

Università degli Studi di Brescia - CeSCAm  
**International Conference**  
**“LIVING AND WALKING IN CITIES”**  
*Vulnerable users’ road safety*  
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## **State of the Art on Urban Road Safety**



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# Urban road safety - Open questions

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- Which are the current and future urban road safety problems?
- Are they the same across Europe?
- How critical are data and evidence based decision making?
- How much transferable are successful urban road safety solutions?
- How to integrate road safety into urban mobility plans?
- Can road safety compete environmental, energy and mobility concerns?
- Are Citizens and Authorities ready for the necessary choices?
- Which are the future challenges of urban road safety?



# Objectives and Structure of the presentation

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## Objective

To provide a comprehensive picture on urban road safety today and of the future challenges, with focus on urban safety and mobility, specially of the vulnerable road users

## Structure

- Basic facts on urban road safety
- The need for road safety knowledge
- Key road safety research priorities
- Fundamental urban road safety choices



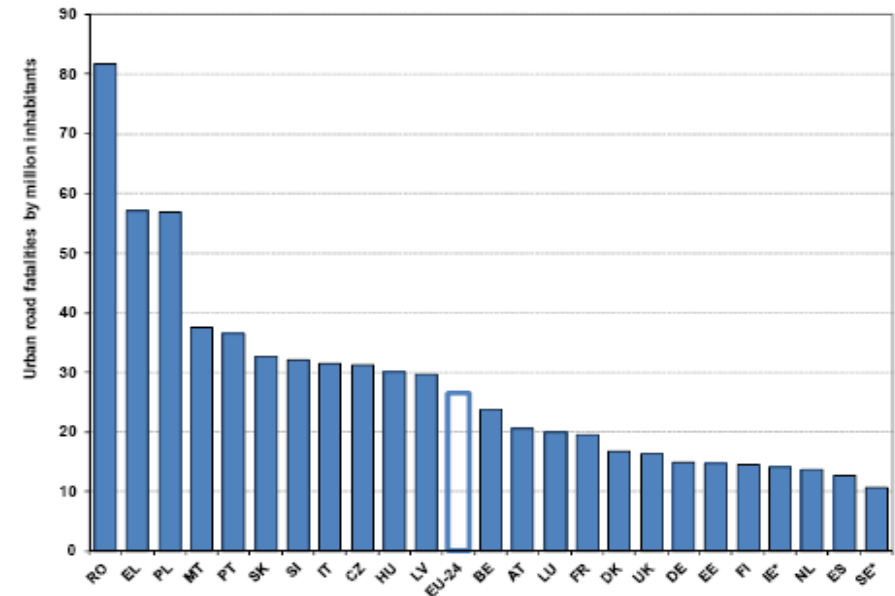
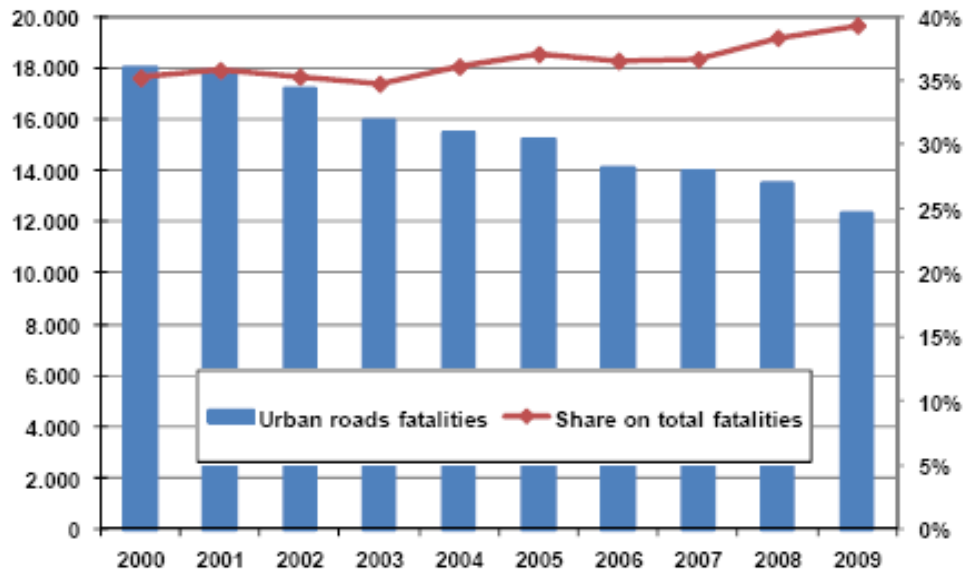
# Different urban road safety progress in different countries

