CATS: Cyclist-AEB Testing System

Car – bicyclist accident analysis and bicyclist dummy development

Introduction

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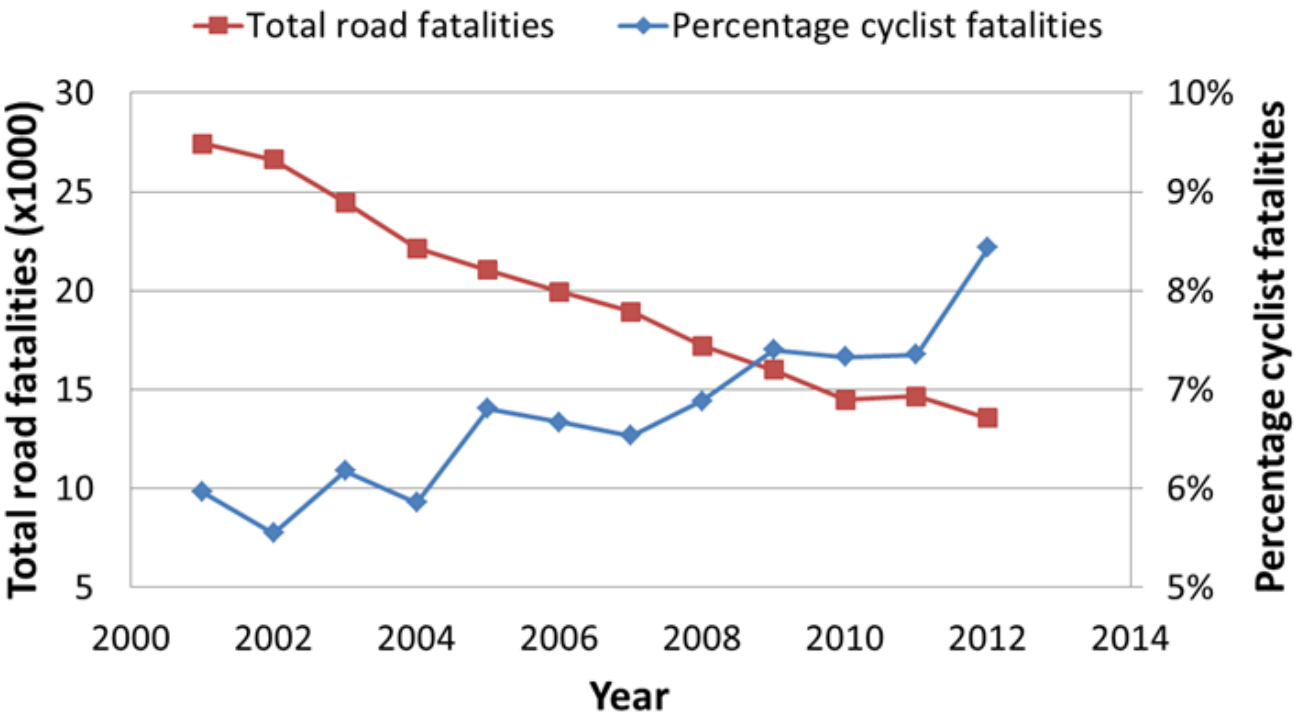
- Cyclist safety raising issue in Europe



CATS project: Objective

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Objective of CATS (Cyclist-AEB Testing System) 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

- In this presentation, the results of the accidentology WP are reported, prioritizing the cyclist-to-car accident scenarios. Also the latest status of dummy and propulsion system will be shown.

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CATS project: Approach

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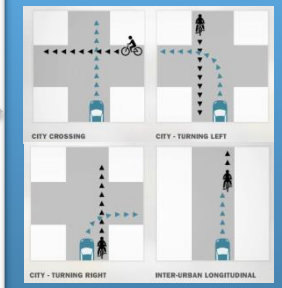
Project approach:

1 Accident Analysis

2 Test scenario definition



3 Dummy development

4 Propulsion system development

5 Verification & Testing

A: Partners

B: Test-houses

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CATS project: Accidentology & scenario definition

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Accidentology 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.

