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Collaboration with other H2020 projects, Deliverable 1.1 of the H2020 project SafetyCube.

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SafetyCube





Collaboration with other H2020 projects

Deliverable 1.1





SafetyCube

Collaboration with other H2020 projects

Work package 1, Deliverable 1.1

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Project Start date: 01/05/2015

Duration: 36 months

Organisation name of lead contractor for this deliverable:
Loughborough University, UK LOUGH

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Executive summary

SafetyCube was one of five projects to be funded under the H2020 Topic MG-3.4-2014 Traffic Safety Analysis and Integrated Approach towards the Safety of Vulnerable Road Users. The five projects were invited by the European Commission to explore the possibilities to cooperate in technical and dissemination aspects.

Early collaborations have been established between SafetyCube and other projects supported under the H2020 Topic MG-3.4-2014 Traffic Safety Analysis and Integrated Approach towards the Safety of Vulnerable Road Users. A series of joint activities have been conducted including

- Project Coordinator collaboration meeting
- Joint Session at Transport Research Arena Conference, Warsaw April 2016
- Informal joint project meeting at TRA
- Specific Joint Work Package meetings with InDeV in relation to the estimation of accident costs

Future joint activities are planned to further explore collaboration opportunities between SafetyCube and other projects

- Invitation to other project representatives to attend SafetyCube Mid-term workshop
- A joint session at the International Cycle Safety Conference in Bologna, November 2016
- Further Work Package level discussions to explore potential cooperation in estimating the under-reporting of crashes.

1 Introduction

1.1 SAFETYCUBE

Safety CaUsation, Benefits and Efficiency (SafetyCube) is a European Commission supported Horizon 2020 project with the objective of developing an innovative road safety Decision Support System (DSS) that will enable policy-makers and stakeholders to select and implement the most appropriate strategies, measures and cost-effective approaches to reduce casualties of all road user types and all severities.
SafetyCube aims to:

1. develop new analysis methods for (a) Priority setting, (b) Evaluating the effectiveness of measures (c) Monitoring serious injuries and assessing their socio-economic costs (d) Cost-benefit analysis taking account of human and material costs
2. apply these methods to safety data to identify the key accident causation mechanisms, risk factors and the most cost-effective measures for fatally and seriously injured casualties
3. develop an operational framework to ensure the project facilities can be accessed and updated beyond the completion of SafetyCube
4. enhance the European Road Safety Observatory and work with road safety stakeholders to ensure the results of the project can be implemented as widely as possible

The core of the project is a comprehensive analysis of accident risks and the effectiveness and cost-benefit of safety measures focusing on road users, infrastructure, vehicles and injuries framed within a systems approach with road safety stakeholders at the national level, EU and beyond having involvement at all stages.

1.1.1 Work Package 1

WP1 deals with the overall coordination of the project and the administrative work required for monitoring the progress of the project.

WP1 comprises a single task, Project Management, which runs continuously through the duration of the project. It is conducted by the Project Coordinator, Loughborough University (LOUGH), and comprises the following activities:

<u>Provision of administrative and contractual infrastructure for project partners</u>
• Liaison with European Commission concerning any contract amendments
• Preparation of Consortium Agreement and any amendments
• Periodic and final project reporting to European Commission
• Distribution of project partner payments
• Routine monitoring of partner time and budget expenditure

<u>Coordination of project activities</u>
• Chair of project Steering Committee
• Maintaining focus on project objectives
• Monitoring of project progress against time-plan, adjustments to activities as required
• Scrutiny of dependencies between Work Packages, identification of obstacles and opportunities

<u>Communication</u>
• Routine communication with European Commission as required
• Communication between partners – direction of project, achievements and progress
• Coordination of annual project plenary meeting
• Representing the Project to the external reviewers
• Coordination of end of project conference

• Representing project to external groups including related H2020 and national projects

Quality Assurance

The Coordinator is responsible for managing the project procedures to ensure the quality of the results and deliverables. A quality assurance procedure has been established to ensure that each deliverable conforms to the specifications laid down in the Work Package descriptions and fully addresses the project objectives to advance the state of knowledge concerning accident causation, risks and the effectiveness of measures. Every member of the partnership is invited to support this QA process, as established in the Deliverable Review Process document. External reviews will also be conducted by external expert for those deliverables considered fundamental. Members of the group will also be invited to conduct an annual review of the progress of the full project against the work plan and expected quality criteria.

Risk management

The Coordinator has the responsibility to maintain the project risk management plan. The first version of the plan is included in the Proposal. Should any unexpected high impact events occur during the course of the project the plan may need further updating. The plan is expected to represent the responses needed by the project team should adverse events occur that impact on the success of the project. The coordinator will establish a monitoring procedure to detect problems at an early stage in sufficient time to react optimally.

Legal and ethical issues

Legal questions may arise at any time during the project. Normally these may be difficulties with legal changes affecting partners, changes of legal status or financial issues. There may be some aspects of the project that initiate ethical considerations although none have been identified at the current time. Many of these issues may need to be addressed under the guidelines laid down in the Consortium Agreement and some may need amendments to the Grant Agreement. The Project Coordinator will ensure there is sufficient legal oversight of the project to enable all of these issues to be addressed properly, maintain full communication with the relevant project partners and where necessary the European Commission, and will ensure that obstacles are addressed rapidly and efficiently by the project team.

During the project contract finalisation phase the SafetyCube team were informed of four other research projects to be funded under the same topic MG-3.4-2014 Traffic Safety Analysis and Integrated Approach towards the Safety of Vulnerable Road Users and were invited to explore opportunities for synergies and collaboration. The projects and Co-ordinating organisations are as follows:

InDeV	In-Depth understanding of accident causation for Vulnerable road users	Lund University, SE
Prospect	PROactive Safety for PEdestrians and CyclisTs	IDIADA, ES
Seniors	Safety-ENhancing Innovations for Older Road userS	BASt, DE
XCycle	Advanced measures to reduce cyclists' fatalities and increase comfort in the interaction with motorised vehicles	University of Bologna, IT

1.2 PURPOSE OF THIS DELIVERABLE

The SafetyCube project team has conducted liaison activities with the four other MG 3.4 projects during the first year of the project duration. This brief management report describes the first stages of engagement between the SafetyCube team and the work packages of the other projects. It does not report on any further engagement between the projects that does not involve SafetyCube.

2 Summary of project liaison activities

This chapter describes the inter-project engagement activities undertaken in the first project year by the SafetyCube team and the outcomes in terms of project synergies.

Liaison activities between SafetyCube and other projects have taken place using a top down approach, based on interaction between Project Coordinators, and a bottom up approach based on communications between project partners.

SafetyCube commenced project activities on 1 May 2015 and all Work Packages were fully established by the end of 2015. To initiate closer communications between the projects a web-based project liaison meeting was held on 4 March 2016. At this meeting Project Coordinators each presented an overview of the projects and discussed possible areas of cooperation.