Road Fatalities change 2001-2010 (source: CARE)

Urban Areas  
Inside    Outside

-48,4%	-50,0%
-47,7%	-42,4%
-22,6%	-24,3%

North-Western countries  
Southern countries  
Eastern countries



# Different urban road safety patterns in different countries

Road Fatalities 2010 (source: CARE)

## Power Two Wheelers

North-Western countries  
Southern countries  
Eastern countries

Urban	Total	%
848	3.776	22%
1.091	3.399	32%
434	4.183	10%

## Cyclists

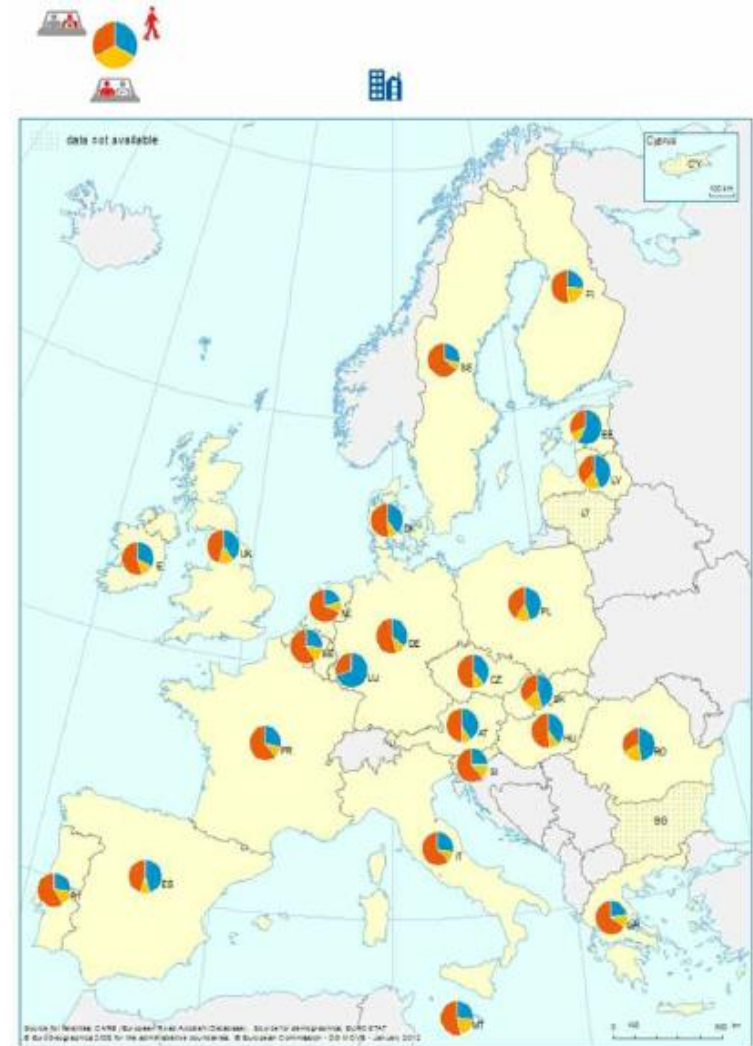
North-Western countries  
Southern countries  
Eastern countries

Inside	Total	%
472	3.776	13%
203	3.399	6%
400	4.183	10%

## Pedestrians

North-Western countries  
Southern countries  
Eastern countries

Urban	Total	%
1.249	3.776	33%
1.066	3.399	31%
1.888	4.183	45%



# Current Urban Road Safety Problems

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- More road fatalities outside urban areas, more **injuries inside** urban areas.
- More **PTWs** in the North-Western EU countries and more **cyclists** in the Southern EU countries result in:
  - Power-two wheelers' safety problems migrating at North and West
  - Cyclists' safety problems of the North migrating at the South
- **Recession** has a direct impact to road fatalities decrease, but what will happen when recession will be over?