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CATS project: Accidentology & scenario definition

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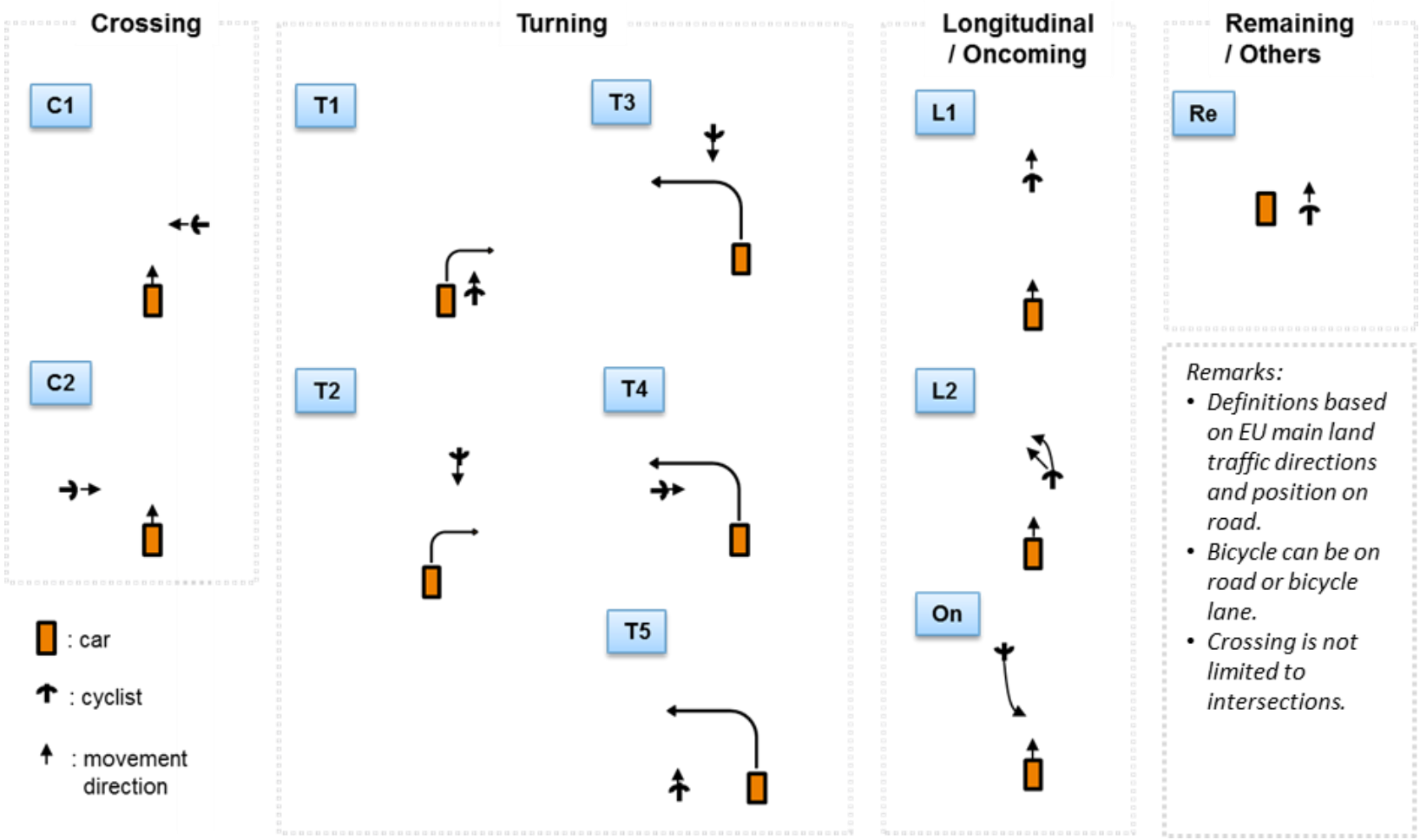
Distinguished car-to-cyclist scenarios



Check if all relevant scenarios are covered

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CATS project: Accidentology & scenario definition

