



Overview of main accident scenarios in car-to-cyclist accidents for use in AEB-system test protocol

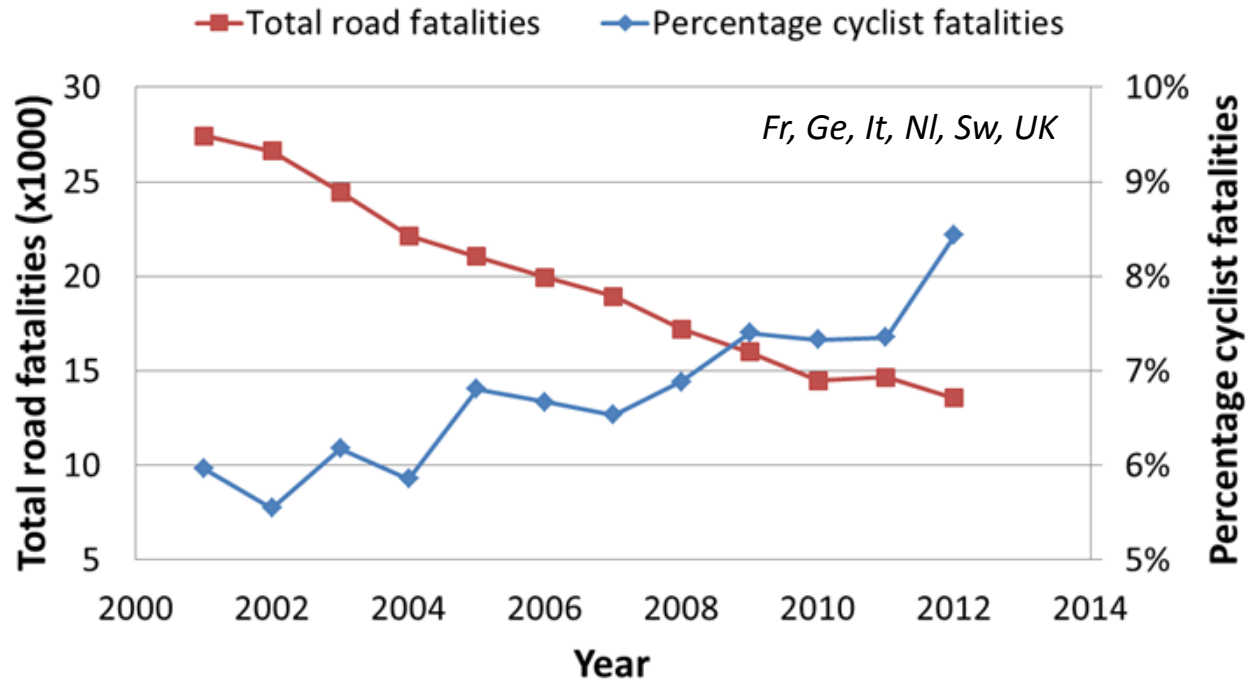
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¹ *TNO Integrated Vehicle Safety*, ² *Autoliv Research*





Introduction





Objective of CATS project

- › Prepare the introduction of a protocol for consumer tests of Cyclist-AEB systems on board passenger cars.
- › Propose a test setup (incl. hardware) and test protocol for Cyclist-AEB systems based on technical/scientific considerations.
- › Base the tests on analysis of most relevant cyclist accident scenarios in EU countries.
- › Timing:
 - Start : 2014 Q2
 - Finish : 2016 Q1 (to be in time for Euro NCAP time line)
- › In this presentation, the results of the accidentology WP are reported, prioritizing the cyclist-to-car accident scenarios.



Approach



- › Study databases for 6 European countries;
- › Select severe car-to-cyclists accidents --> fatalities, seriously injured;
- › Provide overview of distinguished accident scenarios;
- › Determine the distribution of scenarios in the different countries;
- › Prioritize scenarios & indicate how many fatalities and seriously injured are covered.

