



EUROPEAN CITIES AND REGIONS NETWORKING
FOR INNOVATIVE TRANSPORT SOLUTIONS



Safety, comfort and mobility of VRUs: future trends and ITS – VRUITS project

Session 3B

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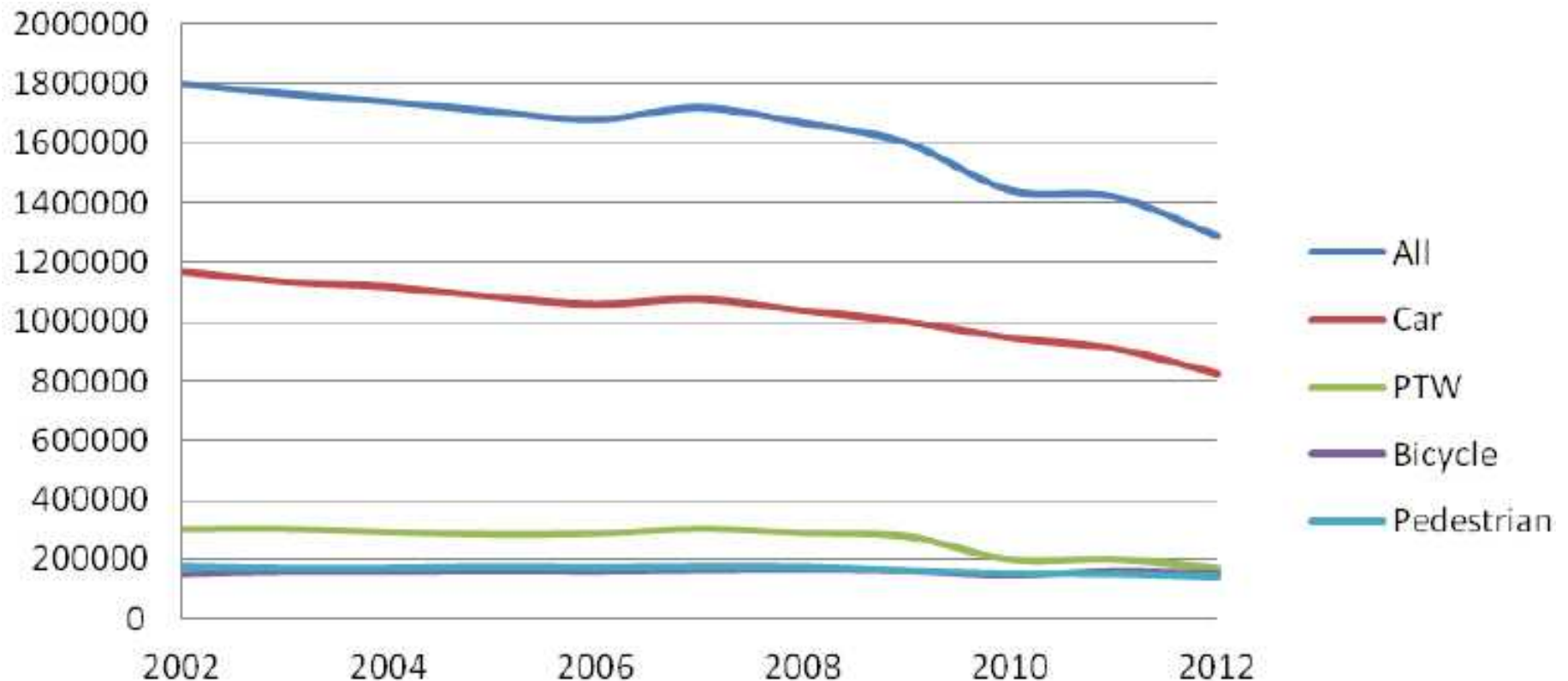