2.1 PROJECT OUTLINES PRESENTED AT COORDINATION MEETING.

1. **SafetyCube -** Safety CaUsation, Benefits and Efficiency - (Pete Thomas, Loughborough University)
   The objective of SafetyCube is to develop an innovative road safety Decision Support System (DSS) that will enable policy-makers and stakeholders to select and implement the most appropriate strategies, measures and cost-effective approaches to reduce casualties of all road user types and all severities. At the core of the project will be a novel and comprehensive analysis of accident causation factors combined with newly estimated data on the effectiveness and cost-effectiveness of safety measures, not just in relation to reduction of fatalities but also the number of injured. An operational framework will be established to provide future access to the DSS once the project is completed. The project has four sub-objectives:
   1. To develop new analysis methods for (a) Priority setting, (b) Evaluating the effectiveness of measures (c) Monitoring serious injuries and assessing their socio-economic costs (d) Cost-benefit analysis taking account of human and material costs
   2. To apply these methods to safety data to identify the key accident causation mechanisms, risk factors and the most cost-effective measures for fatally and seriously injured casualties
   3. To develop an operational framework to ensure the project facilities can be accessed and updated beyond the completion of SafetyCube
   4. To enhance the European Road Safety Observatory and work with road safety stakeholders to ensure the results of the project can be implemented as widely as possible

   The project outputs will be framed according to the specific policy and stakeholder areas – infrastructures, vehicles and road users – so that the measures developed in the project can be most readily applied. A systems approach will ensure effective coordination between these areas. The close involvement of road safety stakeholders of all types at national and EU levels and wider will enable the DSS to be focussed on the most appropriate policy-making procedures and ensure the project outputs have global reach.

2. **Prospect** - PROactive Safety for PEdestrians and CyclisTs - (Andrés Aparicio, IDIADA)
The past decade has seen significant progress on active pedestrian safety, as a result of advances in video and radar technology. In the intelligent vehicle domain, this has recently culminated in the market introduction of first-generation active pedestrian safety systems, which can perform autonomous emergency braking (AEB-PED) in case of critical traffic situations. PROSPECT will significantly improve the effectiveness of active VRU safety systems compared to those currently on the market. This will be achieved in two complementary ways:

   (a) by expanded scope of VRU scenarios addressed and
   (b) by improved overall system performance (earlier and more robust detection of VRUs, proactive situation analysis, and fast actuators combined with new intervention strategies for collision avoidance).

   PROSPECT targets five key objectives:

   i. Better understanding of relevant VRU scenarios
   ii. Improved VRU sensing and situational analysis
   iii. Advanced HMI and vehicle control strategies
   iv. Four vehicle demonstrators, a mobile driving simulator and a realistic bicycle dummy demonstrator
   v. Testing in realistic traffic scenarios and user acceptance study

   The consortium includes the majority of European OEMs (Audi, BMW, DAIMLER, TME and Volvo Cars) currently offering AEB systems for VRU. They are keen to introduce the next generation systems into the market. BOSCH and CONTI will contribute with next generation components and intervention concepts. Video algorithms will be developed by UoA and DAIMLER. Driver interaction aspects (HMI) are considered by UoN and IFSTTAR. Euro NCAP test labs (IDIADA, BAST, TNO) will define and validate test procedures and propose standardization to Euro NCAP and UN-ECE. Accident research will be performed by Chalmers, VTI and BME, based on major in-depth accident databases (GIDAS and IGLAD) and complemented by East Europe data. The work will be done in cooperation with experts in Japan (JARI, NTSEL) and the US (VTTI, UMTRI, NHTSA).

3. **InDeV** - In-Depth understanding of accident causation for Vulnerable road users - (Aliaksei Laureshyn, Lund University)
The InDeV project addresses the second bullet point of the topic MG.3.4. i.e. "… in-depth understanding of road accident causation…". The main objective of the project is to develop a tool-box for in-depth analysis of accident causation for Vulnerable Road Users (VRU) based on a combined use of accident databases, in-depth accident investigations, surrogate safety indicators, self-reported accidents and naturalistic behavioural data. The tool-box will help to link accident causation factors to VRUs' accident risk, and provide a solid basis for developing preventive countermeasures and a better input for socio-economic cost calculations of VRU accidents. The proposed approach is to reveal the causational factors by focusing on the process of accident development, thus overcoming the main weakness of the traditional accident data based approach that might find correlations between various factors and accident frequency, but not show the causation chains. It will also employ, to a larger extent, observation of critical traffic events that are similar in process to real accidents, but are relatively more frequent and easier to collect in sufficient quantities. The InDeV project includes the following steps:

   i) review of methods and identification of the critical sites and road user groups;
   ii) observation studies at the selected sites;
   iii) development of technical tools for automated behaviour data collection;

iv) analysis of the socio-economical costs;
v) compilation of the project results and development of the safety analyst tool-box.

The project has a clear focus on VRUs and the course of events in accidents they get injured in. It will provide solid knowledge, help to avoid a skewed view on the problem of VRUs' safety, and facilitate the proposed tailor-made countermeasures for these groups. Moreover, with the use of surrogate safety indicators, there will be no need to wait for accidents to happen in order to learn how to prevent them from happening.

4. **XCycle** - Advanced measures to reduce cyclists' fatalities and increase comfort in the interaction with motorised vehicles - Luca Pietrantoni, University of Bologna)
Cyclists suffer a disproportionate share of serious injuries and fatalities, and indeed in recent years that disadvantage has been growing. At the same time they often are not treated equally by traffic systems (e.g. traffic signals frequently fail to register their approach or presence). XCYCLE has the aim of developing the means to equalise the treatment of cyclists in traffic and thus both encourage cycling and make cycling safer. XCYCLE will develop: technologies aimed at improving active and passive detection of cyclists; systems informing both drivers and cyclists of a hazard at junctions; effective methods of presenting information in vehicles and on-site; cooperation systems aimed at reducing collisions with cyclists. Two relevant use cases would be bicycle interaction with large vehicles and cars at intersections and the provision of an immediate or extended green traffic light for cyclists approaching traffic signals. An in-vehicle detection system and a system of threat mitigation and risk avoidance by traffic signals will be developed. The components developed and built up will be systematically integrated, implemented and verified. A new large-scale research infrastructure in the city of Braunschweig (DE) and a second test mobile platform will be used as test site. A demo bicycle with a cooperative technology will be developed and tested as well. A user-centred approach will be adopted. Behavioural evaluation will part of the whole process: attentional responses using eye tracking data; evaluation of human-machine interface; acceptance and willingness to pay. In the Cost-Benefit Analysis behavioural changes will be translated into estimated crashes and casualties saved per system. The project will contribute to innovative and efficient advanced safety measures to reduce the number of accidents, often of high severity, involving cyclists in interaction with motorised vehicles.

