



European Road Safety Forecasts:

Experiences and future challenges for reliable and transferable safety measures

George Yannis, Eleonora Papadimitriou

National Technical University of Athens
Department of Transportation Planning and Engineering

TRB Annual Meeting, Washington, 15 January 2014
'Saving the World: Overview of Road Safety Initiatives
Around the Globe'

Background

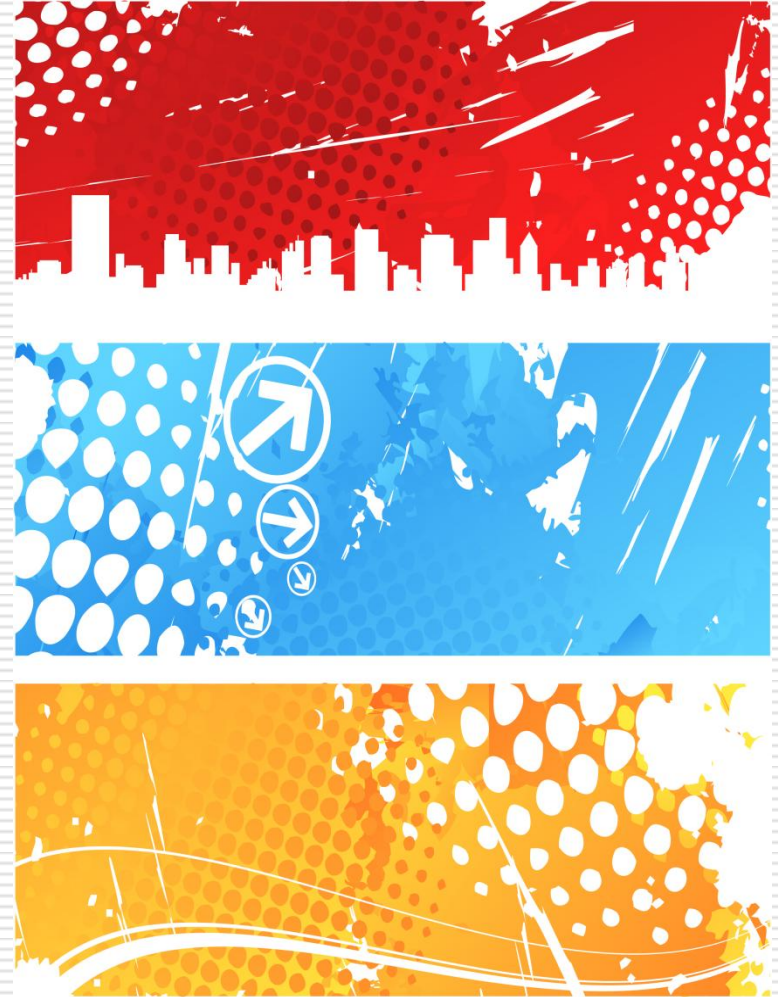
*If you cannot measure it,
you cannot improve it*
(Lord Kelvin)

**Road Safety is a typical field
with high risk
of important investments
not bringing results.**



Background

- Road safety forecasts: important tool in the hands of decision makers but also a complex task:
 - difficulties in isolating the safety effect of a specific measure
 - difficulties in comparing information/data among countries
 - differences in road traffic environments
 - differences in methodologies of safety effect calculation
- Accident Prediction Models (APMs) and Crash Modification Factors & Functions (CMFs) are fundamental for estimating road safety outcomes and identifying the most effective safety measures