**Will anything change
if we keep doing things always in the same way?**

Number of accidents for all severities

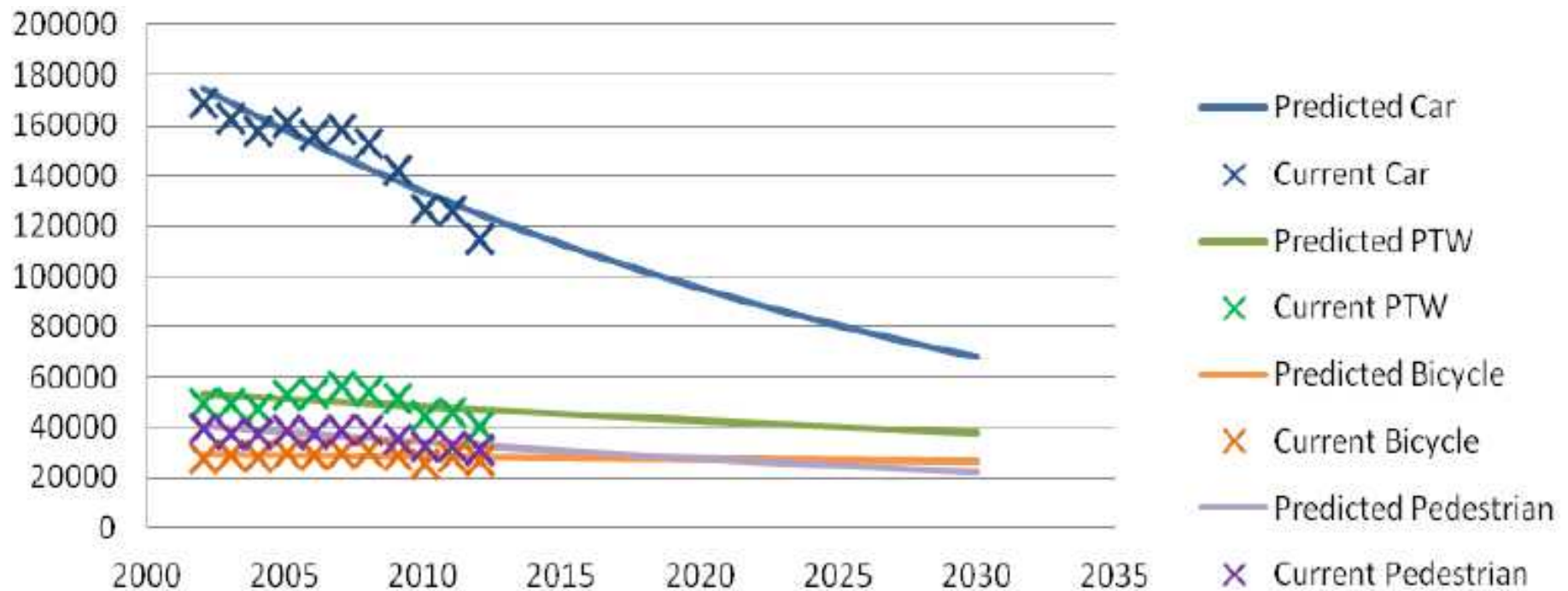
➤ Analysis of historical data from 2002 to 2012

- Significant decline in the numbers of accidents overall
- Decline in accident numbers for the VRU's: much less pronounced
 - » Bicycle and pedestrian casualties – relatively constant



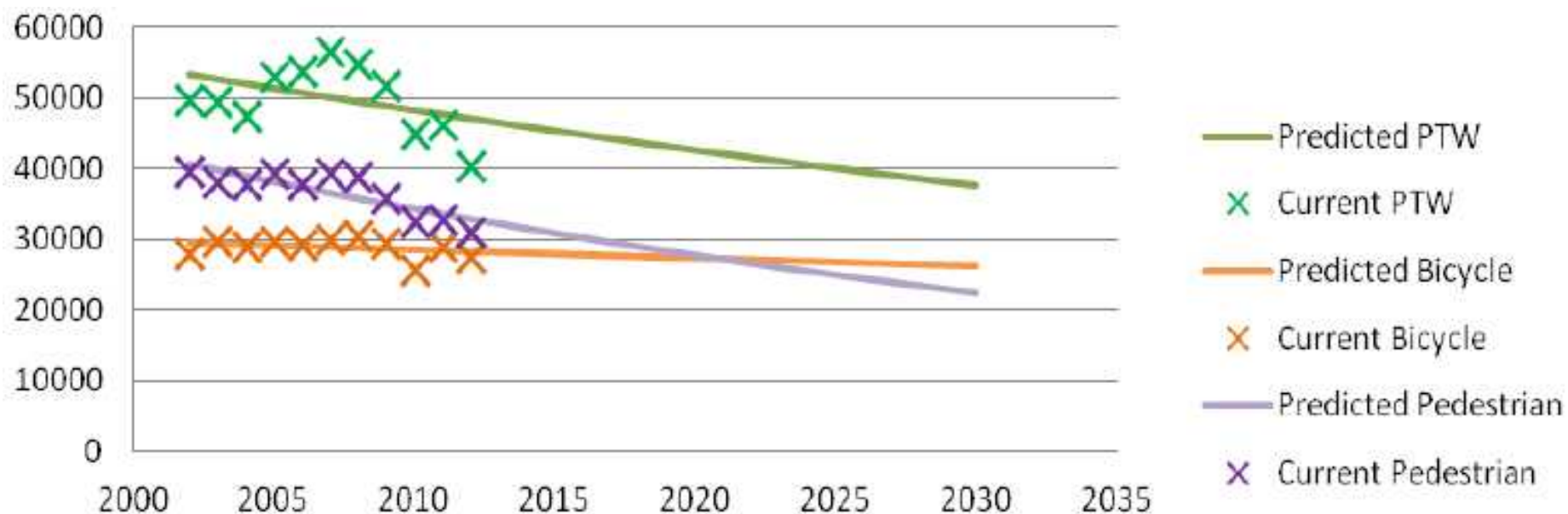
Predicted number of serious accidents for all modes of transport