5. **Seniors - S**afety-**EN**hancing **I**nnovations for **O**lder **R**oad user**S** (Marcus Wisch, BASt)
European countries face great challenges because the demographic structure in the EU is changing rapidly, due to reducing birth rates and increasing life expectancies. In 2012, 17% of Europeans were aged 65 and older and in 2020 this will rise to 28%. Meanwhile, the mobility needs of the elderly are also changing. Maintaining a driver's licence is an important issue of independence today, both for males and females. Also technological developments like the introduction of e-bikes enables access to other means of transport. These demographic and behavioural changes are of growing concern to mobility and road safety. While accident data show a decreasing number of fatalities and serious injuries on EU roads, recent data from the ERSO show an increasing proportion of elderly in the fatality statistics. This trend is a serious threat to the achievements of recent decades and poses a challenge that must be addressed to meet goals set for further reduction of road fatalities. Furthermore, there is an increasing rate of obesity in EU populations, which introduces changes in injury patterns and risks. The SENIORS project focuses on the protection of elderly and obese road users also by transferring nowadays younger generations' safety standards. The objective is to develop the required understanding of accident scenarios, injury mechanisms and risks and to implement these findings in test tools and test and assessment procedures. An integrated approach considering the elderly in multiple transport modes is applied to reduce the portion of elderly fatalities. The small-scale project focuses on providing tools to encourage wider adoption of advanced restraint and pedestrian protection systems improving the protection of older and

obese vulnerable road users. The activities consolidate results from previous EU projects such as THORAX and AsPeCSS and meet the needs defined by the GRSP IWG on Frontal Impact working on a near-term (2015) and mid-term (2020) update of UN-R94.

2.2 TRANSPORT RESEARCH ARENA, WARSAW, POLAND

The five projects collectively proposed to hold a joint dissemination workshop in the form of a Special Session at the Transport Research Arena to be held in Warsaw, Poland. The session took place on 19 April and it included presentations of the five projects together with the research framework of the Forum of Road Safety Research Institutes (FERSI). Over 150 delegates were able to discuss the nature and purpose of the five projects and the FERSI research directions.

The session speakers are listed below and the presentations are attached in Appendix 1.

Presentation	Title	Presenter
Session Chair		Pete Thomas, SafetyCube, Loughborough University
InDeV	In-Depth understanding of accident causation for Vulnerable road users	Aliaksei Laureshyn, Lund University, SE
Prospect	PROactive Safety for PEdestrians and CyclisTs	Andres Aparicio, IDIADA, ES
SafetyCube		George Yannis, NTUA, GR
Seniors	Safety-ENhancing Innovations for Older Road userS	Alba Fornells, IDIADA, ES
XCycle	Advanced measures to reduce cyclists' fatalities and increase comfort in the interaction with motorised vehicles	Luca Pietrantoni, University of Bologna, IT
FERSI	Forum of European Road Safety Institutes	Raschid Urmeew, BASt, DE



Figure 1 Delegates and speakers at the TRA Special Session

The Session Chair took the opportunity of the joint session to invite all partners of each project who were attending the TRA conference to hold an informal meeting with the intention of establishing further working links between the projects. Each delegate described their role in the their project and were able to identify several related activities in other projects including SafetyCube.



Figure 2 Informal meeting of project partners - SafetyCube, InDeV, Seniors, Prospects, XCYCLE

2.3 SYNERGIES BETWEEN SAFETYCUBE AND OTHER PROJECTS

SafetyCube Work Package Leaders have so far identified two areas of synergy with InDeV. Both projects include a task with the objective to estimate the costs of accidents for each EU Member State according to a constant methodology, in SafetyCube the work is undertaken within WP 7. The methodology includes the development of a standardised method to estimate costs followed by a questionnaire to be sent for completion to representatives of EU Member States. The two projects have decided to collaborate to ensure there will be no contradictory estimates of costs and to maximise the use of resources. The work is under development and InDeV will be able to use the national data that SafetyCube will collect with the support of DG-MOVE and the CARE experts group. SafetyCube will be able to use the additional contributions to a common methodology prepared by partners within InDeV.

A further area of potential synergy that was identified at the informal meeting concerned the under-reporting of serious injuries, again involving SafetyCube and InDeV. The task in SafetyCube is to compare methods to estimate the numbers of seriously injured casualties and certain groups including single cyclist and powered two-wheeler crashes are known to be under-reported in police and national statistics. Discussions between the projects are currently at an early stage and further discussions are planned to elaborate on possible collaboration.

2.4 PLANNED ACTIVITIES

Currently several future collaborations are planned.

1. A joint session to present the projects to be held at the International Cycle Safety Conference in Bologna in November 2016
2. Invitations to WP Leaders from other projects to attend the SafetyCube Mid-term workshop to take place in Brussels in September 2016.
3. Further discussions between WP Leaders from SafetyCube and other projects on potential areas of cooperation.

3 Conclusion



Early collaborations have been established between SafetyCube and other projects supported under the H2020 Topic MG-3.4-2014 Traffic Safety Analysis and Integrated Approach towards the Safety of Vulnerable Road Users. A series of joint activities have been conducted including

- Project Coordinator collaboration meeting
- Joint Session at Transport Research Arena Conference, Warsaw April 2016
- Informal joint project meeting at TRA
- Specific Joint Work Package meetings with InDeV in relation to the estimation of accident costs

Future joint activities are planned to further explore collaboration opportunities between SafetyCube and other projects

- Invitation to other project representatives to attend SafetyCube Mid-term workshop
- A joint session at the International Cycle Safety Conference in Bologna, November 2016
- Further Work Package level discussions to explore potential cooperation in estimating the under-reporting of crashes.

Appendix 1: Presentations made at TRA conference 2016

SafetyCube

Safety CaUsation, Benefits and Efficiency

SafetyCube

Safety CaUsation, Benefits and Efficiency

www.SafetyCube-project.eu

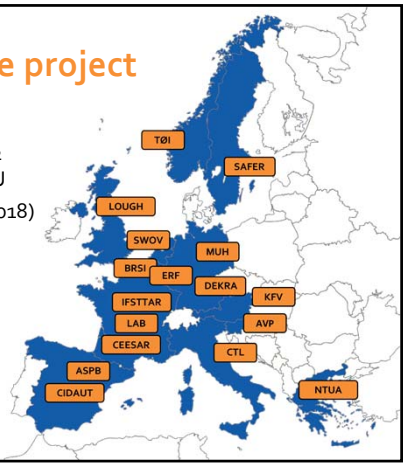
Stakeholder workshop
Brussels, 22 February 2016

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

4/27/2016

SafetyCube project

17 partners from 12 countries within EU
(May 2015 - April 2018)



European Road Safety Observatory

A publicly accessible repository of data and knowledge developed to scientific standards



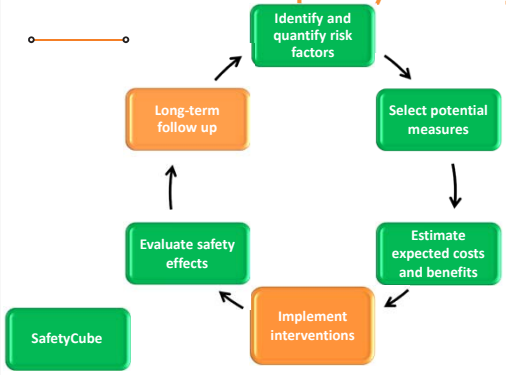
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SafetyCube concept

- Problem
  - *Evidence based road safety policies are becoming more usual and there is much better availability of national data and state of the art knowledge*
  - *Effective road safety policies need good information about accident risk factors and about measures*
- SafetyCube will meet this need by generating new knowledge about **accident risk factors** and the **effectiveness of measures** relevant to Europe
- It will structure this information so it can be readily accessed at both top level and in-depth to meet the needs of all stakeholders



Evidence-based policy-making



What is a risk?