# Road safety is ideal for spending money for nothing

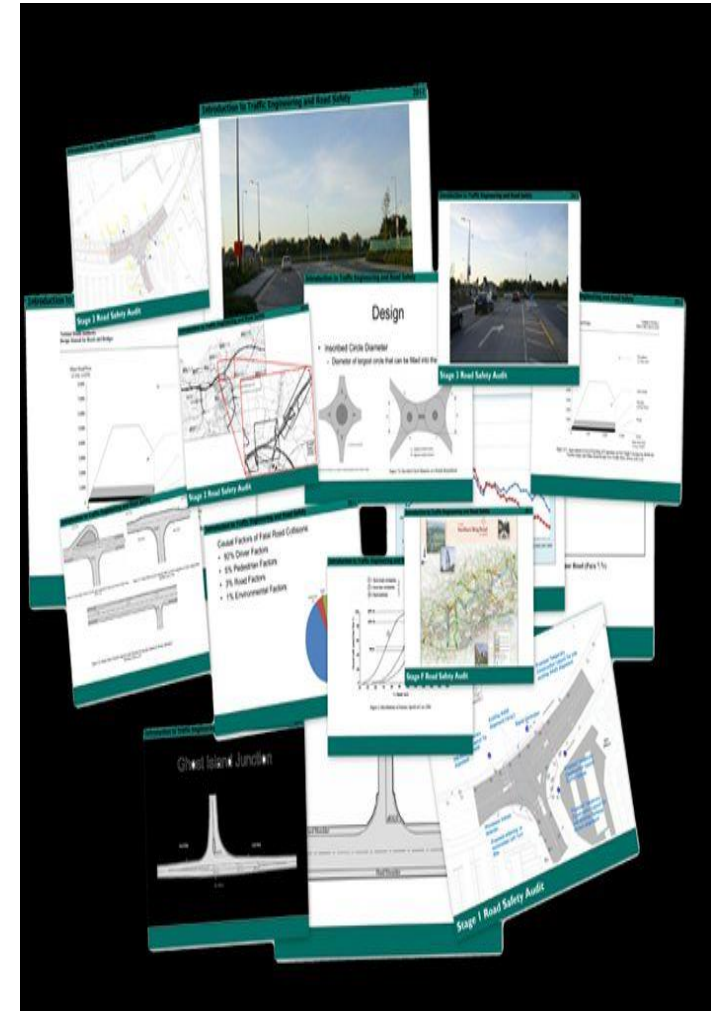
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- Several road safety interventions are often very costly, especially those related to developing and maintaining road infrastructure and to vehicle technologies.
- Very often the impact of the implemented road safety measures is limited if not negative.
- Road traffic and driver behaviour tend to adapt quickly to the new situation and new safety investments often bring new safety problems.



# The need for evidence based decision making

- The identification of the suitable measures for specific road safety problems is a key challenge, possible only through the application of scientific and impartial methodologies.
- The social and economic benefits from a rigorous application of measures efficiency assessment can be very high.
- Road safety research and international cooperation are the keys to support evidence based decision making.





# The need for evidence based decision making

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- Positive and negative aspects of each solution in the short and long term should be demonstrated allowing all road safety actors (society, decision makers) to realize the positive and negative consequences of their choices.
- On that purpose there is a clear need for publicly available high quality and impartial data and knowledge, with focus on the effectiveness assessment of road safety alternative solutions.