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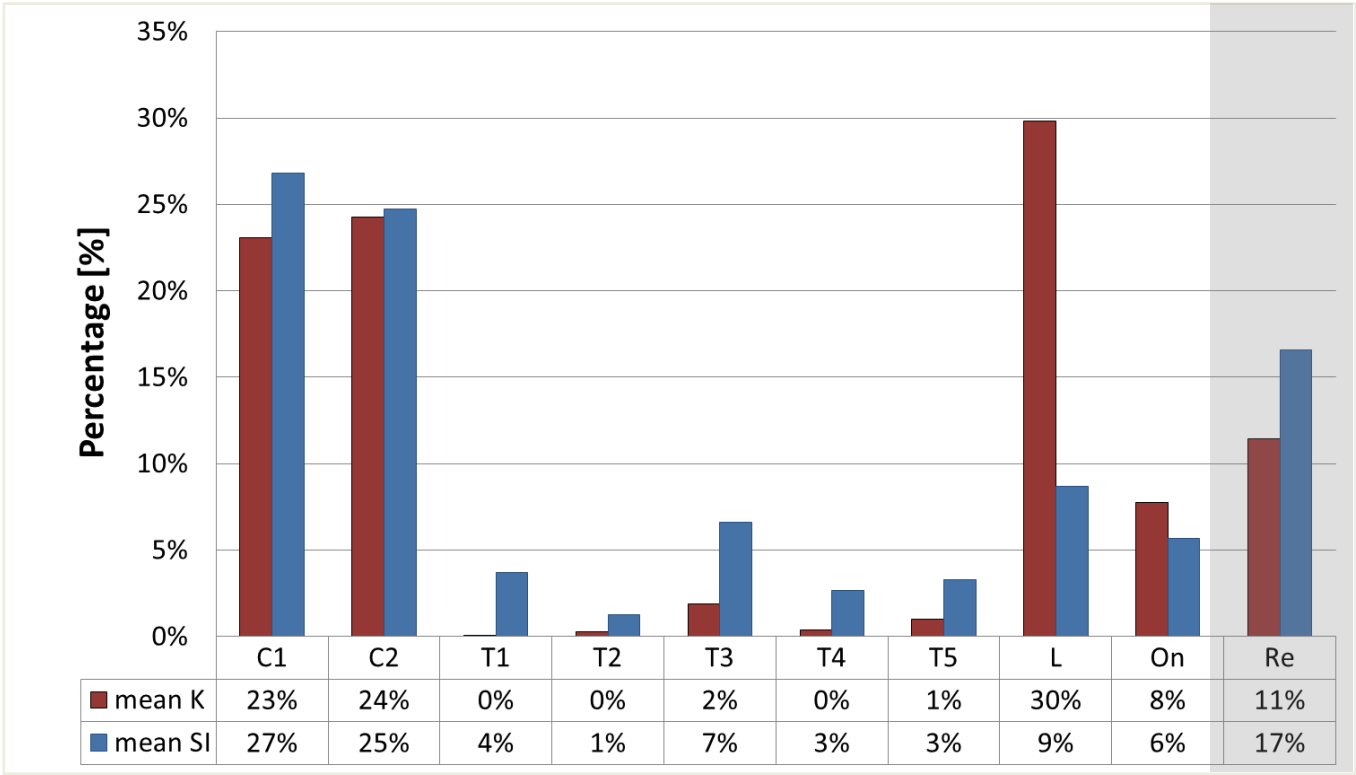
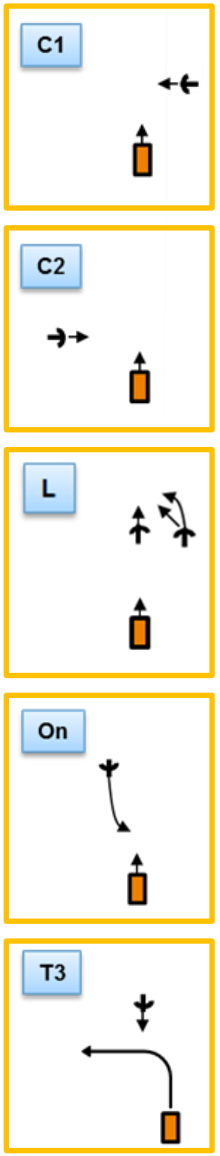
Prioritization of scenarios:

- What fraction of fatal and severe accidents is covered by the different scenarios?
- All countries equally weighted*:



	C1	C2	T1	T2	T3	T4	T5	L	On	Re
mean K	23%	24%	0%	0%	2%	0%	1%	30%	8%	11%
mean SI	27%	25%	4%	1%	7%	3%	3%	9%	6%	17%



* Italy not included due to limited amount data sets not being representative.

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CATS project: Accidentology & scenario definition

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Prioritization of scenarios:

- 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%

* Italy not included due to limited amount data sets not being representative.