- "Risk factor" denotes any factor that contributes to accidents or injuries.
- There are risk factors related to all elements of the road system and the interactions between these elements.
- The importance of a risk factor can be defined as the size of the contribution it makes to accidents or injuries.



What is a measure?

- A measure is any action intended to reduce the numbers of accidents or injuries.
  - *May reduce the risk of a crash*
  - *May reduce the risk of injury*
  - *May reduce exposure to risk*



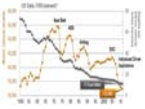
Challenges in evidence based approaches

- Do we have a comprehensive method to identify risks?
  - *Road, road users and vehicles*
- Do we have a comparable method to evaluate measures?
  - *Road, road users and vehicles*
- How do we estimate the likely casualty reduction of a measure that has not been introduced to the real-world?
- Do we have a comprehensive method to evaluate cost-effectiveness?
- How do we handle the situation where there are many measures of effectiveness but they disagree?



Decision-making – challenges of the evidence base

1. How do we identify and quantify the risk factors and problem areas *(eg. Distraction)?*
2. How do we select the most appropriate measures?*(eg speed – enforcement, infrastructure or vehicle measures)*
3. How do we estimate the likely safety benefits and costs?
4. How do we estimate the likely casualty reduction of a measure that has not been introduced to the real-world?
5. How do we make decisions when there is a lot of conflicting evidence?
6. How do we make decisions when there is little or no evidence?



Challenges to access the evidence base

- Much of the evidence on risks and measures is in the research literature – how can it be brought together?
- How can we assess transferability of measures from one country to another?
- How can the available information and data be synthesised?



SafetyCube will meet these challenges

SafetyCube will

- Provide new information about the **effectiveness** of measures by bringing together published information
- Produce a comprehensive method to evaluate the **costs and benefits** of measures
- Produce new information about **seriously injured** casualties
- Produce a new **Decision Support Tool** that will enable easy access to information on risks and measures



SafetyCube Objectives

- To develop new analytic methods to
  - *identify the most important risk factors for crashes*
  - *assess the safety effects of measures that address these factors*
  - *assess serious injuries and socio-economic costs in crashes*
  - *conduct Cost-Benefit Analyses taking account of human and material costs.*
- To apply these methods to available safety data to identify the key accident causation mechanisms, risk factors and the most cost-effective road safety measures for fatally and seriously injured casualties



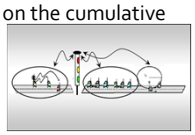
SafetyCube will

- Improve the evidence base for road safety policy-making
- Develop a new Decision Support System
- Bring together data about risks, measures and cost-effectiveness within a single comprehensive framework

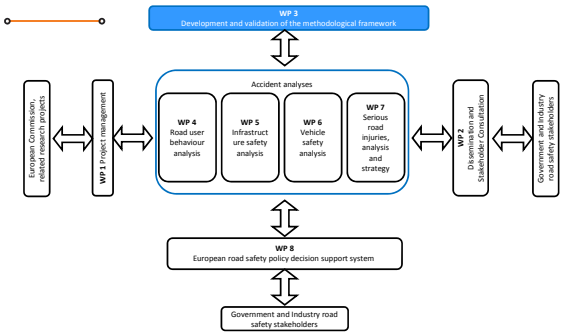


Federal Highway Authority CMF Clearinghouse

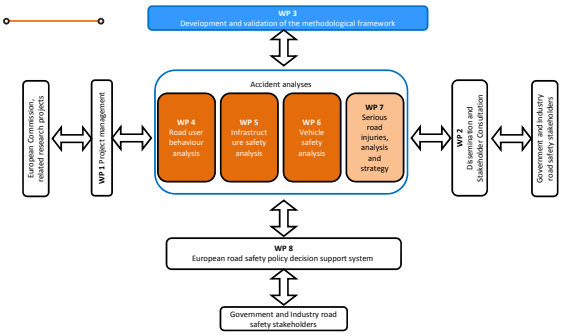
- www.cmfclearinghouse.org
- A central, web-based searchable repository of CMFs (including the ones listed in the HSM) and of additional information and resources related to SPFs and CMFs.
- CMFs are rated according to: study design, sample size, standard error, potential biases and data source.
- A star rating (1-5) is assigned based on the cumulative performance in the five categories.



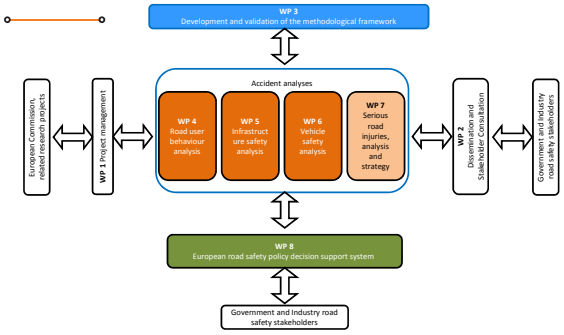
Project structure



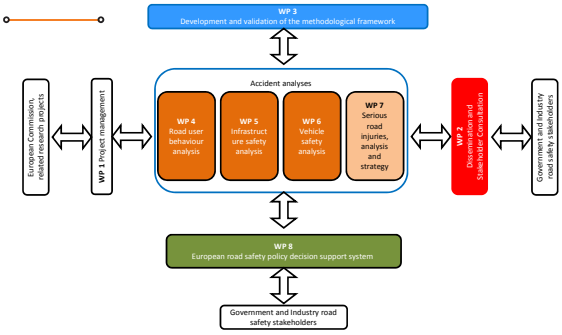
Project structure



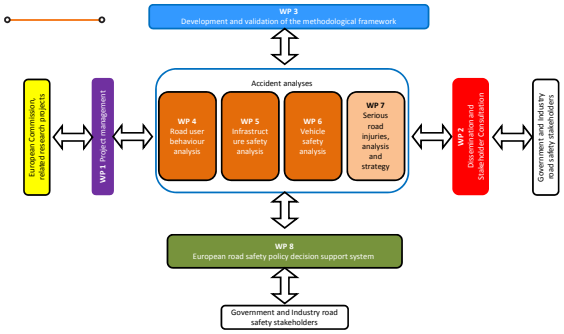
Project structure



Project structure



Project structure



Hot Topics

- An important current question in safety about a risk factor or the effectiveness of a measure.
  - *Distraction*
  - *Automatic Emergency Braking*
  - *Cooperative driving systems*
  - *Helmet use for eBike riders*
- Stay topical for duration of SafetyCube



We need your help

- What is the best way SafetyCube can support evidence based decisions?
- What would you like to see in the Decision Support System?
- What will it look like? How will it operate?
- What are the hot topics we should focus on?