- The decrease in seriously injured car occupants is substantial whilst the decrease in VRU accidents is much less pronounced



Predicted number of serious accidents for VRU groups

- It can be seen that numbers of 'Serious' bicycle accident casualties are expected to surpass pedestrian accidents by 2030



The main assumption

- No effect of the introduction of ITS systems

VRUITS project

- VRUs such as pedestrians, cyclists, motorcyclists and moped riders account for 68% of the fatalities in urban areas (CARE, 2009)
- The VRUITS project assesses the impact of current and upcoming ITS applications on the safety and mobility of VRUs
- The first objective: to assess societal impacts of selected ITS applications
- A number of 10 systems have been selected based on a thorough study of VRU needs

INTELLIGENT PEDESTRIAN TRAFFIC SIGNAL

- ***IPT is a traffic signal control system that uses sensors such as an infra-red camera to determine the presence of pedestrians and adjust the traffic signals accordingly***
- ***When a person enters the detection zone on the curb the “Walk” signal is called for***
- ***By integrating cross-walk detectors late-starting or slow-mowing pedestrians have more time to clear the intersection***



32% of signalised intersections

CROSSING ADAPTIVE LIGHTING

- *Crossing Adaptive Lighting is mounted at a zebra crossing, and illuminates it when a pedestrian and/or cyclist is observed to approach and use the crossing*
- *The lighting dims down automatically when there is no one in the zebra crossing*
- *The detection of the pedestrian or cyclist is done by means of optical sensors and wireless communication*
- *The system will detect pedestrians and cyclist at speeds below 30 km/h*

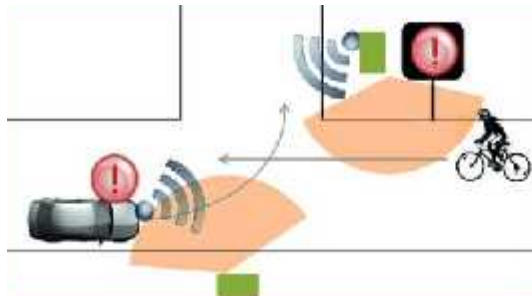


18% of major
pedestrian crossings

INTERSECTION SAFETY

- *Cars and Vulnerable Road User (VRU) can be detected by Road Side Unit (RSU) on the intersection*
- *RSU communicates with cars to warn the car driver about potential intersection accidents*
- *The RSU informs and warns the VRU with light – or sound signal*
- *Two types of accidents can be prevented:*
 - *First type: left- and right turning assistance, the car driver and VRU receive a warning when there is a conflict*
 - *Second type: car driver and the VRU get a warning for dangerous situations when a cyclist drives perpendicular to the path of the car*

40% of vehicles



5% of signalised intersections

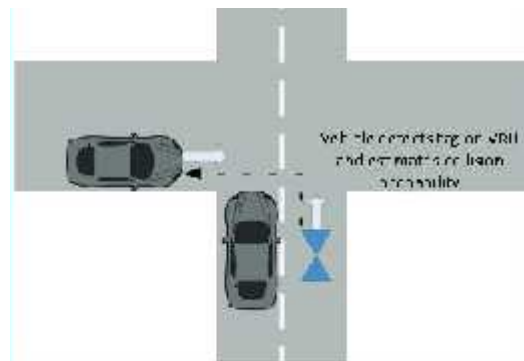
VRU BEACON SYSTEM

- *The VBS is a vehicle based system that aims at preventing accidents involving VRUs via the detection of possible collisions and the timely notification of drivers*
- *The VRU has a tag or device that sends out a signal that can be detected by the device installed in vehicles*
- *This system calculates the trajectories of the detected VRU, in relation with the vehicle trajectory and assesses the possibility of a collision*
- *The driver is then warned about the possible collision, but no intervention of the system is envisaged*