# Data challenges

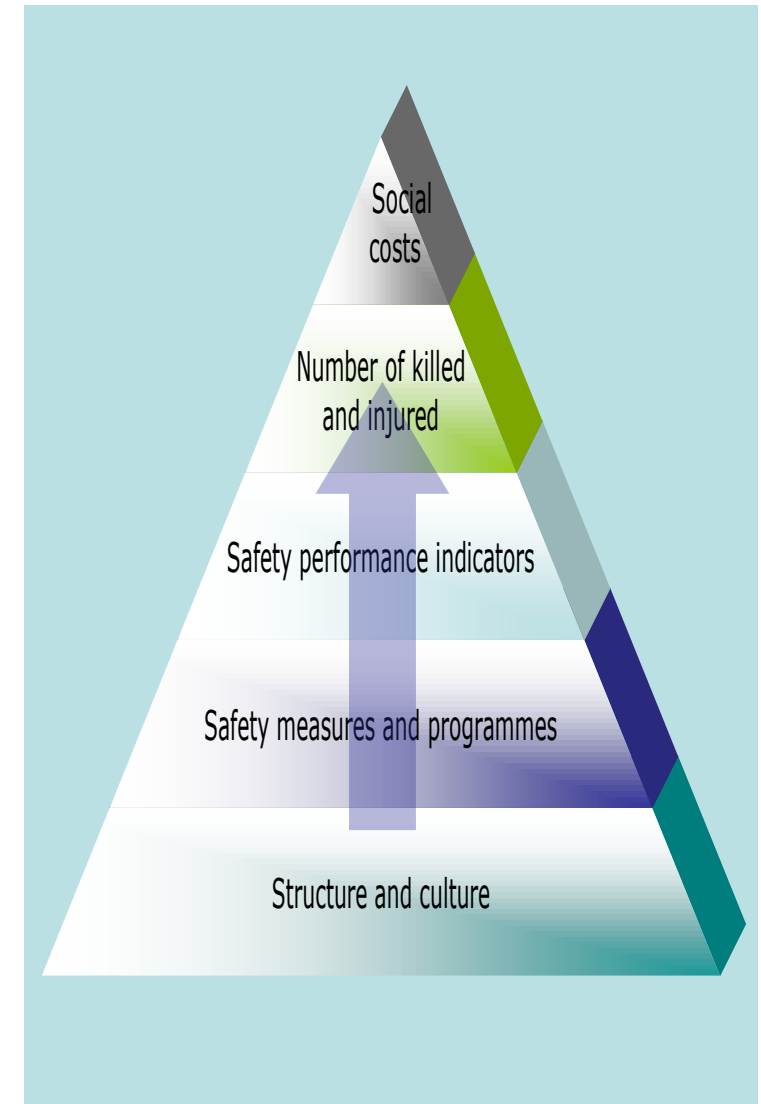
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- Road Accident Data
- **Risk Exposure Data**
- Performance Indicators
- Causation Indicators
- Behaviour/Attitude
- **Measures Cost-Effectiveness**
- Social Cost
- Health Indicators



# Knowledge challenges

- Level 1: **Structural and cultural** characteristics (i.e. policy input)
- Level 2: **Programmes and measures** (i.e. policy output, common practice)
- Level 3: **Safety Performance Indicators** (i.e. intermediate level) - the operational level of road safety in the country (speeding, drinking and driving, road network, vehicle fleet etc.)
- Level 4: Final outcomes expressed in terms of road casualties (**Risk Indicators**)
- Level 5: Total **Social Costs** of road crashes



# Technical barriers for road safety measures assessment

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- difficulties in isolating the safety effect of a specific measure;
- difficulties in aggregating information/data due to high diversification of the measures;
- difficulties in comparing information/data among countries:
  - differences in road traffic environments,
  - differences in the actual investment costs among the countries,
  - differences in methodologies of safety effect calculation.



# Political barriers for road safety measures assessment

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- Authorities and other stakeholders may fear that ex-post evaluation of measures may prove that important road safety investments had little or limited impact.
- Comparisons of measures effectiveness between different cities and between different regions may reveal high discrepancies not only in the unit cost of the measures but also in the implementation effort.



# Barriers for international cooperation for road safety measures assessment

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- Transferability is not easy:
  - not all successful measures are suitable for all different road traffic environments,
  - it is very much possible that the same interventions may lead to significantly different results in two different traffic environments.
- The scientists' competition and quest for the "excellent" methodology, together with the inherent difficulties of measures efficiency assessment, puts in question any initiative.
- Sometimes measures assessment invited by the authorities tend to use faster and less rigorous methodologies, favouring prevailing opinions and decisions already taken, creating thus a wide variety of non-converging efficiency results.



