

FOR CYCLIST AND PEDESTRIAN PROTECTION



SaveCAP

Project Summary



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Content

- Ⓢ Background of the project
- Ⓢ Project activities
- Ⓢ Sensor field test
- Ⓢ Full scale tests
- Ⓢ Potential / effectiveness
- Ⓢ Dissemination
- Ⓢ Conclusions



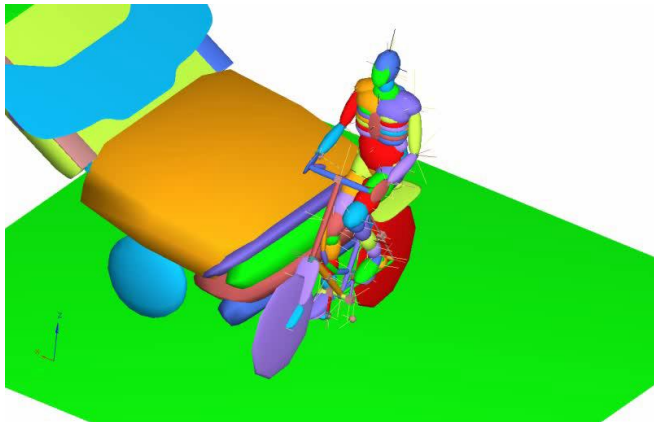
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Project background

Objective

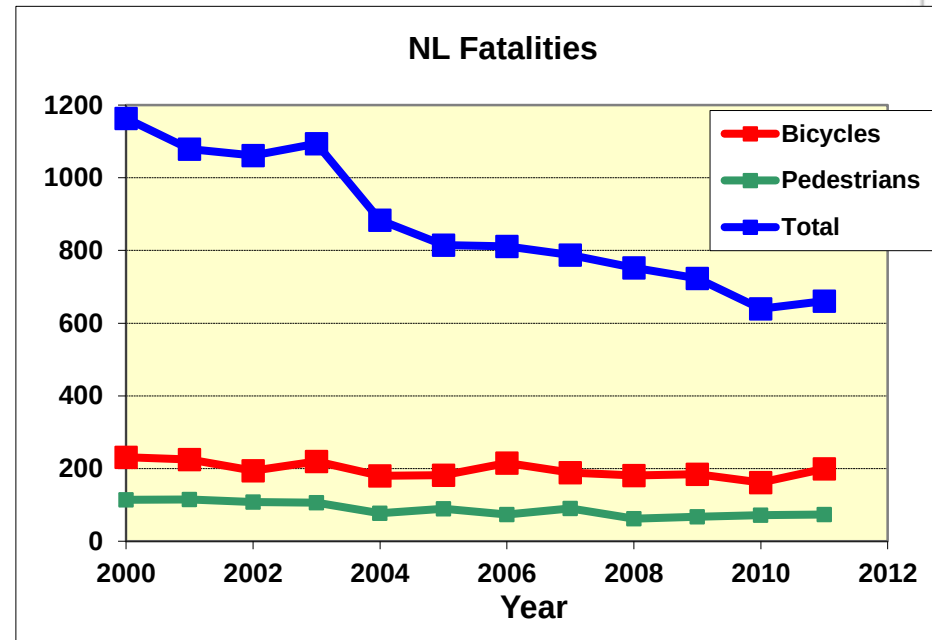
Identified potential VRU protection measures on the vehicle side:

