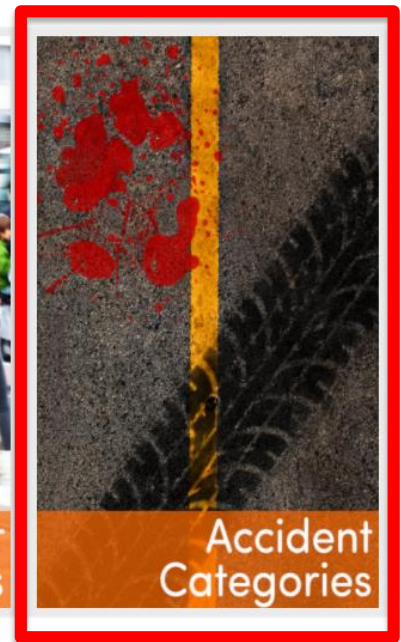


Low star rating (Euro NCAP): ● YELLOW (PROBABLY RISKY) - [\[A\]](#)

Under Development



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. A Quick Guide on using the SafetyCube DSS, with instructions on how to browse the system, make a search and further refine the results, is available for download [here](#).



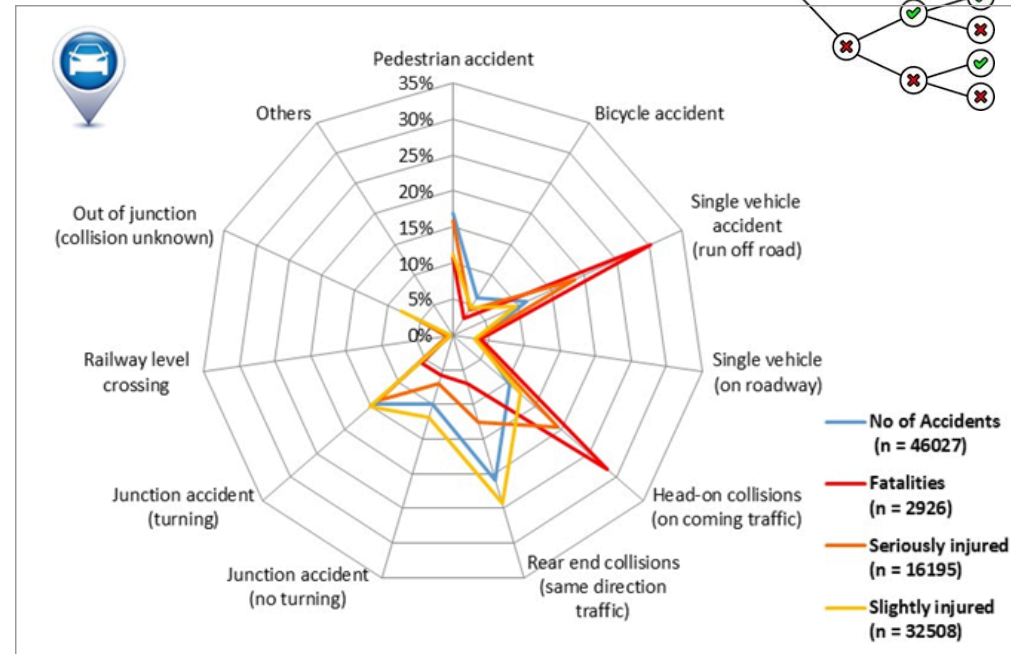
Accident Categories - Scenarios



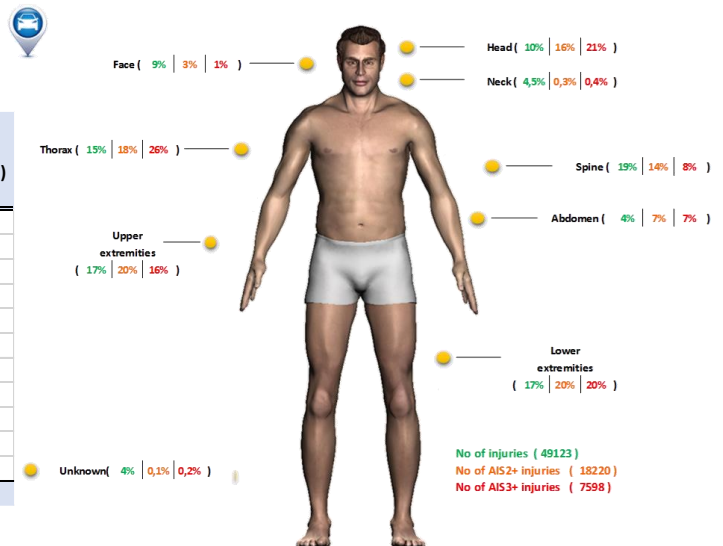
- Fact sheets on common crash types
 - *Frontal crashes*
 - *Single vehicle crashes*
 - *Intersection crashes*
 - *etc.*
- Provides an overview of the numbers of crashes and their severity (fatal, serious injuries, minor injuries, etc.)