Purpose of today

- To introduce SafetyCube to key stakeholders
- To form a relationship that we would like to last the duration of the project
- To start a dialogue about the project outputs to ensure they are as beneficial to road safety stakeholders as possible



Contact

- **www.SafetyCube-project.eu**



- Pete Thomas
- Professor of Road and Vehicle Safety
- p.d.thomas@lboro.ac.uk
- Smart and Safe Mobility Research Cluster
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- LE11 3TU
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InDeV

In-Depth understanding of accident causation for Vulnerable road users

InDeV
IN-DEPTH UNDERSTANDING OF ACCIDENT CAUSATION FOR VULNERABLE ROAD USERS

www.indev-project.eu



Aliaksei Laureshyn
project co-ordinator
Lund University (Sweden)

InDeV aims at:

- developing an **integrated methodology** to study accident causation for VRU

and

- improving **assessment of VRU-accident costs**

"Integrated methodology" utilises:

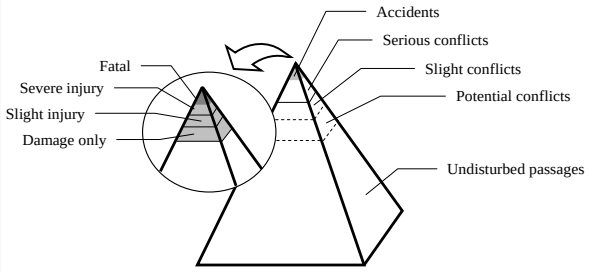
- Accident databases (police & medical care)
- In-depths accident investigations
- Traffic conflicts/observational studies
- Naturalistic cycling/walking (mobile app)
- Self-reported accidents

"Integrated methodology" utilises:

- Accident databases (police & medical care)
- In-depths accident investigations
- Traffic conflicts/observational studies
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- Self-reported accidents

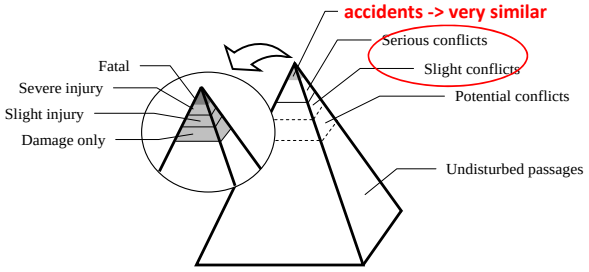
most development happens here

Traffic conflicts



Traffic conflicts

just one step below accidents -> very similar









Technical tools for such studies

- Video analysis:
  - **"Watch dog"** - raise a flag when a conflict MIGHT happen
  - **Advanced tracking** – extracts trajectories, etc.
- **Mobile APP** for naturalistic walking/cycling (incl. single accidents/falls)

InDeV's output

- Methodology
- Technical support tools (open source)
- VRU safety handbook & software manuals

IN-DEPTH UNDERSTANDING OF ACCIDENT CAUSATION FOR VULNERABLE ROAD USERS

Visit us on www.indev-project.eu

Thank you very much for your attention!

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 635895

Prospect

PROactive Safety for PEdestrians and CyclisTs

PROSPECT

PROactive Safety for Pedestrians and CyclisTs

Warsaw, TRA2016 conference

Andrés Aparicio, Applus IDIADA

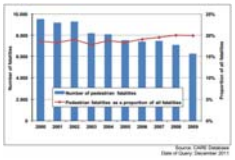
Summary

- Background
- Objectives
- Key aspects
- Project facts
- Consortium
- Structure
- Further information

Background

- Accidents involving pedestrians and cyclists still remain as a pending issue for road safety.
- Pedestrians and cyclists fatalities account for 28% of road fatalities in EU.
- Most of these accidents are caused by the driver being in-alert or misinterpreting the situation.
- Active safety systems have potential to reduce these numbers.





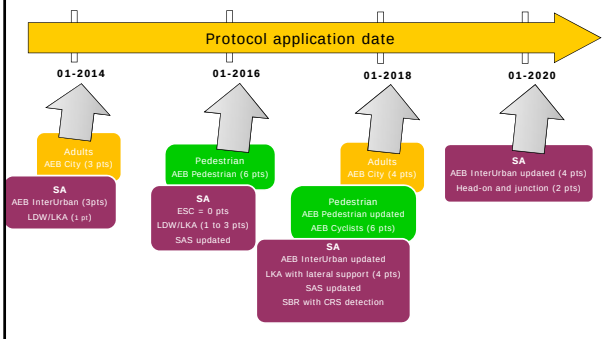
Background

- First generation of Autonomous Emergency Braking Systems that avoid and mitigate VRU accidents just arrived.
- Several technologies developed: RADAR, mono/stereo cameras.
- Euro NCAP will include assessment of AEB-Pedestrian systems in 2016 and AEB-Cyclist systems in 2018.





Background



Background

aspecss

Assessment methodologies for forward-looking integrated pedestrian safety systems – the AsPeCSS project

Objectives and Results:

- To develop harmonized test and assessment procedures including
  - A methodology for balancing active and passive safety benefit.
  - Methods for active safety testing.
  - Methods to adapt passive safety test conditions from the preceding pre-crash actions.
- Results
  - Test scenarios, their relevance and underlying accident data.
  - Test set-up and related tools for AEB-P systems.
  - Test and assessment method integrated safety systems.
    - Benefit based.

Background

Performance of different vehicles in the market

Adult 25% offset
Adult 75% offset



Child behind obstruction

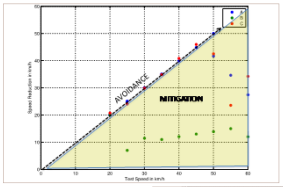


aspecss

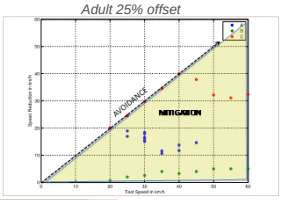
Background

Performance of different vehicles in the market

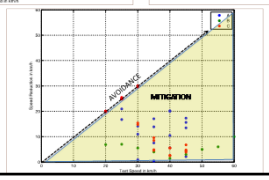
Adult 75% offset



Adult 25% offset



Child behind obstruction



aspecss

Objective

PROSPECT aims to significantly improve the effectiveness of active VRU safety systems compared to those currently on the market

- by expanding scope of scenarios addressed by the systems
- and improving overall system performance

Key aspects of the project

1 Better understanding of relevant VRU scenarios

- Macro statistical and in-depth accident analysis:
  - National statistics from specific countries.
  - CARE analysis for weighting to EU level.
  - Detailed understanding from GIDAS (DE) & IGLAD (CZ, ES, FR, IT, FR and SE).
- Naturalistic urban observations with large number of VRUs:
  - Hotspots monitoring in different EU cities.

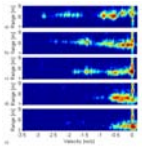


Key aspects of the project

2 Improved VRU sensing



High resolution radar with leg movement detection capability





Enlarged VRU sensor coverage:

- Higher field of view.

Improved sensor and situational analysis:

- Partial occlusion dealing.
- High resolution microwave radar with micro-Doppler evaluation.
- Advanced machine learning techniques for vision sensors.
- Proactive situation awareness, path prediction and human-observable indicators for future VRU motion.

Key aspects of the project

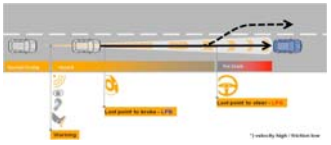
3 Advanced system control strategies

Vehicle control strategies:

- Accident avoidance by combined steering and/or braking.



- Advanced actuator concepts, including high dynamic actuators and torque vectoring by braking.





Key aspects of the project

4 Validation

- Testing in realistic traffic scenarios:
  - Real world scenarios to be reproduced in controlled environments.
- Test methodology and test procedures to be proposed to Euro NCAP:
  - Intervention performance tests considering evasive actions.
  - Unjustified system interventions.
- User acceptance tests:
  - Influence of false warnings and incorrect system interventions.
  - Predictive model of acceptance.