Objectives

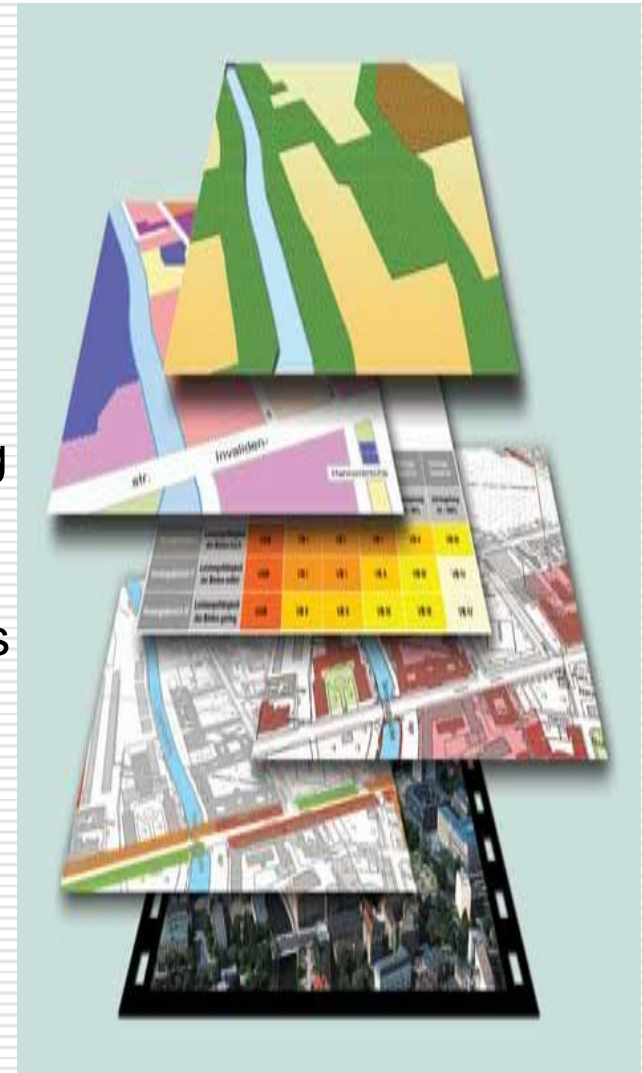
To analyse the current experiences and future challenges for road safety forecasts in Europe, on the basis of reliable and transferable APMs and CMFs

- The need for reliable and transferable APMs and CMFs
- Road safety stakeholder's needs in Europe
- Key resources and publications
- Challenges for the European context
- Opportunities for international collaboration



The need for good and transferable APMs/CMFs

- An APM aims to forecast safety outcomes on the basis of traffic and other site-specific conditions (including CMFs)
- A CMF is a synthesis of diverse evaluation results that allows for more universal understanding and application of safety measures.
ex-post evaluations → meta-analyses → theorizing
- The more correct the functional form of the APM, and the narrower the CMF distribution, the larger is the probability that policy decisions are correct.
- APMs/CMFs could allow more rapid adoption and dissemination of new safety measures.
- They can be the basis for evidence based safety policies.



Road safety stakeholder's needs in Europe

- A questionnaire survey among European road safety stakeholders was carried out in 2012 (DaCoTA project), aiming to identify the needs and priorities for safety data & tools
 - More than 500 stakeholders
 - More than 55 items (data, knowledge & tools)
 - Covering the entire policy making cycle
Fact finding → programme development → implementation → evaluation
- The survey revealed that 'implementation of measures' and 'cost & safety impacts of measures' are of highest importance (high priority and low availability)
 - Monitoring of implemented measures across Europe
 - Good practice on measures implementation
 - Costs and safety impacts of single & combined measures
 - Common methodology for assessing safety impacts (CMFs)