5% of pedestrians

15% of bicyclists

40 % of PTW's



40 % of vehicles

1% of major pedestrian crossings

PTW ONCOMING VEHICLE INFORMATION SYSTEM

- *Vehicle/car drivers are informed/warned about oncoming Powered Two Wheelers/Motorcycles (PTWs/MCs)*
- *PTW/MC drivers are informed/warned about oncoming vehicles/cars*
- *Both parties can be helped to avoid collision, or at least reduce speed before the collision*

28 % of PTW's



40 % of vehicles

INFORMATION ON VACANCY ON BICYCLE RACKS

- *Primarily an information system*
- *Provides information to bicyclists regarding the number of and closest available parking facilities for bicycles (bicycle racks)*
- *Bicyclist receives Information through an application in a mobile device (smartphone) and/or by signs at the parking place*
- *Suitable to be placed at for example: stations for public transport, parking garages, work palaces, apartment buildings, shopping centres and hotels*



15% of bicyclists

BICYCLE TO CAR COMMUNICATION

- *Both the car and the cyclist are equipped with communication technology*
- *When systems from the car and the cyclist are in each other proximity they connect*
- *The system will inform the car driver about cyclists in their vicinity*
- *The system will warn cyclist about risk of collisions with cars on their personal device/smartphone*

10% of bicyclists



40 % of vehicles

GREEN WAVE FOR CYCLISTS

- Cyclists receive a speed advice on personal device (e.g. a smartphone) via V2I communication
- If they follow it, they are guaranteed a green light at the next signalized intersection
- *Roadside components gather data on position, speed, speed preference and optionally route of the cyclist via the personal device, and data on the expected green times from the traffic light controller. It provides speed advice based on that*
- *Main application is for strings of intersections, with static or dynamic traffic light controllers*

10% of bicyclists

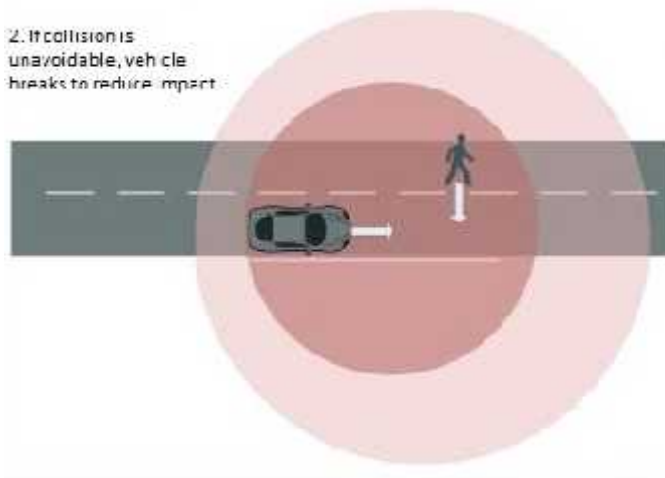


32% of major intersections

PEDESTRIAN DETECTION SYSTEM + EMERGENCY BRAKING

- *The PDS+EBR is a vehicle built-in system that continuously scans for VRUs that the vehicle might be in collision course with*
- *If a crash is likely, the system will warn the driver and if the driver fails to respond in time and the collision risk remains, the system can intervene through braking*
- *For speeds up to 35 km/h the system is considered to be able to prevent collisions. For higher speeds, it is expected to reduce their impact*

2. If collision is unavoidable, vehicle brakes to reduce impact



36% of vehicles

BLIND SPOT DETECTION

- *Car or trucks are equipped with sensor technology aimed at the blind spots of the cars*
- *The system detects pedestrians, bicyclists and PTWs*
- *The system will give a warning to the car driver or truck driver when it detects a VRU or other object in the blind spot*
- *Different sensors technologies can be used for this system*



44% of vehicles

THANK YOU FOR YOUR FEEDBACK

IT IS GREATLY APPRECIATED!