- Automatic braking
- Airbag covering parts of the windscreen and pillars



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Key to working solutions

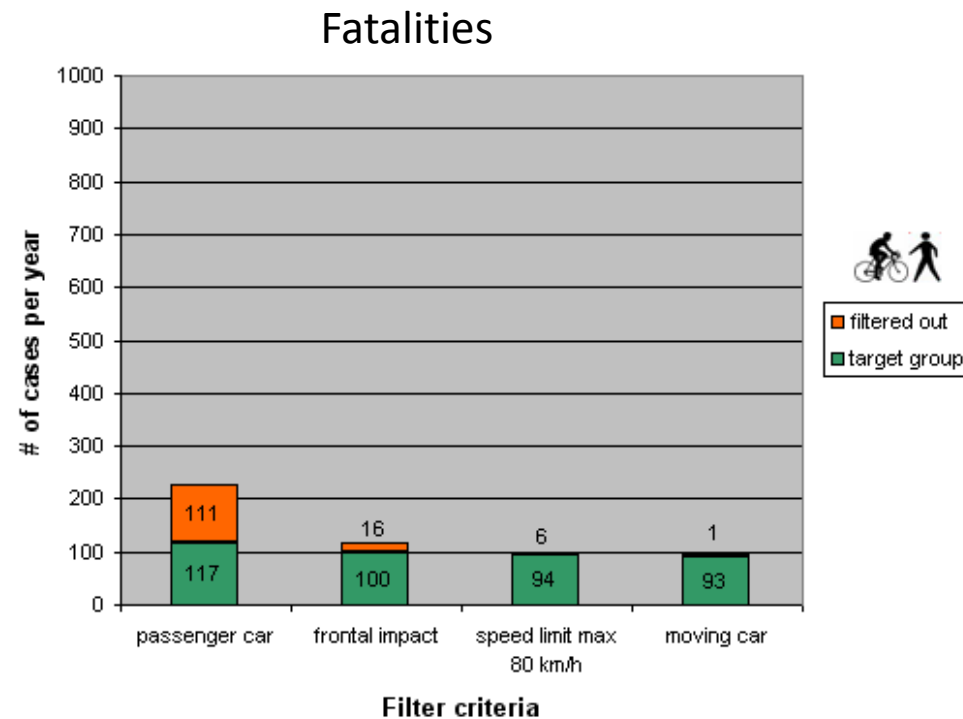
Understanding of circumstances of accidents car to VRU