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CATS project: Accidentology & scenario definition

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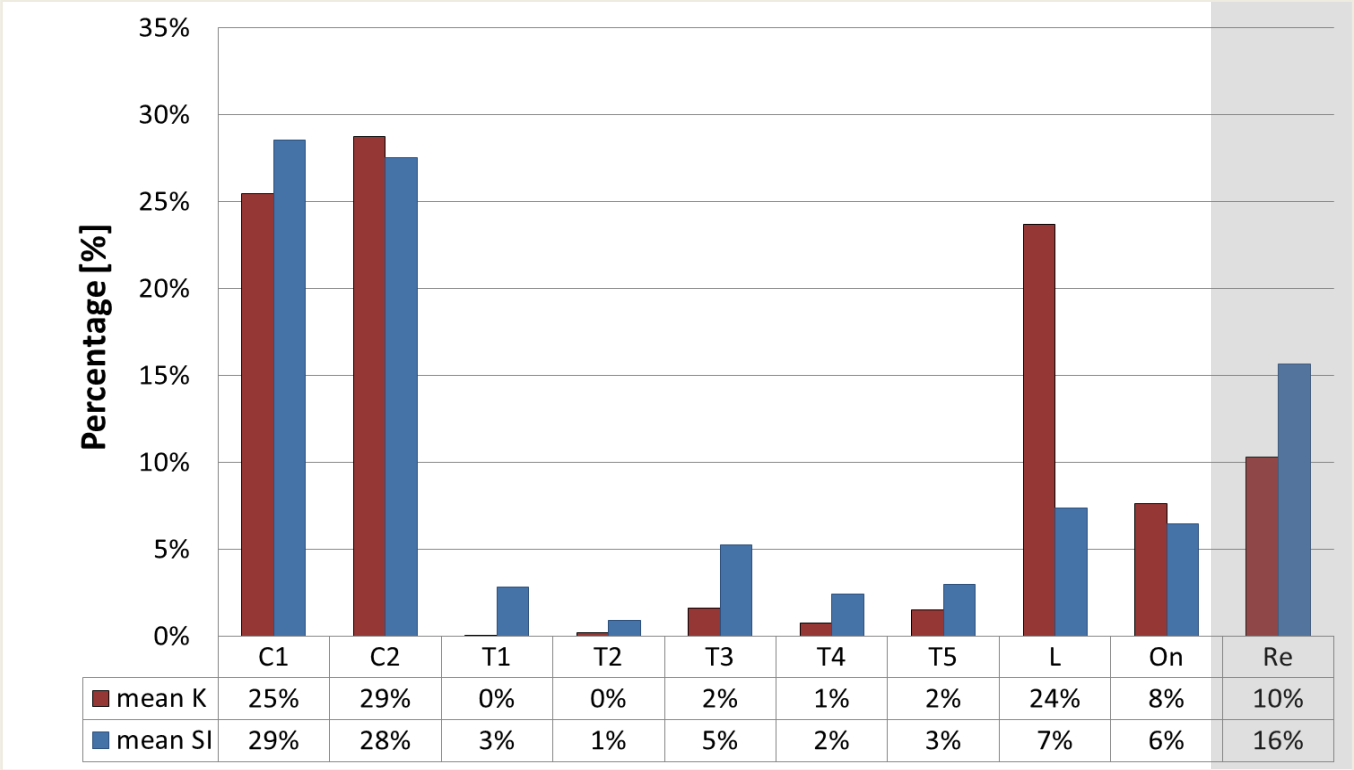
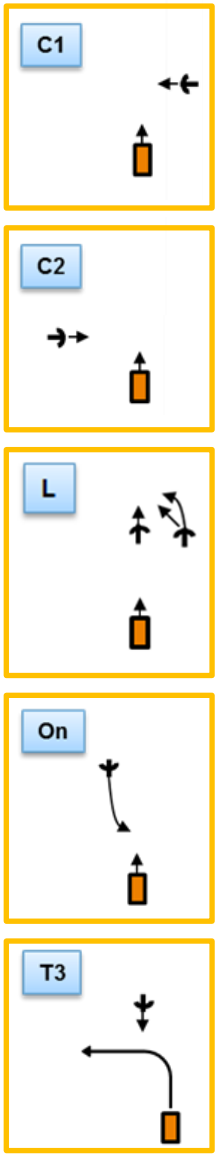


	C1	C2	T1	T2	T3	T4	T5	L	On	Re
mean K	25%	29%	0%	0%	2%	1%	2%	24%	8%	10%
mean SI	29%	28%	3%	1%	5%	2%	3%	7%	6%	16%