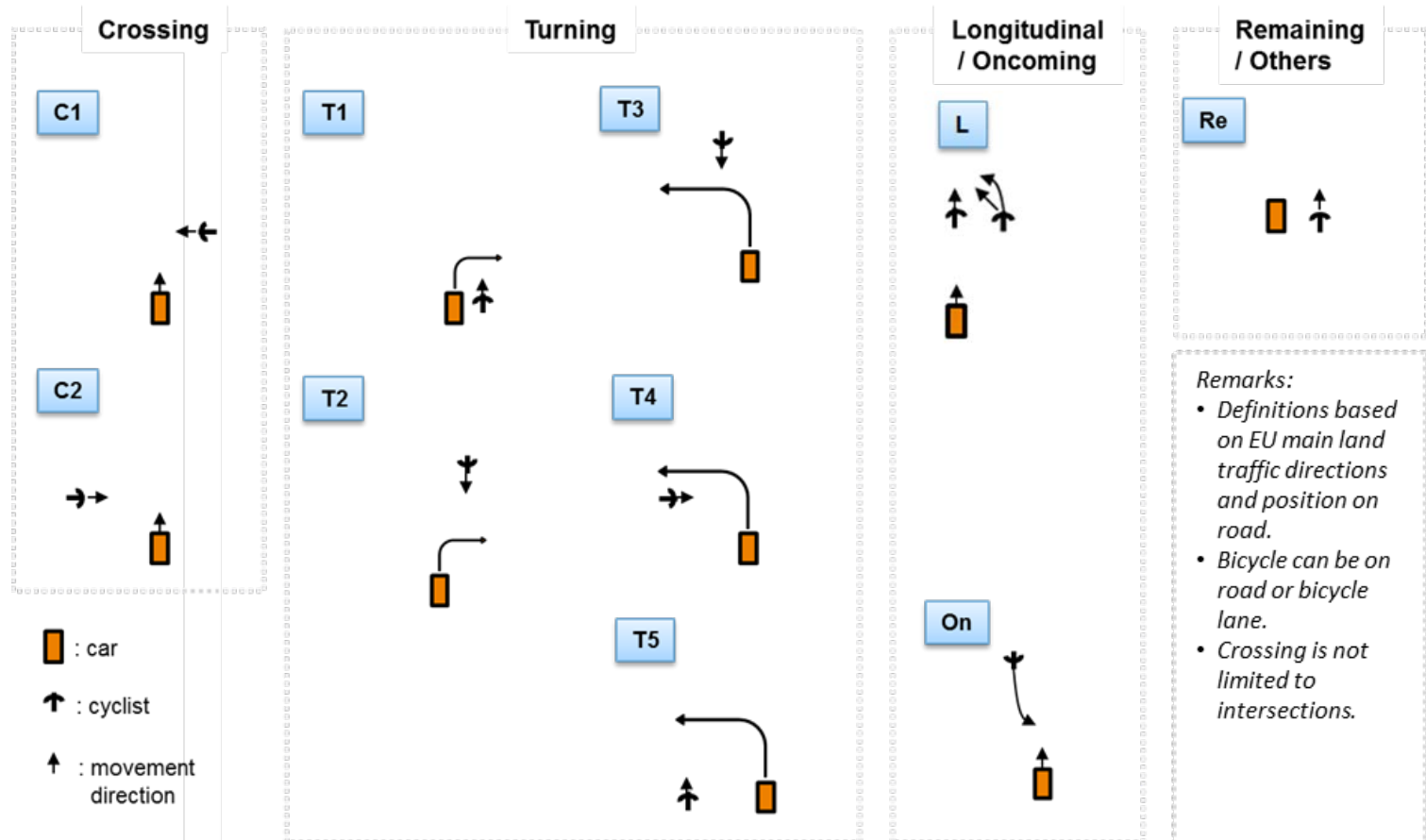


Overview of data sources

#	Country	Source	Killed (K)		Seriously Injured (SI)		Period
			definition	n	definition	n	
1	France	LAB	Fatal	72	severely injured	620	2011
2	Germany	GIDAS based PCM	Fatal	11	AIS2+	360	1999-2012
3	Germany	GIDAS	Fatal	12	AIS2+	514	2006-2013
4	Germany	National accident statistics	Fatal	345	AIS2+	11964	2008-2012
5	Italy	FIAT internal database	Fatal	23	AIS2+	17	2003-2014
6	Netherlands	BRON	Fatal	902	seriously injured	10854	2000-2013
7	Sweden	STA/STRADA	Fatal	104	AIS2+	435	2005-2014 K 2010-2014 SI
8	UK	STATS19	Fatal	116	seriously injured	2699	2008-2010