- Accident scenarios
- Impact locations
- VRU kinematics

VRU= Vulnerable Road User: cyclist or pedestrian



Potential: Dutch Cyclists target population



Fatalities

>> total: 228

SaveCAP target population 93

Serious injured

>> total: 905

SaveCAP target population 398

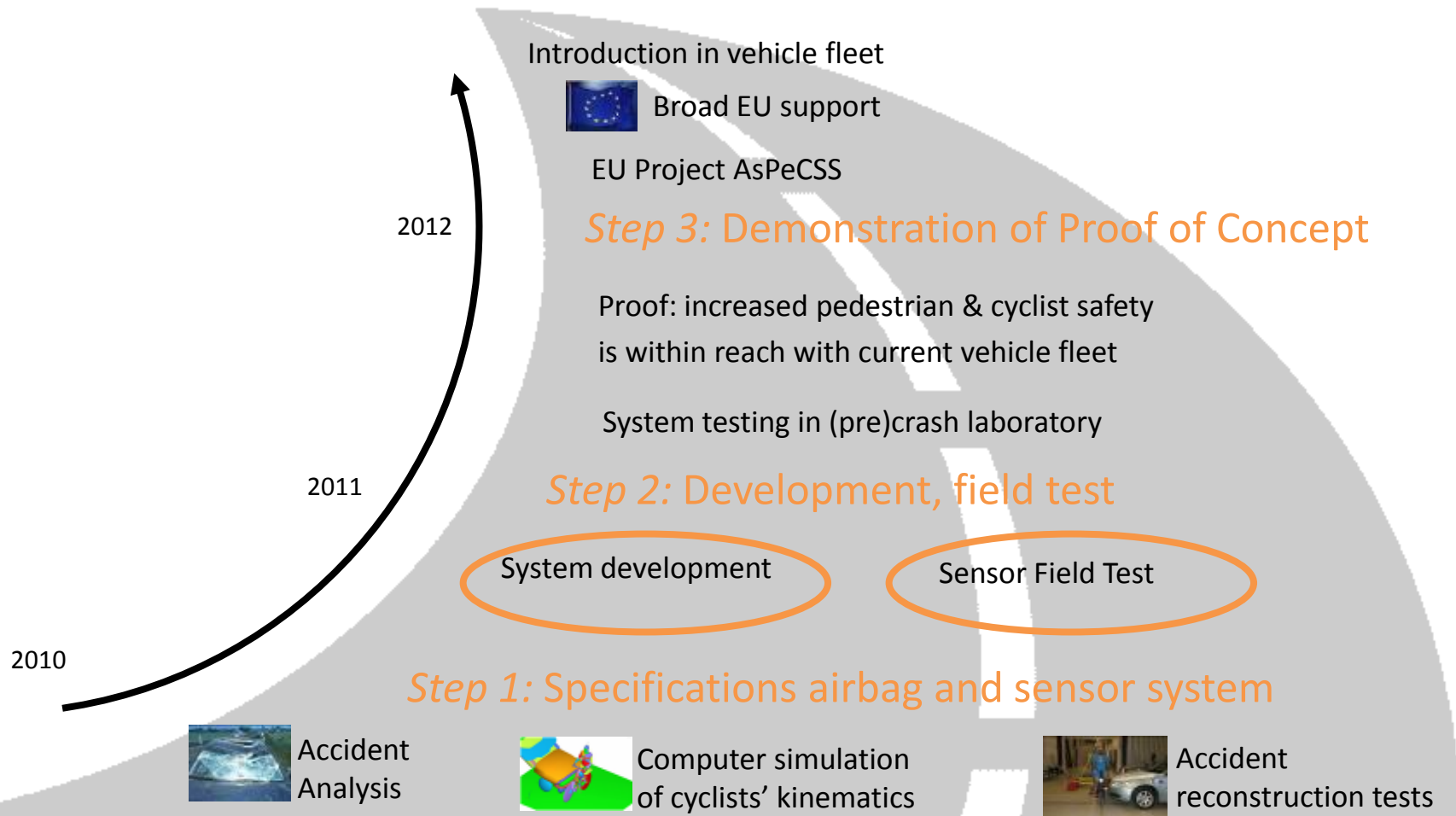


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Project activities





Project activities

- ④ WP 2 System predevelopment
- ④ WP 3 Sensor Field Test
- ④ WP 4 System evaluation
- ④ WP 5 Dissemination
- ④ WP 6 Project management



WP 2 System predevelopment

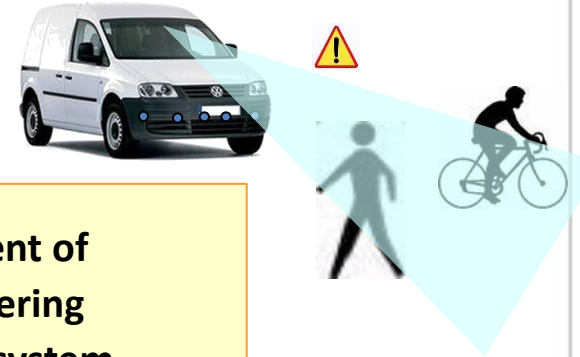
- ☐ Mainly ALV internal project
 - ☐ Sensor system
 - ☐ SaveCAP airbag
- ☐ Project team updated regularly/ during progress meetings





WP 3 Sensor Field Test

Capture video data of critical situations → development of sensor algorithm → optimised countermeasure triggering
5 major types of situations found for updating sensor system
±10 situations with legitimate signal that triggering of braking was needed