Scenarios

- More adapted to vehicle engineering than « risk factor »



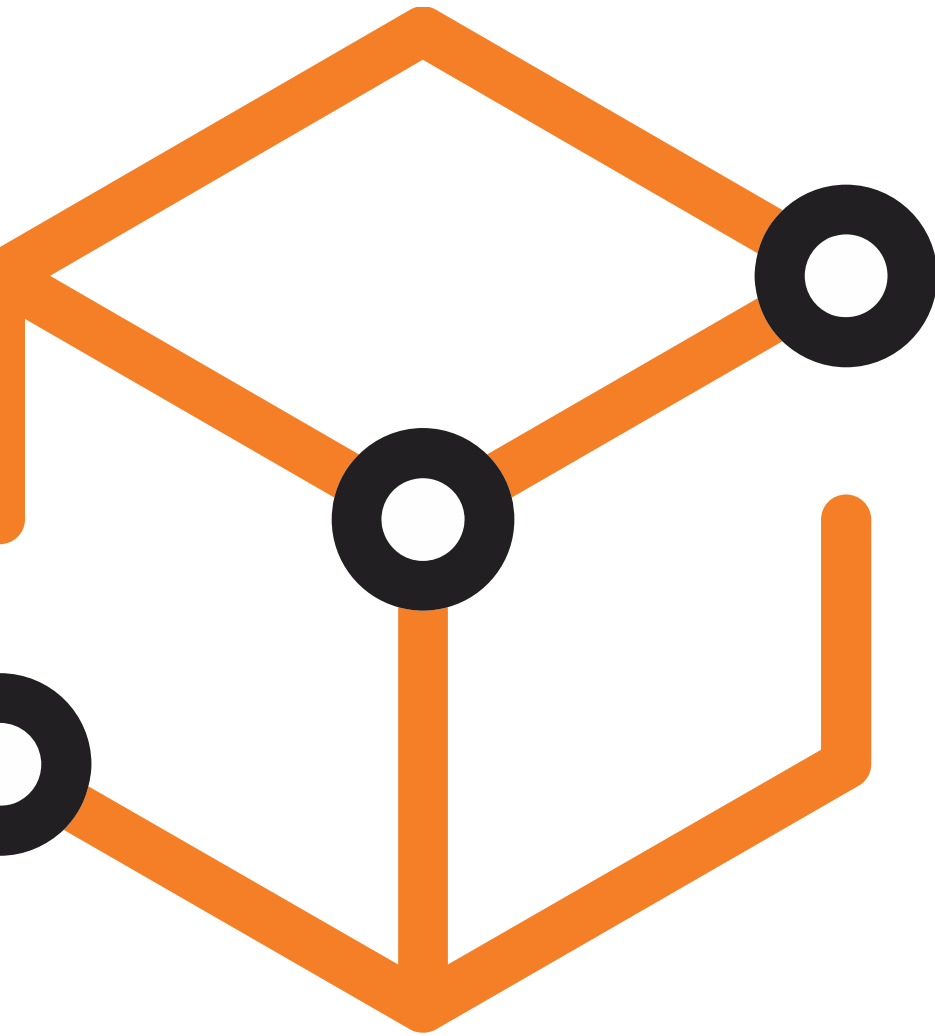
France 2011	No of Accidents	No of PC	Fatalities	Seriously injured	Slightly injured	KSI	KSI (for 100 acc.)	KSI (for 100 Veh.)
Pedestrian accident	7765	7961	313	2564	3631	2877	37	36
Bicycle accident	2858	2946	84	690	1497	774	27	26
Single vehicle accident (run off road)	5136	5136	882	3008	3086	3890	76	76
Single vehicle (on roadway)	1729	1729	114	533	979	647	37	37
Head-on collisions (on coming traffic)	4797	7146	828	3130	4004	3958	83	55
Rear end collisions (same direction traffic)	9628	14052	203	2027	7876	2230	23	16
Junction accident (no turning)	4553	6469	171	1119	3837	1290	28	20
Junction accident (turning)	6748	8438	169	2236	4940	2405	36	29
Railway level crossing	225	270	18	144	87	162	72	60
Out of junction (collision unknown)	2589	5397	144	745	2571	889	34	16
Others	0	0	0	0	0	0	0	0
Total	46027	59544	2926	16195	32508	19121	42	32