Overview of distinguished car-to-cyclist scenarios

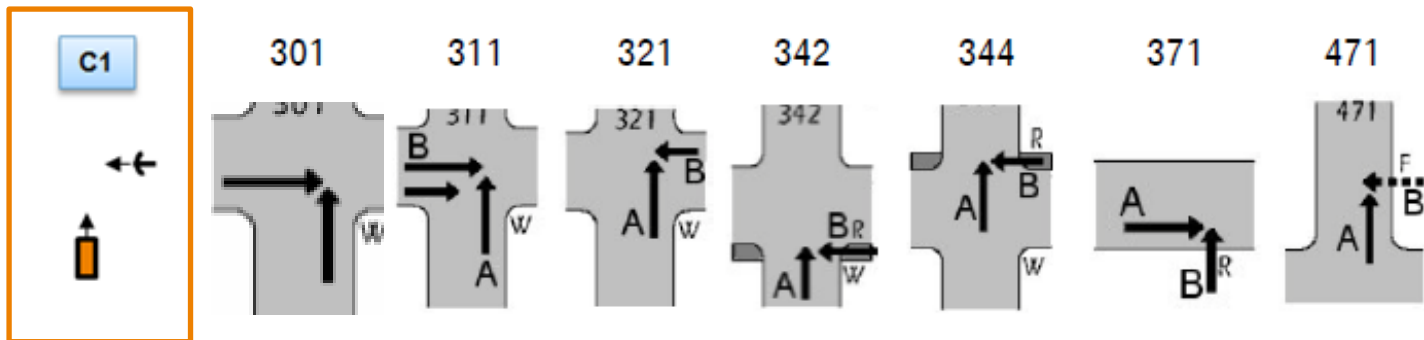


› Check: all relevant scenarios are covered



Conversion of databases to CATS scenarios

› Germany

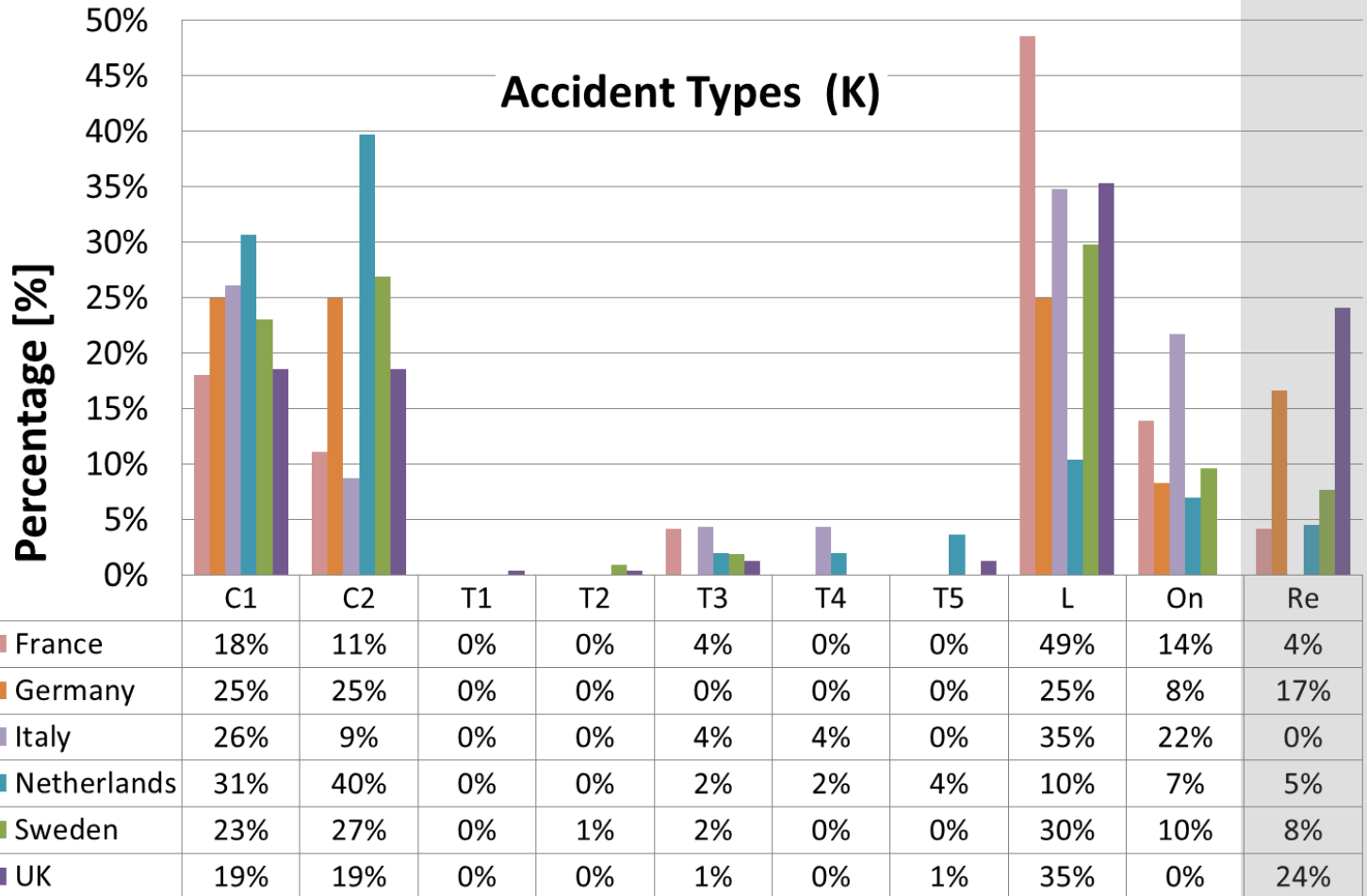


› The Netherlands

Manoeuvre	# fatalities	CATS scenarios	Distribution
Side impact on crossing	327	C1 / C2	50% C1, 50% C2