# The European Road Safety Observatory

## Data

- Annual Statistical Report
- Basic Fact Sheets
- Statistical tables
- Recent Trends
- Geographical distribution

## Knowledge

- Syntheses on road safety key issues
- Country profiles
- Policy
- Legislation
- Research results

[www.erso.eu](http://www.erso.eu)



# Road Safety Research Priorities in Europe

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- Road user behaviour
- Infrastructure
- Vehicle technology
- Road safety management
- Research tools





# Road user behaviour

## Vulnerable road users

Young: still at highest risk

Elderly: ageing population

Pedestrians: still often overlooked

Cyclists: still often overlooked

PTWs: an emerging problem in several countries

## Fit to drive

Driving under the influence of substances

Driver distraction

Driver fatigue

*Definitions, measurement, causes and effects*

## Changing road user behaviour

Enforcement - Campaigns - Education

Focus to the five killers:

Speeding, Alcohol, Seat belt, Helmet, Cell phone



# Infrastructure

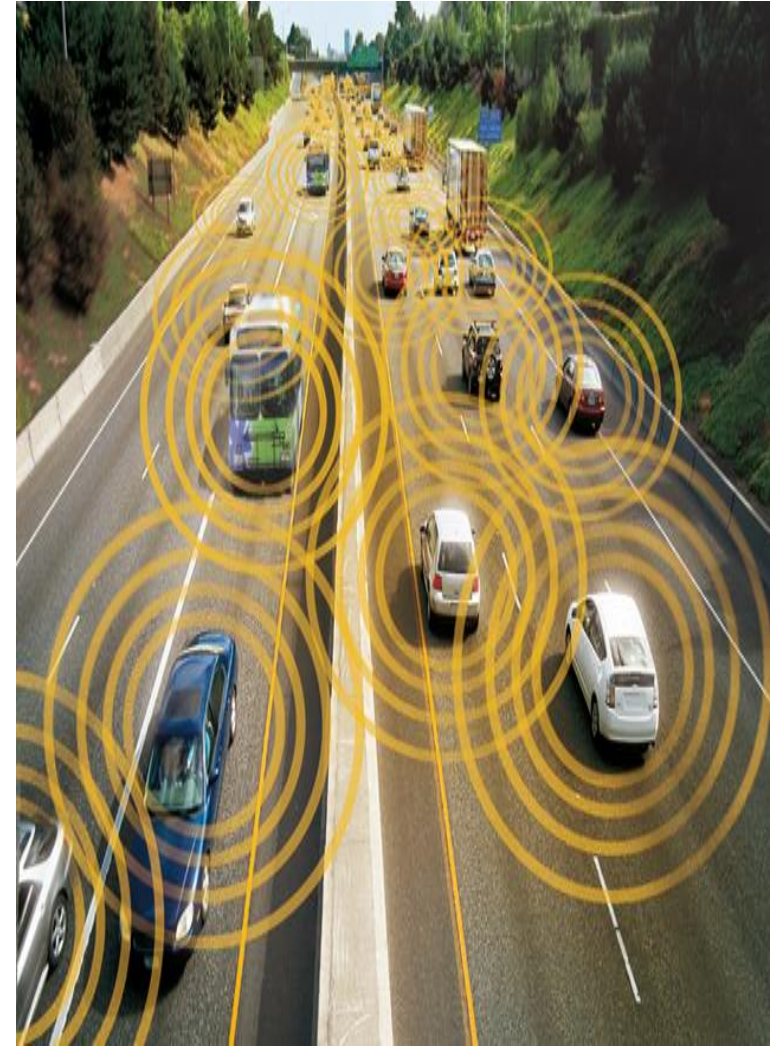
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- Smart infrastructure
- New road safety infrastructure management techniques
- Self-explaining roads, forgiving infrastructure, roadside treatment
- Road infrastructure uniformity across Europe
- New road safety infrastructure measures and investments
  