Vehicle information – next steps



- Final partner contributions processed year end 2017
- Next major release of DSS to include all vehicle based risks and measures with linking
 - *January 2018*



Thank you!



Frontal impact	Directive 96/79/CEE et ECE.R94
Frontal impact	EuroNcap (Full width & ODB)
Frontal impact	Frontal airbag
Frontal impact	PTW Airbag
Frontal impact	Seat belt (effectiveness) SBR and Load limiter included
Frontal impact	anti-submarining (airbags, seat bossage, knee airbzg, seatbel pretensionner,...)
Side impact	Directive 96/27/CEE et ECE.R95
Side impact	Regulation UN R135 (Pole side-impact protection)
Side impact	EuroNCap (MBD & Pole)
Side impact	Side airbag (Head only Head + Thorax, Thorax + Abd + Pellvis, Farside airbag, curtain, ...)
Rear impact	Regulation UN R32 (Behaviour of the structure in rear-end collision)
Rear impact	Anti Whiplash (Seat, active headrest, ...)
Rear impact	EuroNCap (whiplash)
Rollover	AirBag protection (Roof, curtains, ...)
Rollover	RollOver protection systems incl. ECE R66
Pedestrian	Pedestrian protection (Active bonnet, pedestrian airbag, EuroNCap, ...)
Pedestrian	Pedestrian regulation
Child	Child Restraint System (usage, fitting, misuse, ISOFIX, EuroNCap, ...)
PTW	Helmet + Protective equipment (use & performance)
Cyclist	Helmet + reflective equipment + lighting (usage + performance)
HGV	Underrun protection (Front / Side + Lateral Side Guards / Rear)
Longitudinal	Emergency Braking Assistance system
Longitudinal	Autonomous Emergency Braking AEB (City, interurban)
Longitudinal	Autonomous Emergency Braking AEB (Pedestrians & cyclists)
Longitudinal	Emergency Stop Signal (ESS)
Longitudinal	Braking system PTW (ABS, Combined braking system, ...)ABS (PTW)
Longitudinal	Collision Warning
Longitudinal	Intelligent Speed adaptation + Speed Limiter + Speed regulator
Longitudinal	Adaptive Cruise Control (ACC & ACC Stop & start)
Lateral control	Electronic Stability Control (ESC)
Lateral control	Lane Departure Warning (LDW) + Lane Keeping Assist (LKA) + Lane Centering System
Driver assistance	Drowsiness and Distraction Recognition
Driver assistance	Alcohol Interlock (ALC)
Visibility enhanced	Enhanced Headlights (automated, adaptive, advanced system, ...) incl. Daytime running lights
Visibility enhanced	Night Vision
Visibility enhanced	Vehicle backup camera - Reversing Detection or Camera systems (REV)
Visibility enhanced	Blind Spot Detection
Visibility enhanced	Blind Spot mirror - Direct vision and VRU detection (VIS) for HGV
Technical defects	ISO 26262 (road vehicles - functional safety)
Technical defects	Tyre Pressure Monitoring and Warning
Technical defects	Vehicle inspection
Technical defects	Regulation ECE R13 (braking systems) change to: AEB for trucks
Connected	Vehicle to Vehicle communication
Post-Crash	eCall
Post-Crash	Rescue Data Sheet & Rescue code
Post-Crash	ECE R100 (Battery electric vehicle safety)
Post-Crash	Event Data Recorder