Other side impact	190	C1 / C2	50% C1, 50% C2
Right side impact with crossing vehicle	85	C2	100% C2
Rear end collision without turning	75	L1 / L2	50% L1, 50% L2
Frontal without lane change	63	On	100% On



Scenario relevance per country (killed)



C1

C2

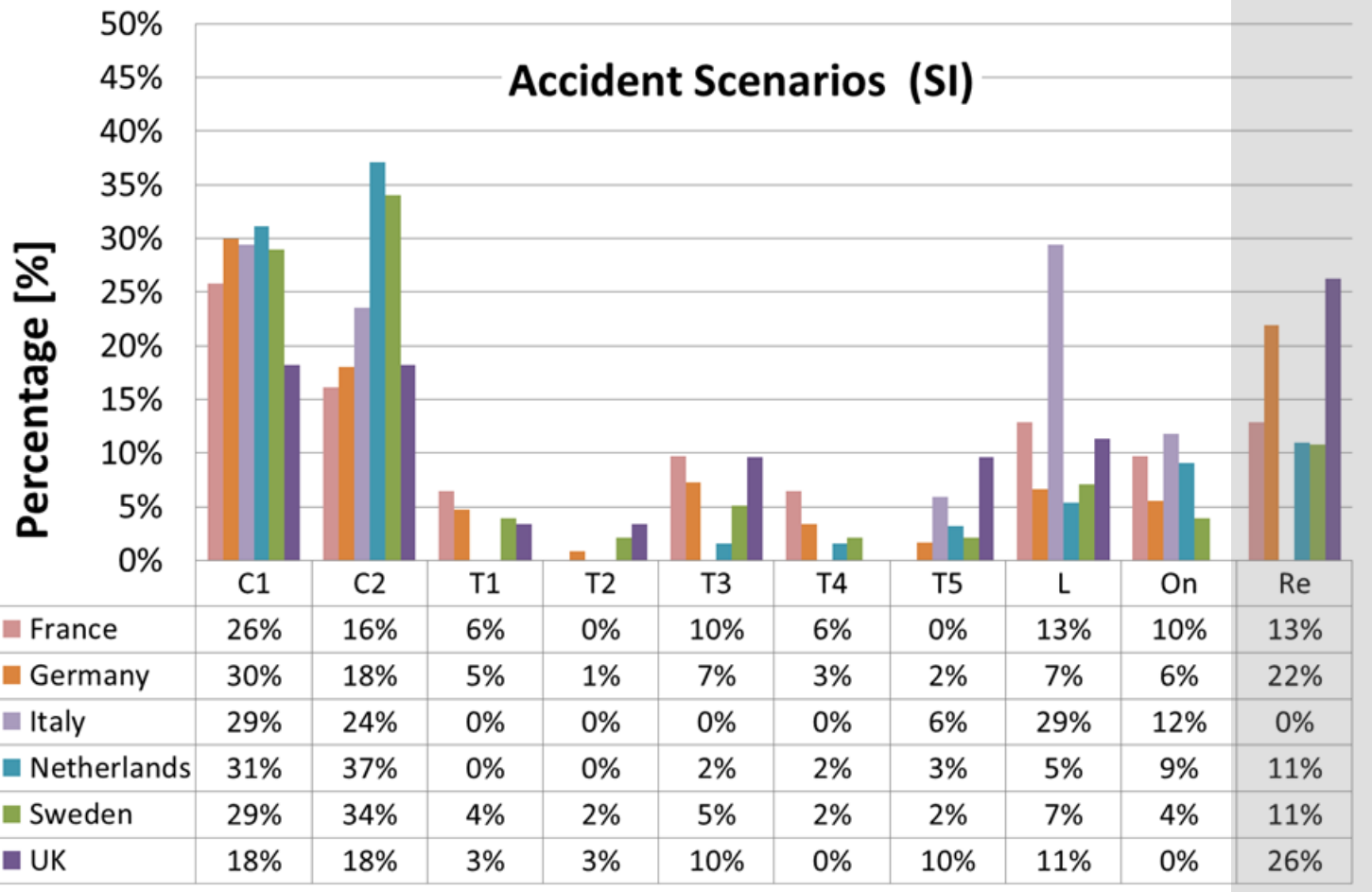
L

On

T3



Scenario relevance per country (seriously injured)