- Integration of road safety into transport / traffic / urban plans
- New generation of pedestrian and cyclist arrangements
- Infrastructure and traffic arrangements for PTW
- Special design for the elderly, the vulnerable and for users with specific needs



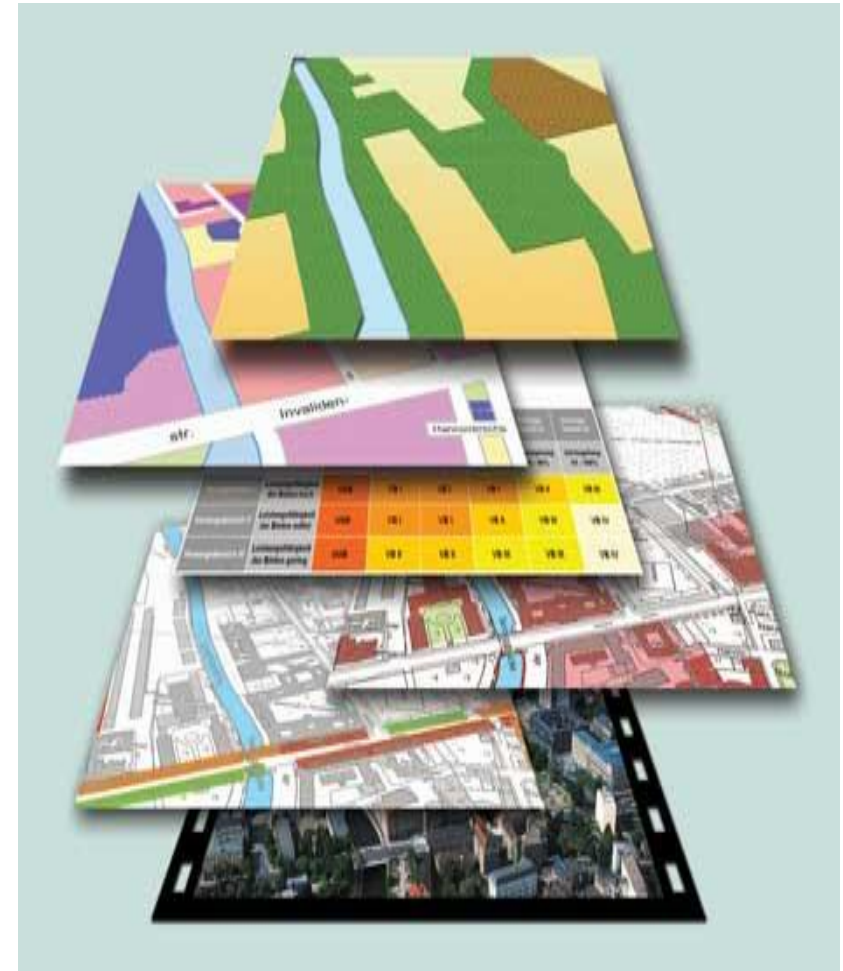
# Vehicle technology

- Advanced driver assistance systems with focus on safety (ADAS)
- Safe design of Human Machine/Vehicle Interface (HMI/HVI)
- V2V and V2I communication and co-operative systems
- New active and passive safety equipment
- Better understanding and support of the pre-crash phase
- Improved pedestrian and 2-wheeler detection systems for accident avoidance
- Systems for the protection of (motor)cyclists
- Safety of new vehicles (hybrid, electric)



# Road Safety Management

- Developing the Road Safety Culture
- Targeted strategies and integrated policies
- Efficient programmes and measures
- Linking road safety management with road safety performance
- Monitoring implementation and effectiveness
- Efficiency assessment and cost-benefit (crash modification factors, standardisation and transferability)



# Research Tools

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- Full operation of road safety knowledge centers (incl. the EU Road Safety Observatory) with data, knowledge
- Exposure surveys for all road users (veh-kms, person-kms)
- Surveys for driver behaviour, attitudes, perceptions and road safety performance indicators
- Data harmonization and database interconnections (police, traffic, hospitals)
- Multilevel and time series analysis and forecasting
- Understanding road user behaviour and accident causes through large scale experiments for all road users (incl. PTW, cyclists, pedestrians):
  - Accident in-depth investigations
  - Naturalistic Driving Studies
  - Driving Simulator Experiments



# Urban Mobility and Road Safety Choices

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The high complexity of the urban environment makes road safety choices a very difficult task, attempting to balance conflicting social needs and economical restraints, especially during the economic crisis.