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CATS project: Accidentology & scenario definition

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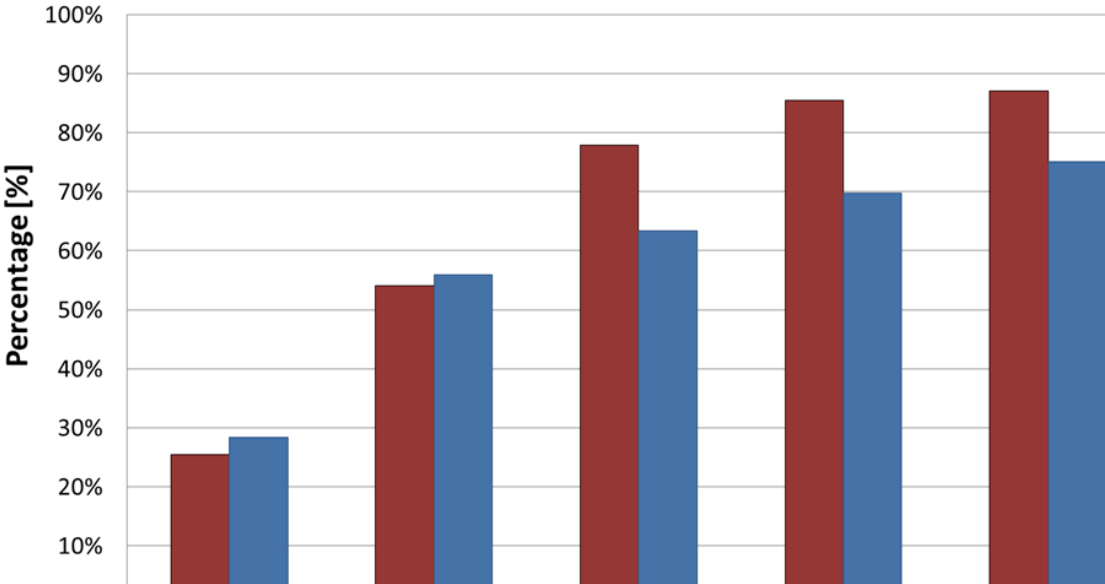
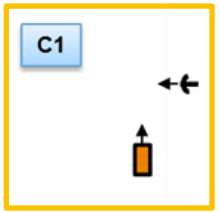
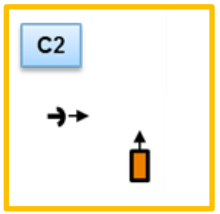
Conclusions:

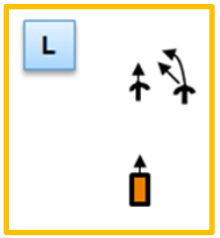
- C1, C2 and L in all countries dominant.
- The scenarios C1, C2 and L together cover already between 78% (fatal) and 63% (seriously injured):

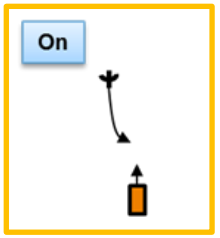


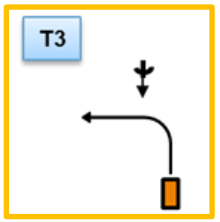
	C1	C1+C2	C1+C2+L	C1+C2+L+On	C1+C2+L+On+T3
mean K	25%	54%	78%	85%	87%
mean SI	28%	56%	63%	70%	75%











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CATS project: Accidentology & scenario definition

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Next steps accidentology & scenario definition:

- 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), enriched with results from observation studies.

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CATS project: Dummy & propulsion system development

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- CATS consortium to define technical specification for bicycle, cyclist dummy and propulsion system.
- 4activeSystems GmbH to development of bicycle and cyclist dummy together with propulsion system meeting set requirements.

- Development and verification workshops are ongoing:
  - Development workshops focus on detailed development of bicycle and cyclist dummy.