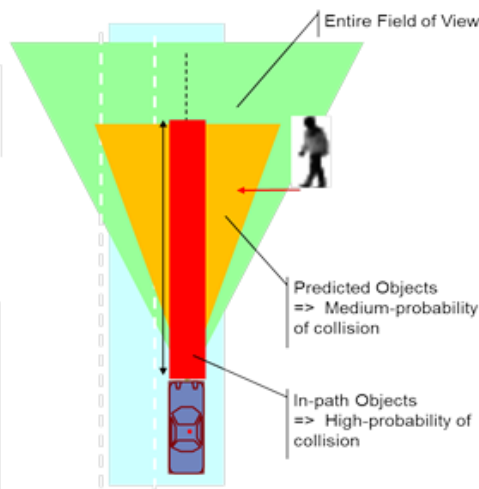
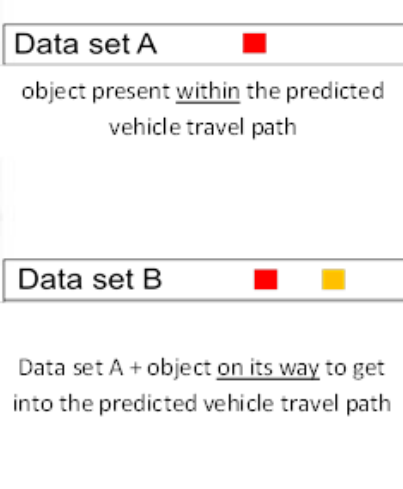
- 5 equipped vehicles
 - ONLY Stereo camera, GPS, yaw-rate
 - NO Airbag, contact sensor, Active Braking
- Almost 2 years (all weather conditions)
- Vehicles of KPN service fleet
- Volkswagen Caddy
- Total: 60.000 km driven; ± 3000 hours
- Each vehicle has 1 driver





WP 3 Sensor Field Test

- ⌚ Data gathering in 2 periods
 - ⌚ Set A: Feb 2011- June 2011
 - ⌚ Set B: June 2012- Feb 2012
 - ⌚ Set B: measurements continued till November 2012, no reporting



Vehicle id	1	2	3	4	5	Total	Unit
Data set A							
Uptime	131,2	70,0	262,4	102,3	53,4	619,3	h
Total Mileage	3516	1252	7809	5032	2449	20058	km
Collected files	423	417	1360	365	293	2858	files
Data set B							
Uptime	159,1	265,6	261,6	150,3	250,4	1087,0	h
Total Mileage	7100	7164	12894	6586	9334	43078	km
Collected files	659	2351	2088	1306	964	7368	files



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WP 4 System evaluation

Pre crash testing

- Ⓢ Pre crash testing with “dummy”; pedestrian, cyclist
- Ⓢ Braking of the car, warnings
- Ⓢ In time?
- Ⓢ Detection of VRU; still hard. Commercial systems are mainly developed for pedestrians: they don't see cyclists → SaveCAP developments are needed on the market!!



WP 4 System evaluation

Full-scale testing: introduction

18 full-scale vehicle – cyclist test performed with Proof of Principle airbag/braking

Set-up:

- Volvo V70 in 4 configurations:
 - Reference without airbag at 40km/h
 - Airbag with airbag at 40km/h
 - Full braking without airbag at 26km/h & 50mm pitch
 - Reduced braking without airbag at 33km/h & 25mm pitch
- Honda POLAR II instrumented dummy (head, neck, chest & pelvis)
- Stationary bicycle (male 58cm frame size) for reproducibility
- 3 different position configurations
 - Impact cyclist from the rear with head impact on A-pillar (Rear, A-pillar)
 - Impact cyclist from the side at centreline of the vehicle (Side, centreline)
 - Impact cyclist from the side on the far side with head impact on A-pillar (Side, far side)



SAE CAP

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Side, far side

Airbag

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0ms



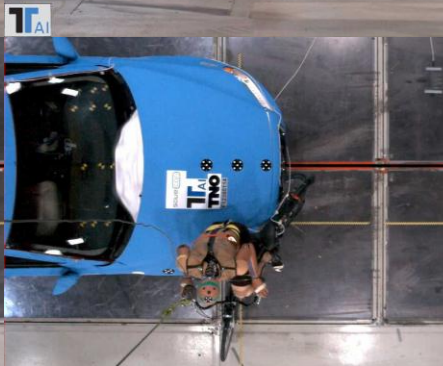
50ms



100ms



150ms



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0.150

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Test results >> Example !!!