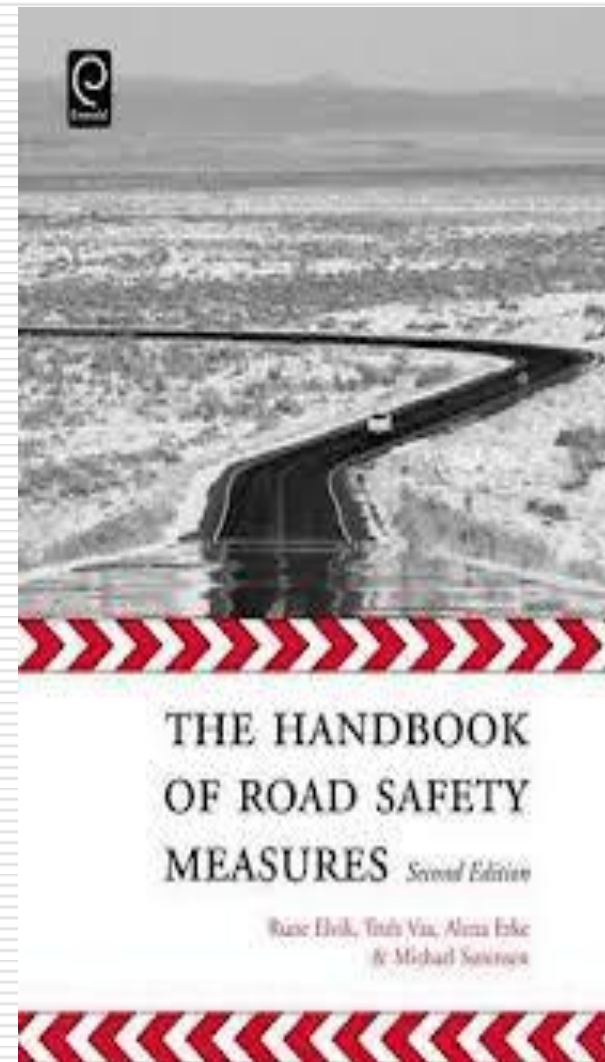
Road safety stakeholder's needs in Europe

- Evaluation of safety measures appears to be **the weakest component** of road safety management systems in Europe
 - Only in few countries, evaluation of safety measures is part of the culture and a routine within the road safety programme, with a dedicated budget.
 - In most countries, evaluation is rare and adjusted to the available budget.
 - Evaluation is usually limited to infrastructure and enforcement measures.
 - Evaluation of entire road safety programmes is even more rare
 - Formal efficiency assessment techniques are not always implemented.
- Due to the **lack of a common framework as regards APMs/CMFs** in the European context, researchers and policy makers rely on a number of key publications and resources



