5th conference
Transport Solutions:
from Research to Deployment
Innovate Mobility, Mobilise Innovation!
Paris - La Défense CNIT, 14 - 17 April 2014

European Road Safety and e-Safety

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Objectives

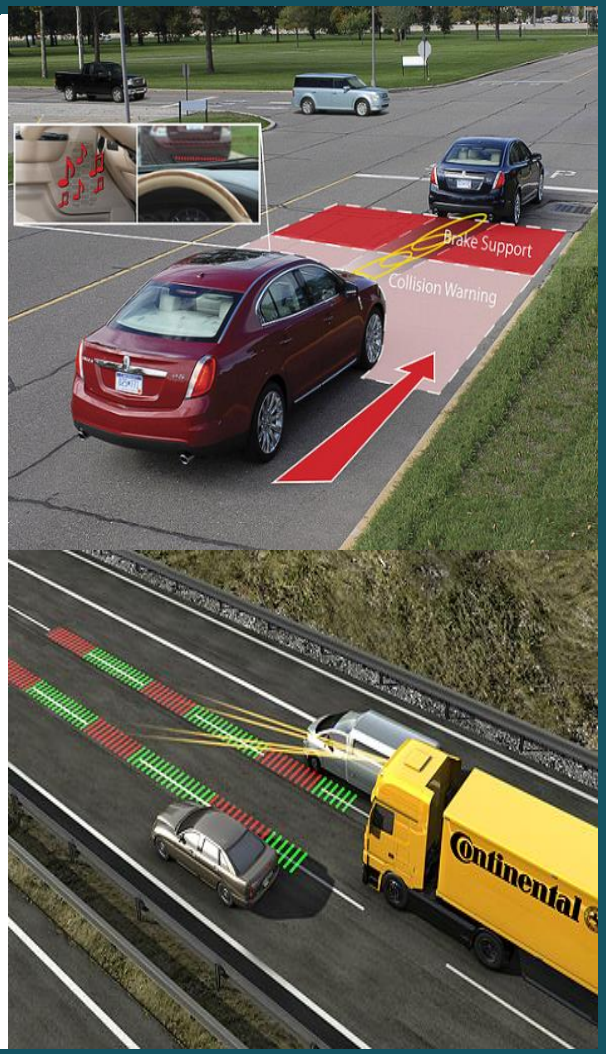
- Develop and describe a methodology that allows building the structure of **an e-safety component** at the European Road Safety Observatory (ERSO)
- Identify the nature of the e-safety **data and information** that has to be stored in such an observatory
- Implement suitable methods for appropriate e-safety data analyses that will assess the **most promising technological countermeasures**

Introduction

- **e-Safety** is defined as the vehicle-based intelligent safety systems which could improve road safety
- **Technologies applications**:
  - intelligent road infrastructure safety
  - e-traffic
  - car-to-car communication
  - user-to-user communication
  - countermeasures

e-Safety Systems Categories

- **Passive safety measures**
  - managing the crash forces
- **Active safety measures**
  - taking preventive measures
- **Integrated safety measures**
  - allow the vehicle to adapt to a pre-crash situation
- **Rescue safety measures**
  - supplying information location to rescue services