C1

C2

L

On

T3

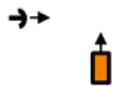


Scenario relevance per country (fatalities)

C1



C2



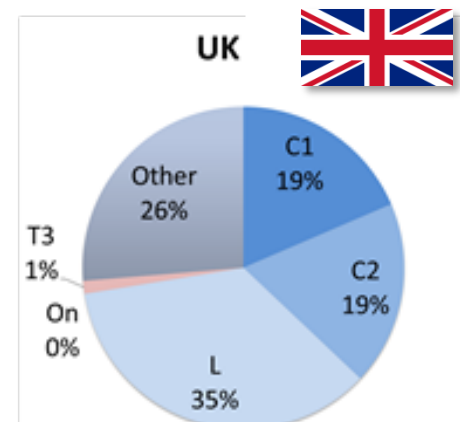
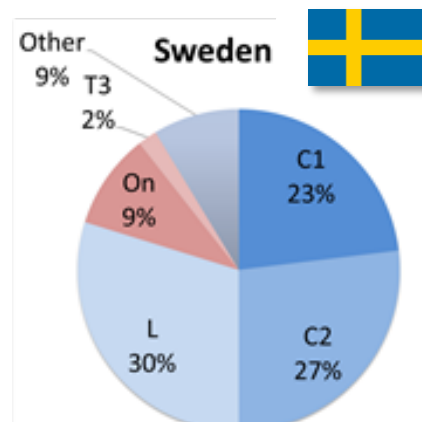
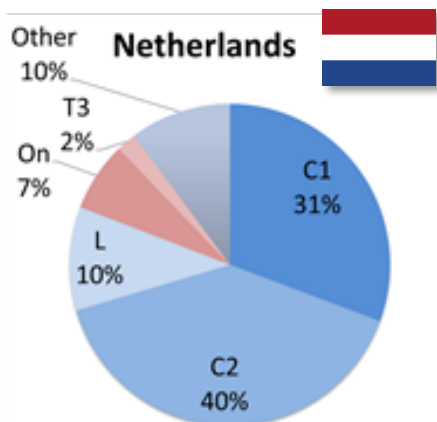
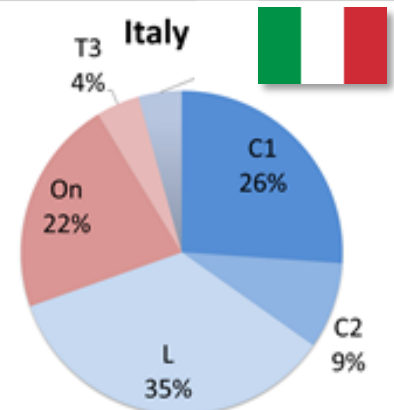
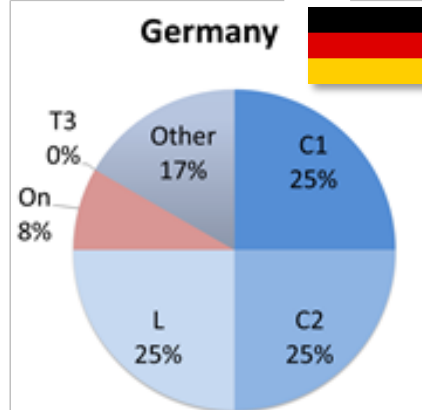
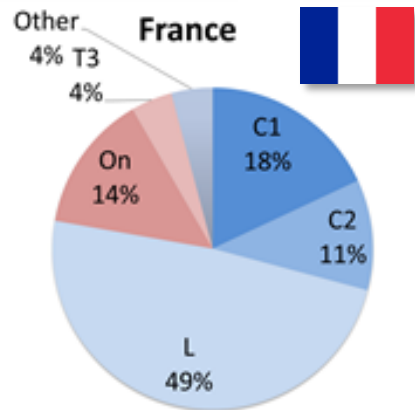
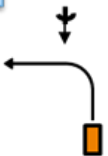
L



On



T3



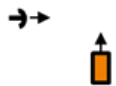


Scenario relevance per country (seriously injured)