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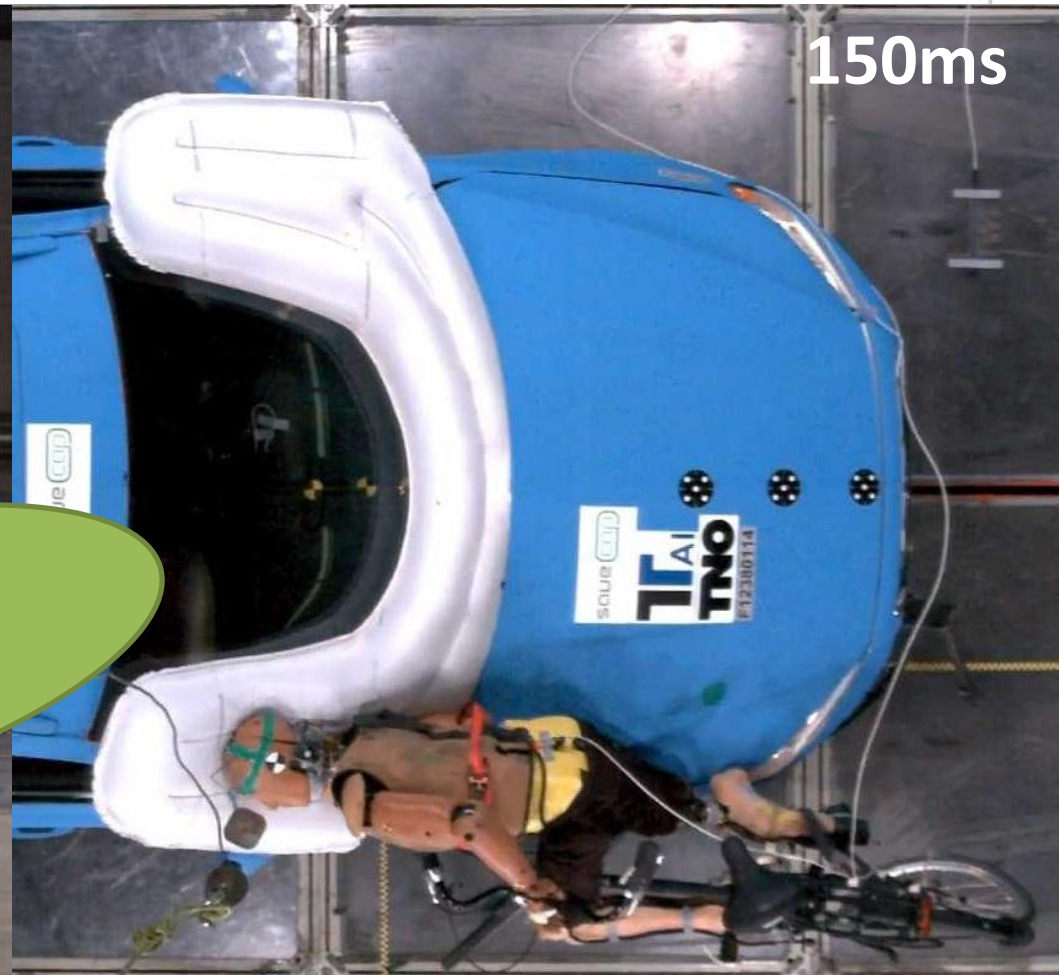
Side, far side