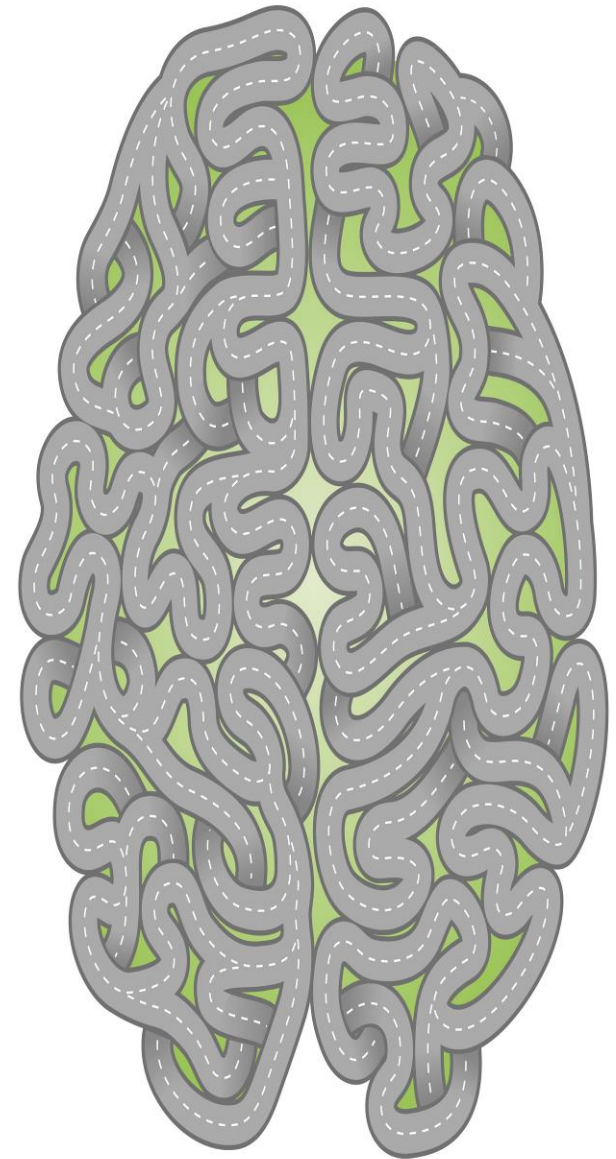
- Traffic Efficiency (Speed) Versus Traffic Safety
- Vehicles Versus Vulnerable Road Users
- Expensive but safe Versus Cheap but unsafe (vehicle, infrastructure, management)
- Priorities in policies, measures, research, etc.



# The urban road safety choices

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- First comes safety then speed and traffic efficiency
- First comes public transport then cycling and walking and last car traffic.
- Maximum separation of vehicle traffic from pedestrian and cycling traffic.
- Maximum separation of passenger traffic from urban freight transport.
- In complex locations (junctions, etc.):
  - optimum readability of directions,
  - road design consistency (no surprises)
  - a forgiving road environment.



# Fundamental directions for urban road safety choices

- Safety should be integrated not only into the development of Urban Mobility Plans but also into proposed Urban Mobility Audits and Guidelines and be reflected in common targets.
- Plans should adopt a clear hierarchy of transport users, with public transport users, cyclists and pedestrians at the top of the hierarchy.
- **The core public transport modes (bus and rail) are the safest modes of transport.**
- Real and perceived safety can have a profound effect on modal choice especially in terms of the most sustainable modes of travel - walking and cycling and ability to access public transport.