Key aspects of the project

5 Demonstrators

- 4 vehicle demonstrators:
  - Demonstration vehicle by Continental with stereo vision camera and high resolution radars, featuring high dynamic brake system combined with power assisted steering actuator.
  - Demonstration vehicle by Daimler featuring improvements in earlier and more robust detection of VRUs.
  - Demonstration vehicle by Bosch featuring enlarged FOV sensors including side coverage, avoidance by steering and braking and new HMI concepts.
  - Demonstration vehicle and driving simulator by Volvo featuring advanced HMI and control strategies to evaluate interaction between the driver and the vehicle.
- 1 mobile driving simulator:
  - Mobile DS featuring HMI findings.



- Development of realistic pedestrian and cyclist dummies including platform propulsion system:
  - Advanced pedestrian and cyclist dummy test targets for realistic testing.
  - Dummy propulsion platform with multiple target carrying on a predefined path.

Project facts

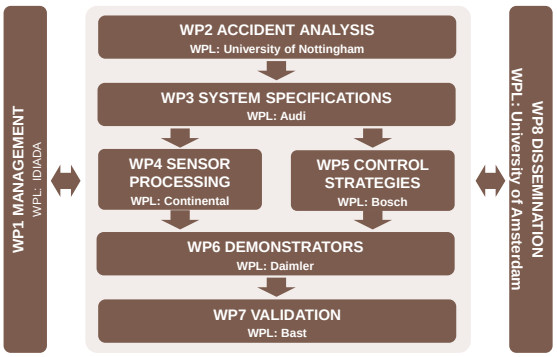
Project title	PROactive Safety for Pedestrians and CyclisTs
Acronym	PROSPECT
Funding	European Commission, Innovation and Networks Executive Agency, under the frame of Horizon 2020 programme
Topic	MG-3.4-2014 Traffic safety analysis and integrated approach towards the safety of vulnerable road users
GA number	634149
Consortium	17 partners, 9 EU countries
Coordinator	Andrés Aparicio IDIADA Automotive Technology, SA
Starting date	1st May 2015
Ending date	31st October 2018
Budget	6.931.978,75 €

Consortium



9 EU countries
17 partners
- 5 car manufacturers
- 3 suppliers
- 5 research centres
- 4 universities

Project structure



Further information



Visit our website
www.prospect-project.eu

- Detailed project information.
- Regularly updated news.
- Publications.
- Contact information.

Thank you

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www.prospect-project.eu

This project has received funding from the European Commission's Innovation and Networks Executive Agency, under the frame of Horizon 2020 programme, with grant agreement nº 634149.

Seniors

Safety-ENhancing Innovations for Older Road

SENIORS

SAFETY ENHANCED INNOVATIONS FOR OLDER ROAD USERS

Project Introduction

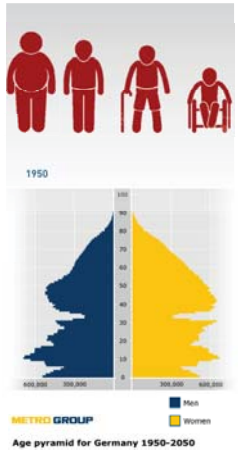
Alba Fornells, IDIADA
on behalf of the SENIORS consortium

TRA, 19 April 2016

MOTIVATION







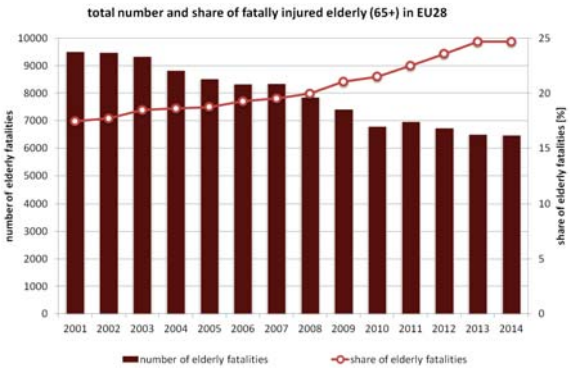
Age pyramid for Germany 1950-2050

→ Tools for safety assessment don't represent seniors poeple

→ Population is getting older

MOTIVATION

Figures from CARE (Community Road Accident Database)



→ Number of fatally injured road users is decreasing; however, share of elderly is increasing

MOTIVATION

Facts and key target group

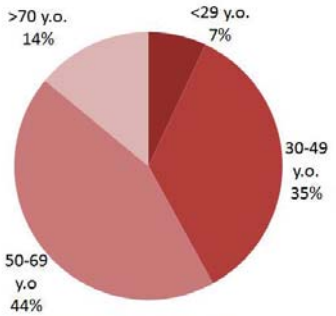
Safe mobility = quality of life



Image: highwaytosafety.com

The demographic change leads to higher participation of older people on the road corresponding with accident and injury risks

Most new car buyers



Mean age of new car buyers in Germany in 2012.
Source: University of Duisburg-Essen

INTRODUCTION

What stands SENIORS for and who are we?

Safety **EN**hanced **I**nnovations For **O**lder **R**oad User**S**

Main Goal:

- To improve the safe mobility of the elderly, including obese, using an integrated approach.

Key facts:

- EC Horizon 2020 programme, contract no. 636136
- Run time: June 2015 – May 2018 (36 months)
- Budget: 2.9M€

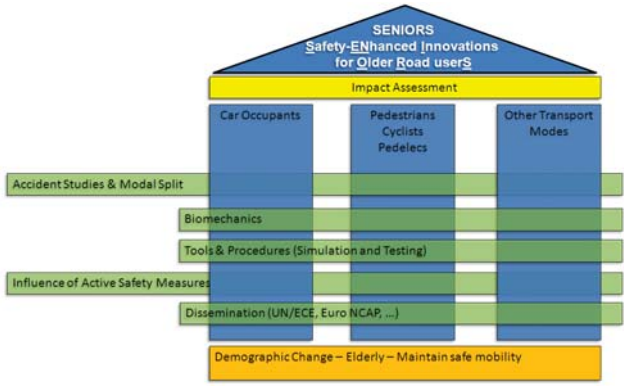
Consortium:

- 8 European partners: Autoliv (SWE), BASt (DE), Fiat Chrysler Automobiles (IT), Ford (DE), Humanetics (DE), IDIADA (ES), LMU Munich (DE), Transport Research Laboratory (UK)

bast · Autoliv · FCA · Ford · HUMANETICS · Applus IDIADA · LMU · TRL

PROJECT IDEA / APPROACH

Integrated approach



Introduction

Focus of the project SENIORS

- Protection of the elderly (and obese persons) as car occupants and external road users (pedestrians, cyclists / e-bike riders)
- Study and evaluation of the reduction of injury frequency and types that can be achieved through innovative and appropriate testing tools and vehicle safety systems.