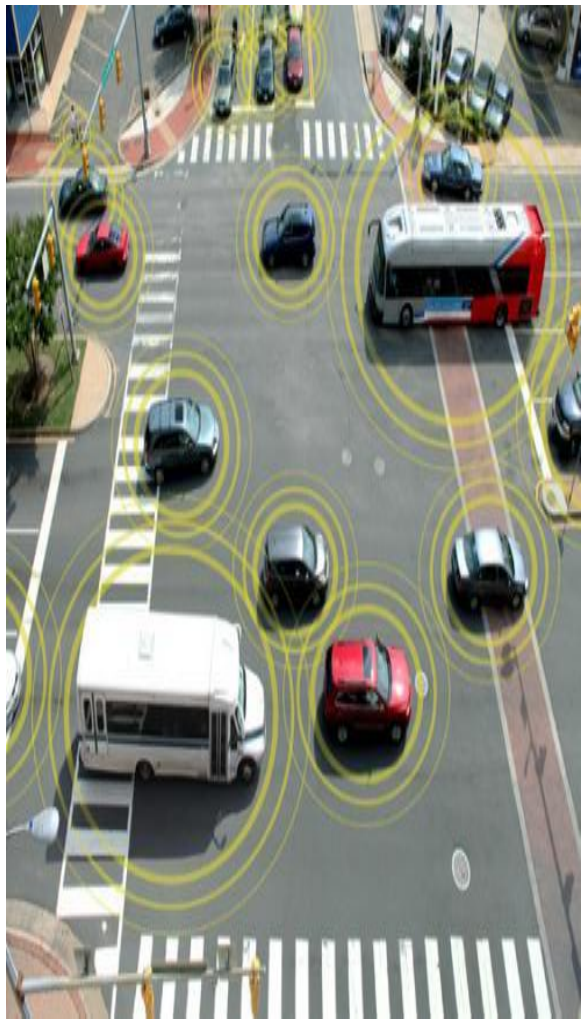


List of e-Safety Systems

Name	Abb.	Service
Advanced Adaptive Front Light System	AAFS	Visibility
ABS (Antilock Braking System)	ABS	Dynamic Control Longitudinal
Adaptive Cruise Control	ACC	Dynamic Control Longitudinal
Airbag Pedestrian Protection	PedPro	Protection
Alcolock Keys	AK	Driver Behaviour
Anti Whiplash Seat	AW	Protection
Automated Headlights	AutoLights	Visibility
Blind Spot Detection	BS	Visibility
Brake Assist	BA	Dynamic Control Longitudinal
Collision Avoidance and Automatic Emergency Braking (not pedestrian)	CA (AEB)	Dynamic Control Longitudinal
Collision Warning	CW	Warning
Drowsy Driver Detection System	DDS	Driver Behaviour
eCall	eCall	Localization/Prevention
Electronic Stability Control	ESC	Dynamic Control lateral
Event Data Recorder	EDR	Driver Behaviour
Intelligent Speed Adaptation	ISA	Dynamic Control Longitudinal and Speed / Warning
Intersection Control	IC	Communication
Lane Changing Assistant	LCA	Warning
Lane Keeping Assistant	LKA	Dynamic Control Lateral
LDW (Lane Departure Warning)	LDW	Dynamic Control Lateral
Low Friction Detection	LoFrctD	Localization/Prevention
Night Vision	NV	Visibility
Precrash (Presafe)	PreSAFE	Protection
Predictive Assist Braking	PBA	Dynamic Control Longitudinal
Rollover Detection	RollD	Dynamic Control Lateral
Speed Cameras	SpdCam	Localization/Prevention
Traffic Sign Recognition	TSR	Communication
Tyre Pressure Monitoring and Warning	TPMS	Warning
Vulnerable Road Users Protection	VRU	Dynamic Control Longitudinal
Youth Driver Monitoring	DrvMon	Driver Behaviour
Youth Key	YK	Driver Behaviour

Information Collection

- Aim of the system
- Functions covered by the system
- Phases of the accident
  - Driving, Rupture, Emergency, Crash, Rescue
- Level of intervention
  - Perceptive Mode, Mutual Control, Delegation of function, Automation



Example of ACC (1/3)

Aim of the system

If a leading vehicle is travelling at a lower speed than the user's vehicle the ACC system intervenes via braking pressure

Functions covered by the system

- Keeping a set distance to vehicle in front
- Detecting a fixed obstacle on the road
- Predicting that another user will stop or slow down
- Predicting that another user will move off or fail to stop
- Improving traffic flow

Example of ACC (2/3)