Airbag

HIC15 = 627



150ms



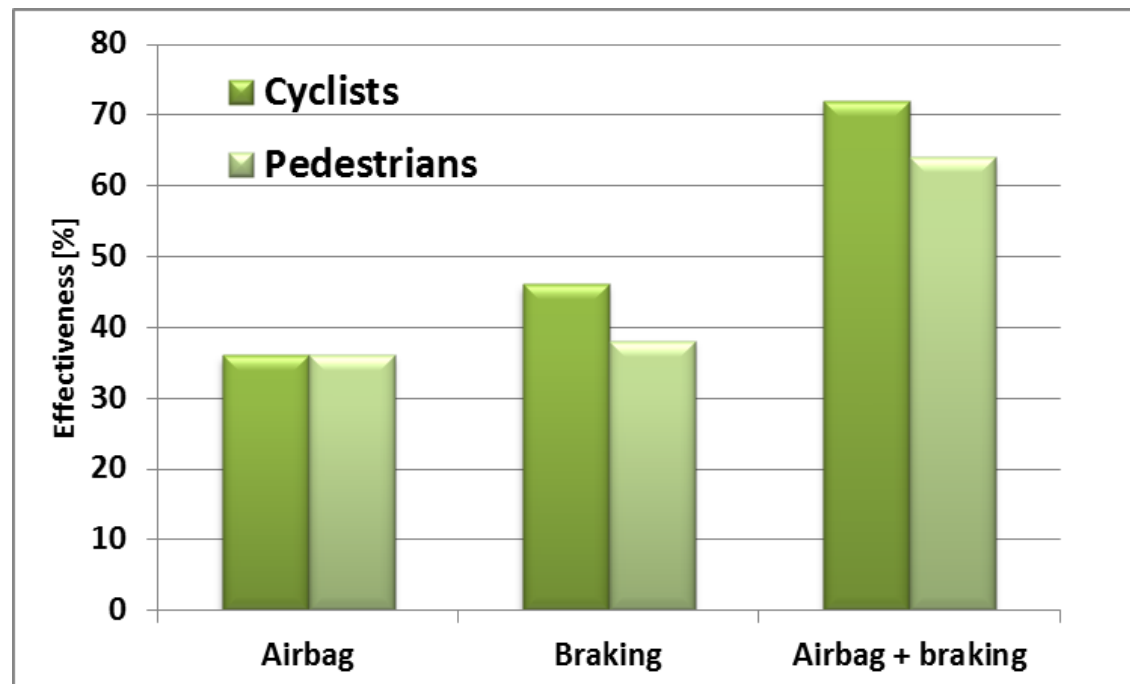


WP 5 Dissemination

- Ⓢ Project identity
- Ⓢ Project website, leaflet
- Ⓢ Publications for the general public
- Ⓢ Publications related to conferences
 - Ⓢ IRCOBI, ESV, ITS, NVVC, Praxis, AAAM
 - Ⓢ In contact with a lot of stakeholders
- Ⓢ Project movie
- Ⓢ Events
 - Ⓢ SFT kick off, November 15th 2010
 - Ⓢ SaveCAP demo event, November 8th 2012
 - Ⓢ Many publicity following (newspapers, tv, magazines, radio)



Potential savings: fatalities and severe injuries



Remarks:

- ICSC-2012 Presentation Autoliv
- GIDAS data / limited number of cases / limited accuracy

>> Significant reduction of fatalities and serious injured VRU's !!



Conclusion

- Proof of principle SaveCAP airbag successfully demonstrated
- Developments on Automated Emergency Braking for VRU brought to the next level (project bonus)
- Significant reduction of fatalities and (severely) injured people possible
- Broad audience was made aware of the project efforts and results
- SaveCAP has put cyclist safety internationally on many roadmaps!!
- Role of car manufacturers to bring it to the market
- Euro NCAP can encourage introduction, with support of national governments
- Cyclist safety and pedestrian safety can be truly helped with the same systems... when carefully developed

Questions?

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