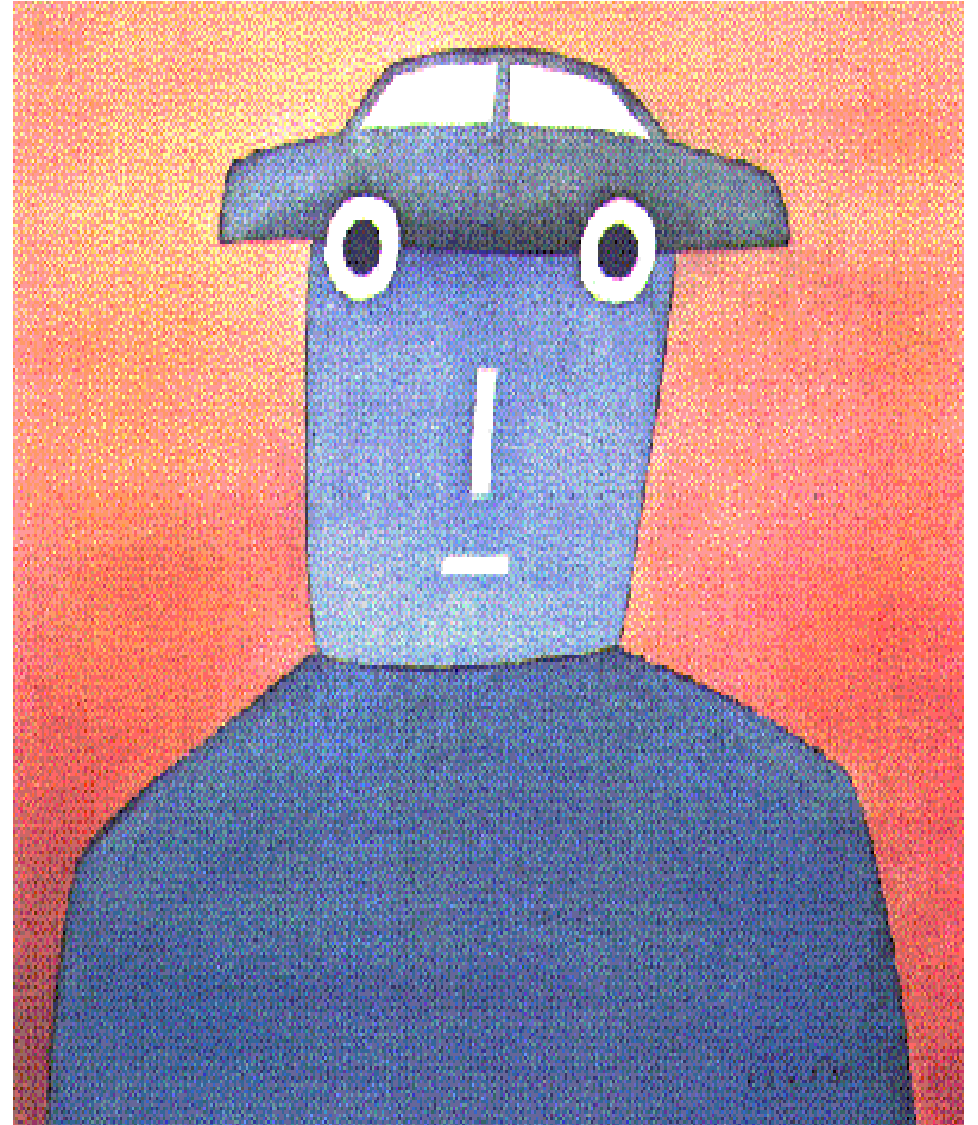




# Conclusion

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- Urban road safety should be integrated into the urban mobility plans, equally with environment, energy and mobility concerns, within a long term and sustainable vision.
- Both authorities and citizens should realise the choices to be made (with focus on car traffic restriction) and work together and sincerely to implement them.
- Continuous research is needed to acquire the necessary knowledge for the support of decision making.



# The future urban road safety challenges

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## Brave Road Safety Choices

Vehicle Technology

Driver Behaviour

Smart Infrastructure

Safety Culture

Efficient Enforcement



Power Two Wheelers

Efficient Measures

Pedestrians

Available Data & Knowledge

International Cooperation

Scientific Research

Evidence Based Policy Making