Source: AAA Foundation for Traffic Safety


Source: GIDAS


Source: YouTube "Smart Car for Two Fat Dudes"

Project Core

Quantification of needs
- Literature (injury, behaviour, …)
- Accident studies

Initial benefit assessment
- Achievable injury prevention
- Analysis of risks
- Derivation of safety strategies

IDENTIFICATION OF NEEDS / PRIORITIES FOR OLDER ROAD USERS

Prioritise
- Future project activities

Biomechanical testing
Dummies / impactors
Numerical models
Injury criteria

IMPROVED TOOLS

Injury risk curves
Test procedures
Assessment procedures

CAR OCCUPANT
- Better older thorax IRC*
- Obese occupant
- Active HBM

PEDESTRIAN/CYCLIST
- Flex-PLI with UBM
- Head-neck
- Pedestrian thorax‡

* To be confirmed from the accident analysis

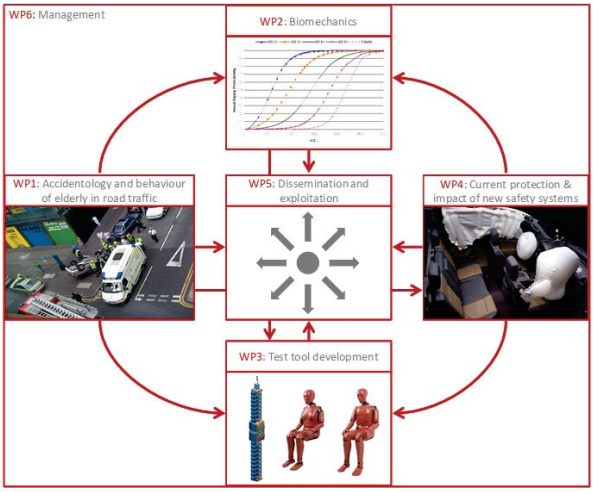
‡ Head-neck and pedestrian thorax will be early-stage research

Safety of older road users
- Effectiveness of new tools and advantages of new procedures
- Applied to current and advanced new safety systems
  - Passive
  - Active

BENEFIT AND IMPACT ASSESSMENTS

Integrated benefit analysis

Project Structure



Expected Results

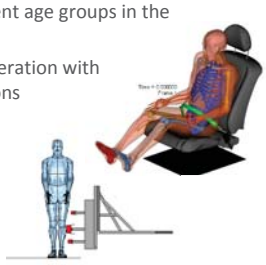
Selected sub-goals of SENIORS

- View on anthropometric particularities of the elderly and their injury mechanisms compared with younger persons
- Development and optimization of test tools, procedures and assessment methods regarding the needs of the elderly
- Use of an integrated approach (different types of road users)
- Identifying differences in the dynamics of different age groups in the pre-crash and crash phase
- Transfer of knowledge and results through cooperation with authorities and consumer protection organizations







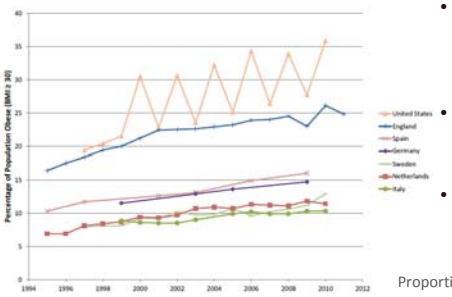


Expected Results

Preliminary results

Obesity:

- Literature from US indicated higher injury severities with obese people in road traffic accidents
- Studies on European accident data did not show these effects yet.



Proportion of adults with BIM≥30

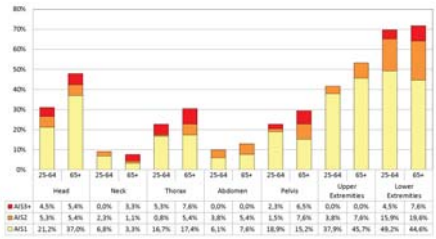
- There are BMI codings in a few European databases and only a few persons coded having a BMI > 30
- Obese did not show clear trends of a higher injury severity
- It was not able to identify different injury types or for obese occupants

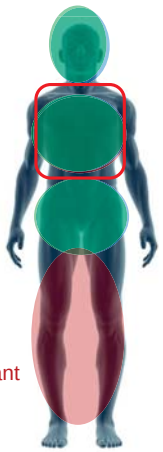
Expected Results

Preliminary results

Accidentology:

- Elderly are more frequent and more severe injured in general
- Obvious differences in various body regions
- Other databases show similar results





Cooperation

International collaboration

Vehicle safety and especially the safety of the elderly is among others also an issue in Asia and the US

Seven Letters of Support (LoS) received:
- General Directorate of Transport in Spain
- Swedish Transport Ministry
- NTSEL (Japan)
- University of Virginia (USA)
- Expert bodies EEVC, AAAM und IRCOBI

Further external experts / advisors:
- Daimler
- University of Straßbourg
- JARI (Japan)
- NHTSA (USA)
- University of Michigan (USA)
- …



Workshops

1st SENIORS Expert Meeting, September 2015, Lyon (FR)

- 35 participants



… to be continued…

2nd SENIORS Expert Meeting envisaged for 16 September 2016, Malaga (Spain)

Partners

bast · Autoliv · FCA · Ford · HUMANETICS · Applus IDIADA · LMU · IRL

For further information:

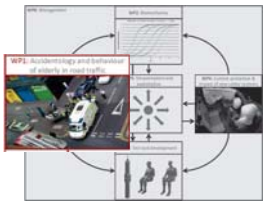
Marcus Wisch (wisch@bast.de)
Project Coordinator

Adrià Ferrer (adria.ferrer@idiada.com)
Project Manager

The research leading to the results of this work has received funding from the European Community's Eighth Framework Program (Horizon2020) under grant agreement n° 636136

www.seniors-project.eu

Project Structure



WP1 - Accidentology and behaviour:

- Mobility data



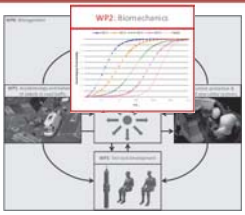
- Accident data

DESTATIS wissen.nutzen. · STATS · irtad International Traffic Safety Data and Analysis Group · Istat Istituto Nazionale di Statistica · GIDAS German In-Depth Accident Study · Road accident in-depth studies (RAIDS) · IGLAD

- Hospital data

TRANSPORT STYRELSEN STRADA · TARN THE TRAUMA AUDIT & RESEARCH NETWORK

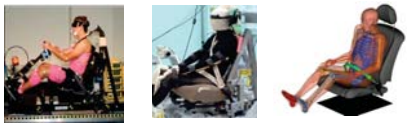
Project Structure



WP2 - Biomechanics:

- Testing and simulation
- WP2 will develop injury risk functions mirroring older road users

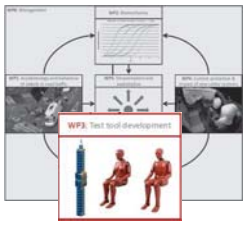
- Occupant safety



- Pedestrian Safety



Project Structure

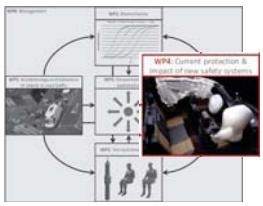


WP3 - Test tool development

- Occupant dummy improvement
- Pedestrian impactors
- Adaptation of test procedures and assessments







WP4 - Current protection & impact of new safety systems:

- Testing procedures and assessment methods
- Evaluation of test procedures
- Benefit analysis and impact