  - Verification workshops focus on feasibility of scenarios

CATS project: Dummy & propulsion system development

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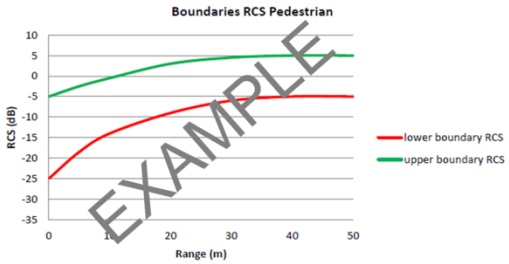
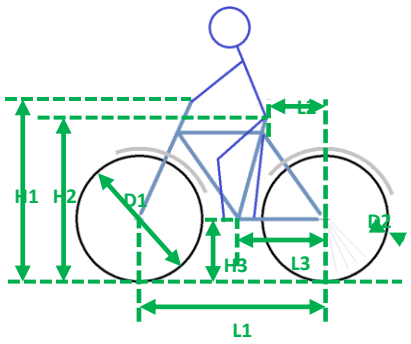
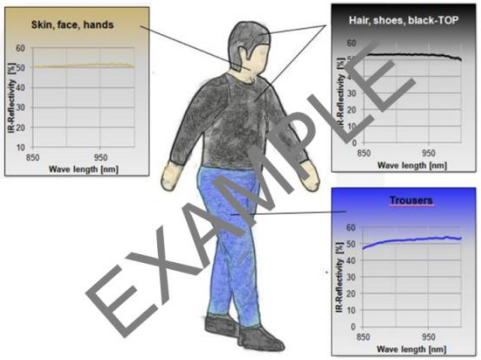
- Align all bicycle and cyclist dummy requirements as much as possible with the pedestrian dummy:
  - Euro NCAP
  - vFSS
  - ISO/TC 22/WG 16 Active safety test

- Specify requirements on bicycle and cyclist dummy for:
  - Dimensions
  - Features
  - Sensing properties





	The Netherlands	Germany	UK	Spain	Sweden	France	Italy	EU	CATS (proposed)
Front reflector	-	Yes, white	-	-	Yes, white, only at night	Yes, white	Yes	-	√
Rear reflector	Yes, red (0,35-0,9 m from ground)	Yes, one red and one wide-angle	Yes, red	-	Yes, red (could be combined with the rear light), only at night	Yes, red	Yes	Yes, red	√
Pedal reflectors	Yes, yellow at front and rear	Yes, yellow at front and rear	Yes, amber	-	-	Yes, orange at front and rear	Yes, both sides	-	√
Wheel reflectors	Yes, white or yellow	Yes, at least 2 yellow or a white stripe	-	-	Orange or white side reflectors, only at night	Yes, orange	Yes	-	√
Front light	Yes, white, only at night/dark weather	Yes, white	Yes, only at night	-	Yes, fixed white or yellow light, only at night	Yes, yellow or white, only at night/dark weather	Yes, yellow or white	Yes, white or yellow	√
Rear light	Yes, red, only at night/dark weather	Yes, red (at least 250 mm from ground)	Yes, only at night	-	Yes, fixed red Light, only at night	Yes, red, only at night/dark weather	Yes, red	Yes, red	√



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CATS project: Dummy & propulsion system development

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- Align propulsion system requirements with AEB pedestrian as much as possible:
  - Euro NCAP
  - vFSS
  - ISO/TC 22/WG 16 Active safety test
- Specify requirements on:
  - General requirements
  - Dimensions
  - Dynamic properties

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CATS project: Verification & testing

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- Crossing

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CATS project: Verification & testing

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- Longitudinal

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CATS project: Next steps

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Next steps

- Fine tune sensor characteristics of dummy.
- Ensure impactability of dummy.
- Improve propulsion system for longitudinal scenario.
- Further verification of test protocol and dummy in development and verification workshops.

- Test protocol definition including specification of scenarios, dummy & propulsion system.

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Acknowledgement

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TNO innovation for life
Ministry of Infrastructure and the Environment
4Active Systems
bast
Autoliv
BMW
Continental
DAIMLER
DENSO
FIAT
CHRYSLER
MAGNA
Opel – Wir leben Autos.
PSA PEUGEOT CITROËN
RENAULT
SUBARU
TOYOTA
TRW
Valeo
VOLKSWAGEN AKTIENGESELLSCHAFT
VOLVO

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Contact details

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Thank you very much for you attention

- Heiko Schebdat, GME Vehicle Safety Integration, technical lead
  - Telephone +49 6142 7 69643
  - Email: Heiko.Schebdat@de.opel.com
- Sjef van Montfort, TNO Integrated Vehicle Safety, consultant
  - Telephone: +31 88 866 09 32
  - E-mail: Sjef.vanMontfort@tno.nl
- More info can be found on www.tno.nl/cats

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