C1



C2



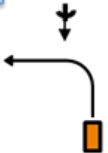
L



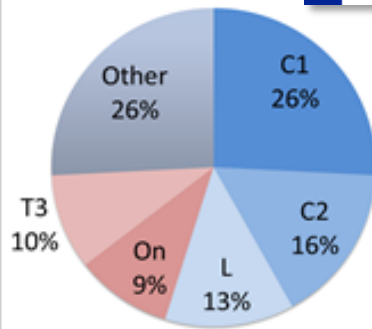
On



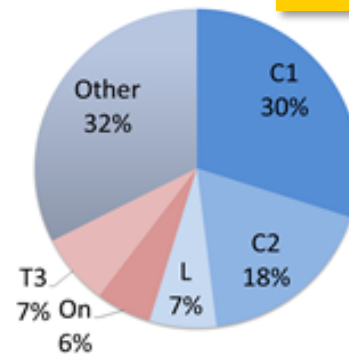
T3



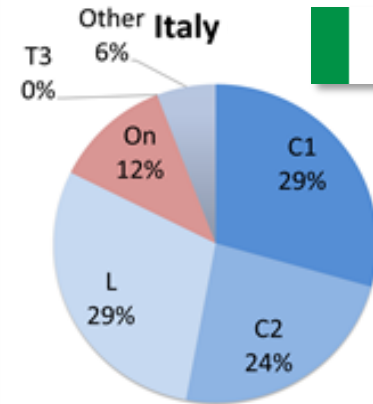
France



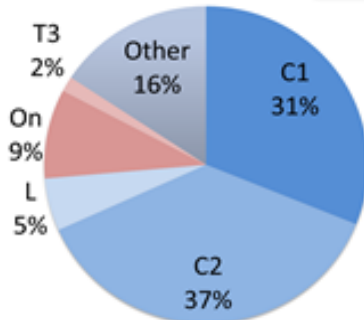
Germany



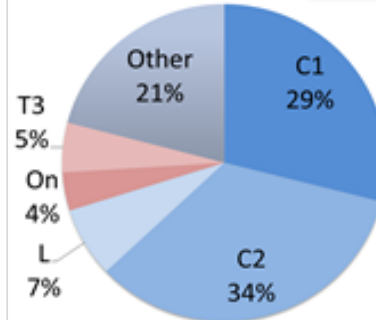
Italy



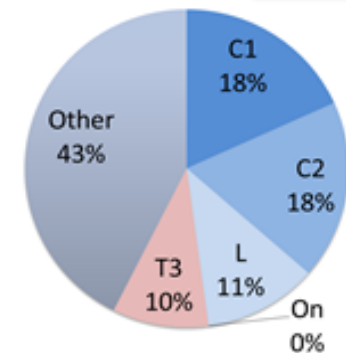
Netherlands



Sweden



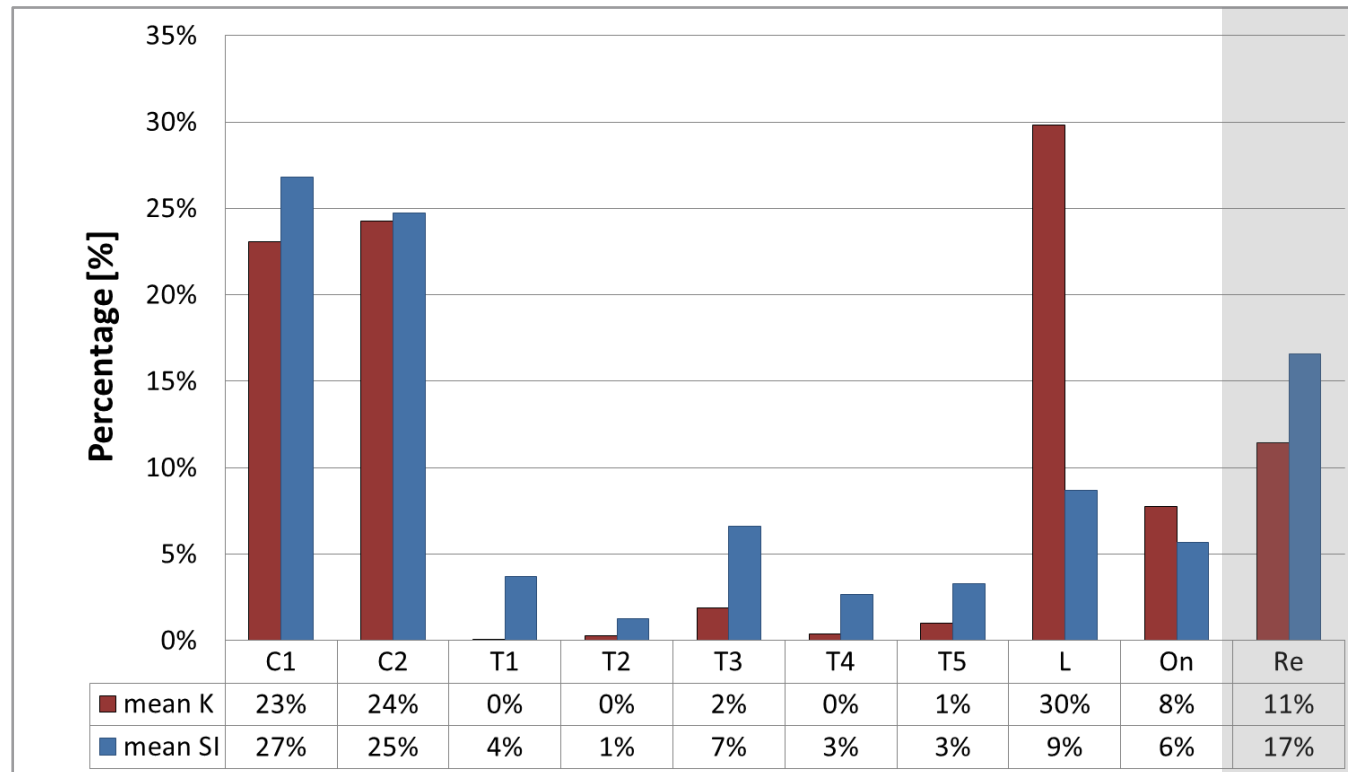