Xcycle

Advanced measures to reduce cyclists' fatalities and increase comfort in the interaction with motorised vehicles



XCYCLE

Advanced measures to reduce cyclists' fatalities and increase comfort in the interaction with motorised vehicles

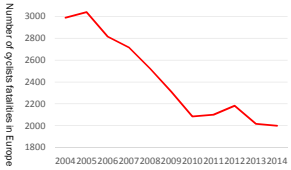
Coordinator:

Prof. Luca Pietrantoni, University of Bologna

luca.pietrantoni@unibo.it

THE PROBLEM





From 2010 to 2014,
the reduction in the number of cyclist deaths has stagnated

THE PROBLEM

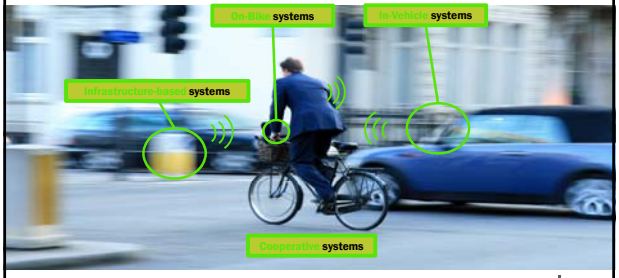
THE PROBLEM

Objectives

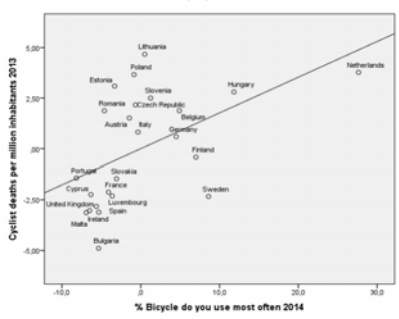
- **To improve cyclists' safety in the potentially dangerous interaction with passenger cars and HGVs**
- **To develop the means to equalise the treatment of cyclists in traffic and both encourage cycling and make cycling safer**

Concept and approach:

- Vehicle-based systems, Infrastructure-based systems, Cooperative systems
- Developing and testing technologies in the driving simulator and a "stationary" and "mobile demonstrator"
- Two use cases: 1) bicycle interaction with cars/HGVs at intersections; 2) provision of immediate or extended green traffic light for cyclists
- Behavioural evaluation part of the whole process
- Gender/age analysis



In-depth analysis of B-MV accidents



- Data analysis for ten European countries
- Data taken from government reports or statistical data collected by police institutions
- Cluster analysis to understand which are most frequent accident scenarios
- Systematic review: contributing factors to B-MV collisions

Examples of recent on-site systems

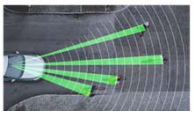





Examples of recent in-vehicle systems








Examples of recent on-bike systems





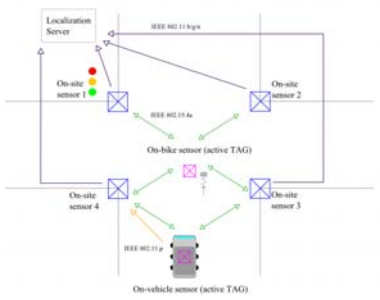


Analysis of existing safety systems

Name	Technology	TRL	HMI		Pros
Varia Rearview Radar	Radar; Wireless Edge Pairing system; Blacklight warning system	9	Visible	X	***
			Audible		
			Haptic		
TNO Intelligent Bike	Forward-looking radar; rear looking sensor camera	7	Visible	X	***
			Audible		
			Haptic	X	
MoDe:FlexeBike	Ultrasonic rear sensor; central unit processor; pedal assistant system	7	Visible	X	***
			Audible	X	
			Haptic	X	
Hindsight	Rear view camera; LCD display	9	Visible	X	**
			Audible		
			Haptic		
The Owl 360	Rear view camera; LCD display	9	Visible	X	**
			Audible		
			Haptic		
Hammerhead	Smartphone app; LED interface device; Bluetooth	7	Visible	X	**

- In-veichle
- On-site
- On-bike

The XCYCLE system architecture



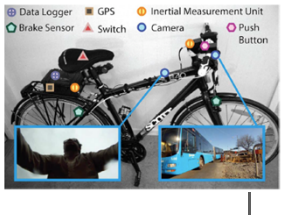
- Cooperative systems architecture
- High accuracy and speed
- On-bike system prototype and infrastructure sensors already available

Semi-naturalistic approach

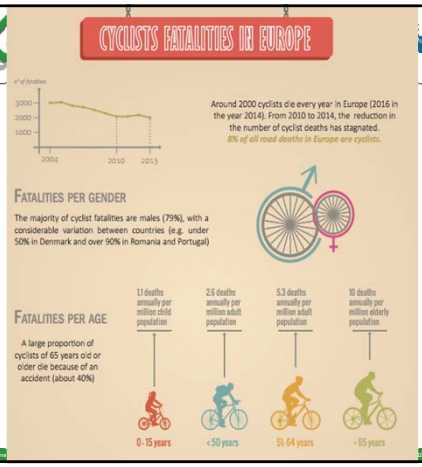
***Abstract*—As technology advances, motorized vehicles employ newer, more intelligent systems to improve drivers' safety and mobility. The evolution of these systems is supported by increasingly accurate models for driver behavior and vehicle dynamics. Despite the significant role of nonmotorized vehicles such as bicycles in traffic accidents, the evolution of in-vehicle intelligent systems has no counterpart for bicycles. Part of the reason is that, to date, models for bicyclist behavior are absent and models for bicycle dynamics are limited. This paper presents a platform for collecting field data from bicycles and shows how such data can support the development of intelligent systems by offering novel insights into bicycle dynamics and bicyclist behavior.**

***Index Terms*—Bicycle dynamics, bicyclist behavior, cycling safety, intelligent systems, naturalistic data, vulnerable road users.**

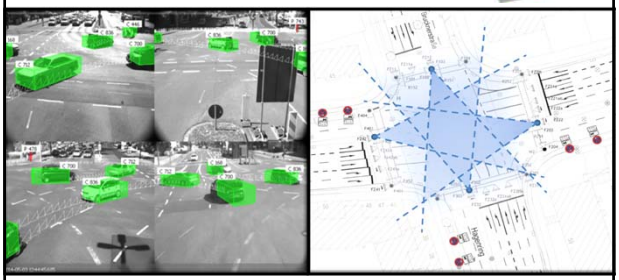
I. Introduction



CYCLISTS FATALITIES IN EUROPE

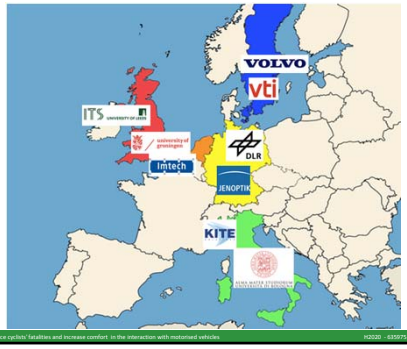








The consortium



www.xcycle-h2020.eu



International Cycling Safety Conference
3-4 November Bologna 2016
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XCYCLE - Advanced measures to reduce cyclists' fatalities and increase comfort in the interaction with motorised vehicles H2020 – 635975