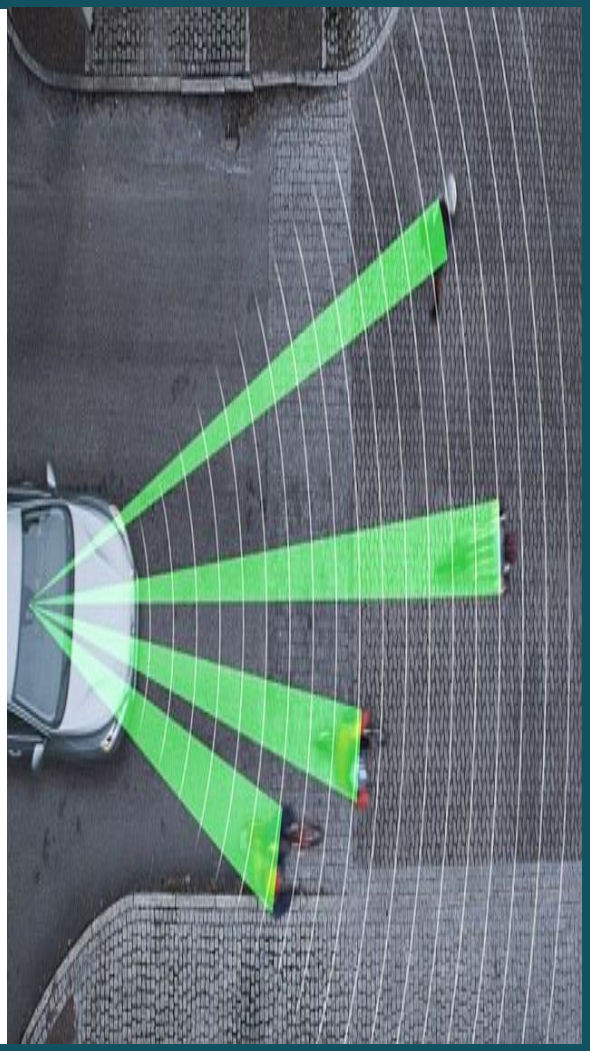
Phases of the accident

Phases	Evaluation of actions
Driving Phase	ACC may employ radar, laser or machine vision (camera) to continuously monitor the leading vehicle
Rupture Phase	The system intervenes if the current speed or headway would lead to a likely collision
Emergency Phase	The system decelerates the vehicle
Crash Phase	If a collision is inevitable the system may have been able to decrease speed and lower crash severity
Rescue Phase	-

Example of ACC (3/3)

Level of intervention

		Specifications
Perceptive Mode		ACC may employ radar, laser or machine vision to continuously monitor the leading vehicle
Mutual Control	**Warning Mode**	The system warns if the current preselected speed or headway would lead to a likely collision
	Limit Mode	The system intervenes if the current preselected speed or headway would lead to a likely collision
	Corrective Mode	-
	Action Mode	-
Delegation of function	**Regulated Mode**	-
	Prescriptive Mode	-
	Mediatised Mode	-
Automation		The system can decelerate or accelerate the vehicle if the current preselected speed or headway would lead to a likely collision or to maintain a safe headway.



Review of evaluation procedures

- **Organisations**
  - ISO
  - SAE
  - NHTSA
  - NCAP Organisations
    (EuroNCAP, JNCAP, C-NCAP, KNCAP)
- **Research projects**
  - PReVENT, 2008
  - E-value, 2008
  - ASSESS, 2010

Standards and Systems

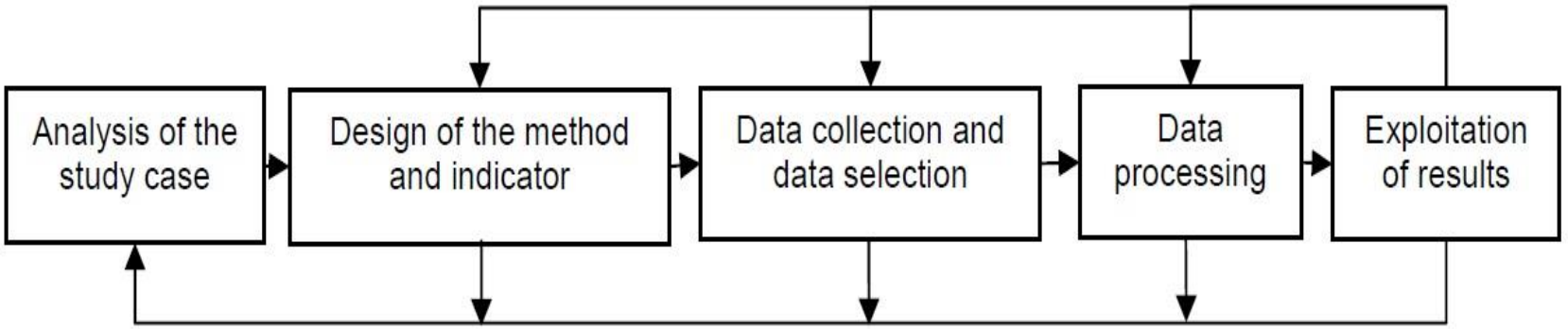
Standard / Report	ACC	FCW	BSD	LKA	LDW	ABS	ESC
ISO 3888-1:1999							●
ISO 3888-2:2002							●
ISO 6597:2005						●	
ISO 7401:2003							●
ISO 7975:2006						●	
ISO 15622:2002	●						
ISO 15623:2002		●					
ISO 17361:2007					●		
ISO.DIS 17387			●	●			
ISO 21994:2007						●	
ISO.DIS 22178	●						
ISO.DIS 22179	●						
SAE J2399	●						
SAE J2400		●					
SAE J2478				●			
SAE J2536						●	
FMCSA-MCRR-05-005					●		
FMCSA-MCRR-05-007	●	●					
FMVSS 126							●
GRRF-63-26							●