UK





Prioritization of scenarios

- › What fraction of fatal and severe accidents is covered by the different scenarios?
- › Weight the results for the different countries*:



*All countries equally weighted, Italy not included



Prioritization of scenarios

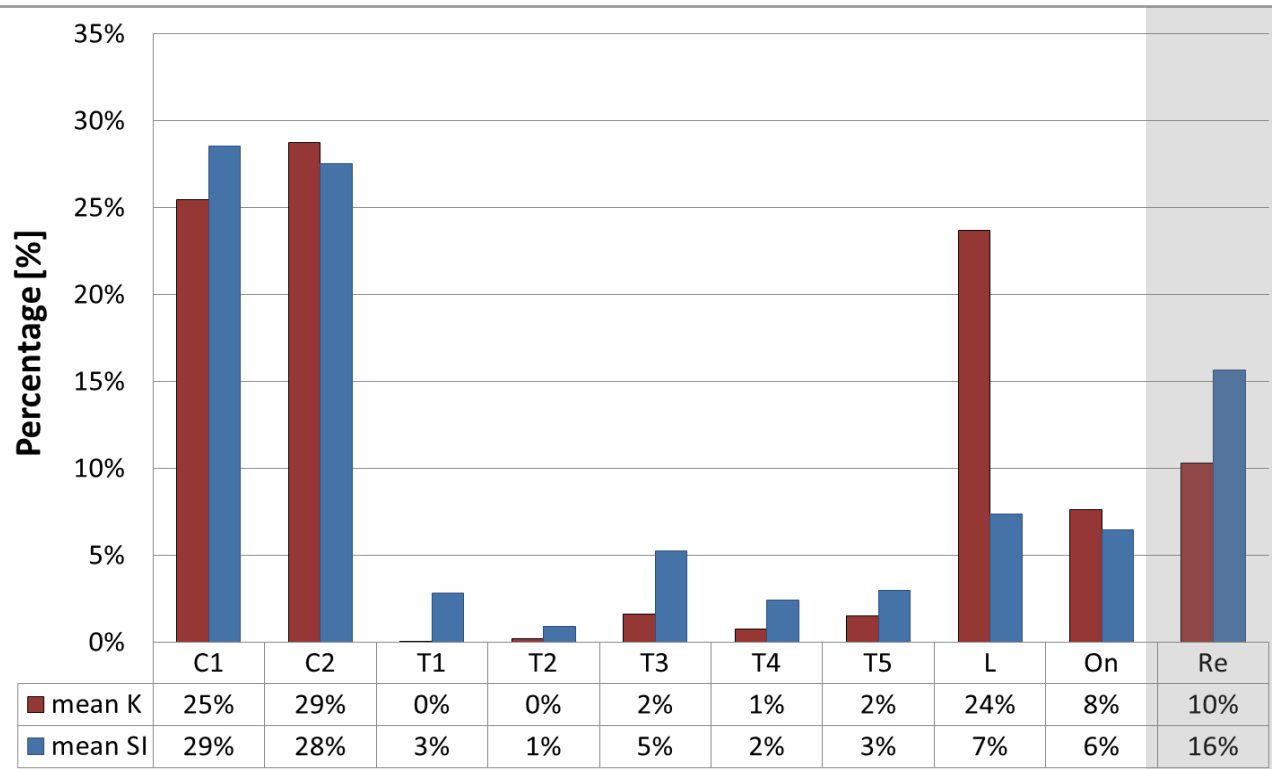
- › Option: weight the results according to # cyclist fatalities per million inhabitants:

Country	# road fatalities per million inhabitants	# cyclist fatalities per million inhabitants	Weighting [%]
France	62	2,8	11%
Germany	45	6,0	26%
Italy	68	5,4	-
Netherlands	32	9,2	38%
Sweden	28	3,6	15%
UK	30	2,3	10%



Prioritization of scenarios

- Weight the results according to # cyclist fatalities per million inhabitants*:

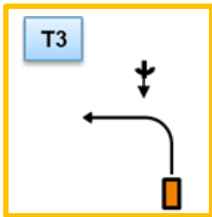
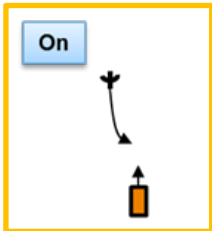
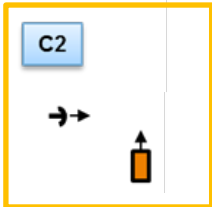
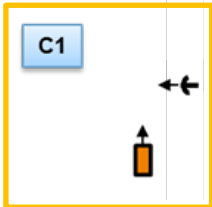
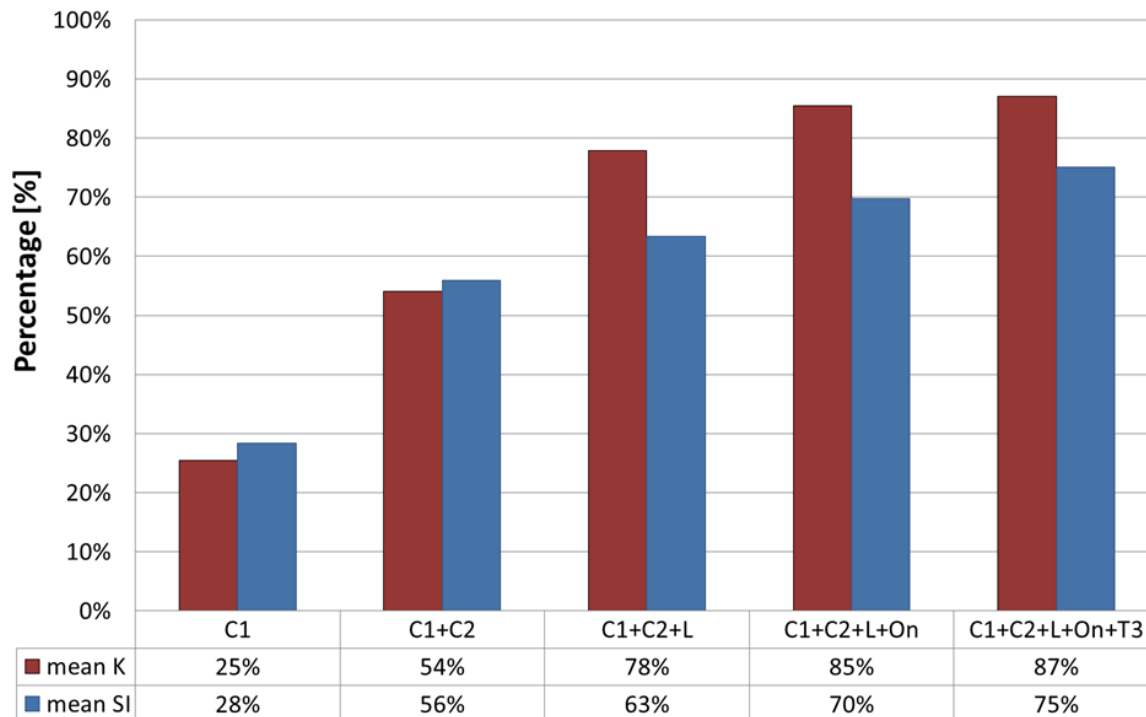


*Italy not included



Conclusion

- › C1, C2 and L in all countries dominant.
- › The scenarios C1, C2 and L together cover already between 78% and 63%:





Next steps:

- › Study weighting method.
- › Selection of scenarios for which a test protocol is developed.
- › Determine test ranges for these scenarios such as:
 - Vehicle speeds
 - Bicycles speed
 - Presence of view blocking obstructions
 - Collision point on the vehicle
 - Size and posture of bicyclist
- › Select parameters describing the level of light and precipitation.
- › Use information available in databases (GIDAS – PCM) possibly enriched with results from observation studies.





Acknowledgement:



Ministry of Infrastructure and the
Environment



DAIMLER

DENSO



CHRYSLER



Wir leben Autos.

PSA PEUGEOT CITROËN



SUBARU

TOYOTA



VOLKSWAGEN
AKTIENGESELLSCHAFT