A general evaluation model

- The most macroscopic representation of the evaluation activity
- Aims to propose a definition of the evaluation activity that can be used by the evaluators
- The duration of each step and the related cost differs depending on the system that is evaluated

The five steps model

- Analysis of the evaluation case
- Design of the evaluation method and indicator
- Data collecting
- Data processing
- Exploitation of results

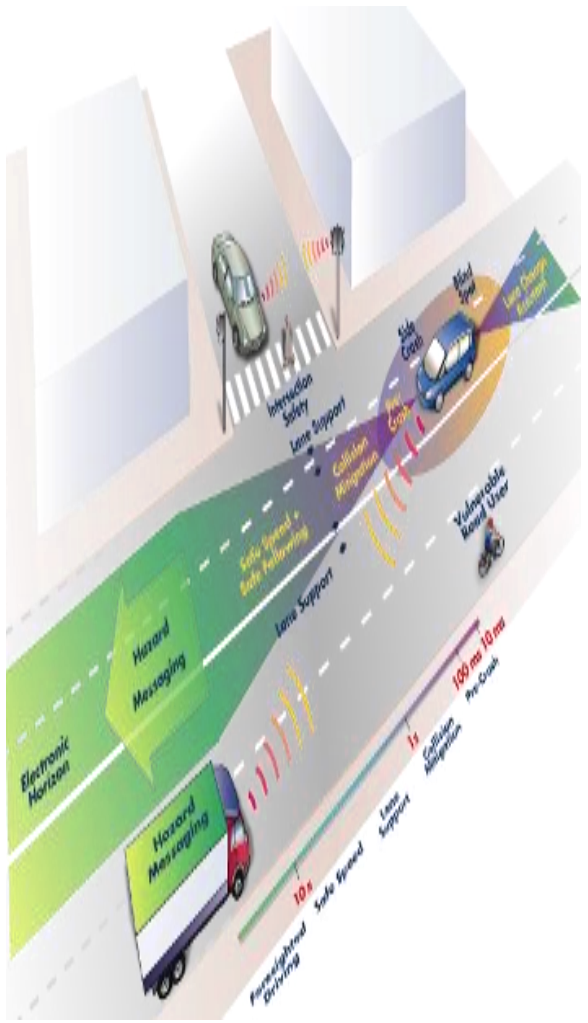


Modelling Analyses

- It is difficult for evaluators to model knowledge on the study case since there is no formalization of stakeholders' needs
- Lack of communication exists between people from various areas
- Some of the objects/systems to be modeled are complex

Conclusions

- At European level **no common information system** shared by all members states works
- A **common structure** addressing the researches questions should be organized
- A well matched statistical **analysis model** is necessary for quantitative assessment of the e-Safety systems
- These needs should be recorded and organized **in a structured way** in ERSO



Discussion

- The **knowledge** has to be shared and improved :
  - regarding assessment tools and methodologies
  - regarding setting up a common European information system
- Importance of **human behavior** in e-Safety studies
- Need for **priority ranking** of new technologies and dealing with legislative issues

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