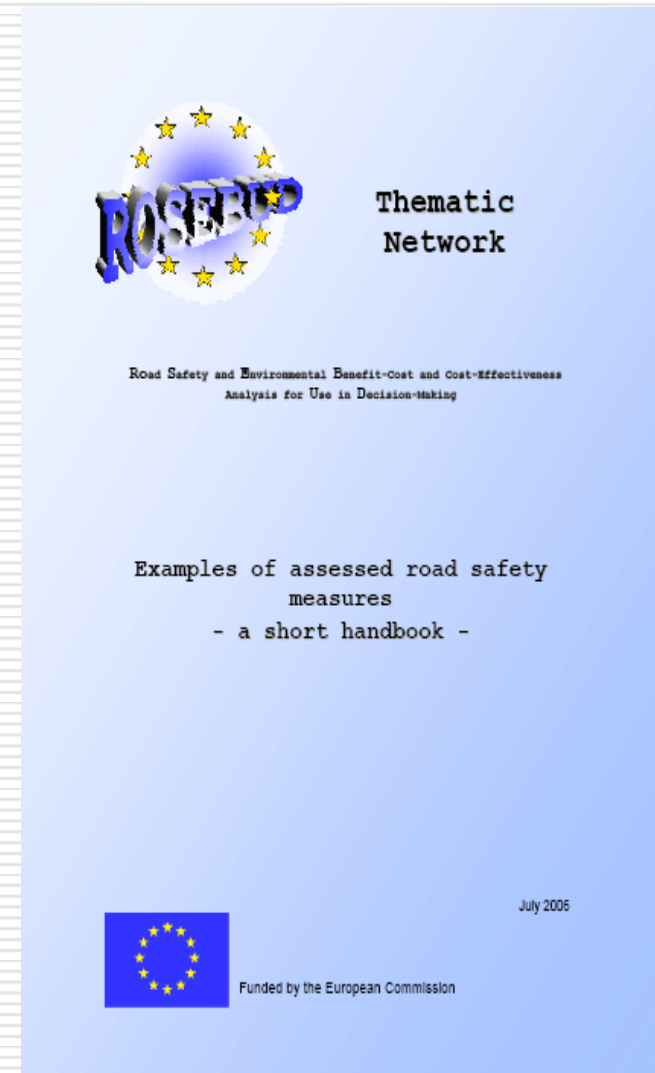
Key resources

- **The Handbook of Safety Measures (2009)**
- State-of-the-art summaries of current knowledge on the effects of 128 road safety measures
 - policy instruments
 - road design, equipment, maintenance, traffic control
 - vehicle design, protective devices, inspection
 - driver training and regulations,
 - public education & information,
 - police enforcement and sanctions,
 - post-crash care
- Formal techniques of meta-analysis used.
- A systematic framework was used to assess the validity of the studies.



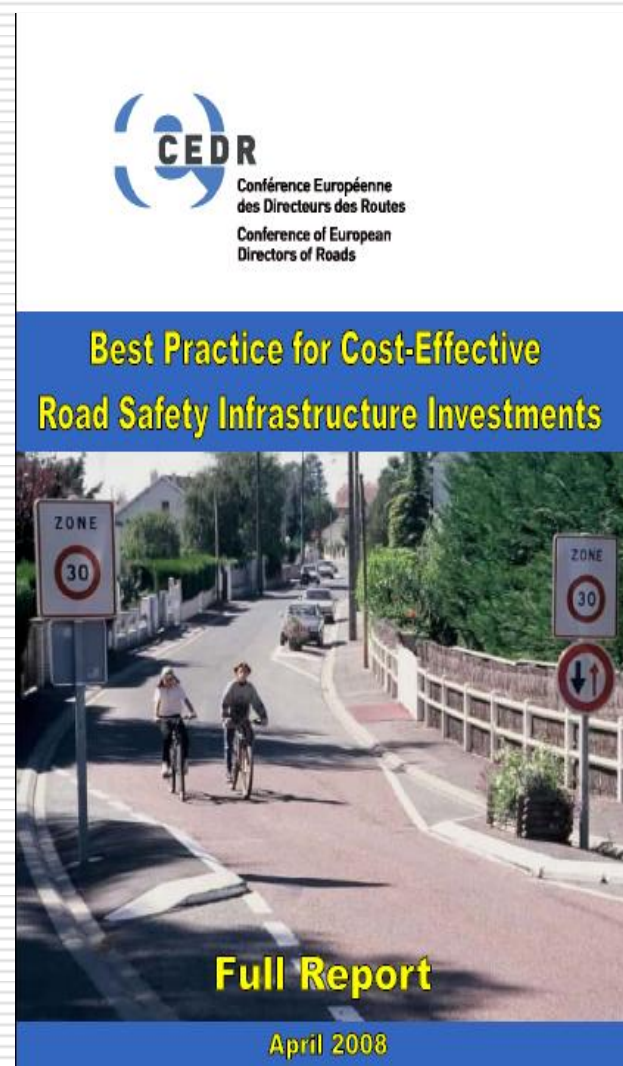
Key resources

- The ROSEBUD Handbook (2006)
Examples of assessed road safety measures
- The handbook includes information about various assessed road safety measures.
 - User related
 - Vehicle related
 - Infrastructure related
- The assessment methods used are cost effectiveness or cost-benefit analysis
- According to the Benefit-Cost ratio, measures are ranked as poor, acceptable and excellent.



Key resources

- The CEDR Report (2008)
Best Practice on Cost Effective Road Safety Infrastructure Investments
- A review of 56 road infrastructure investments (literature and national CEDR questionnaires)
 - motorways, rural roads, urban areas
 - Simple road sections, bends, junctions
- Five most promising investments were identified:
 - Roadside treatment
 - Speed management
 - Junctions layout
 - Junction traffic control
 - Traffic calming
- Safety effects, Other effects (mobility, environmental etc.), Investments costs, CEA/CBA results, Strengths and weaknesses, implementation barriers



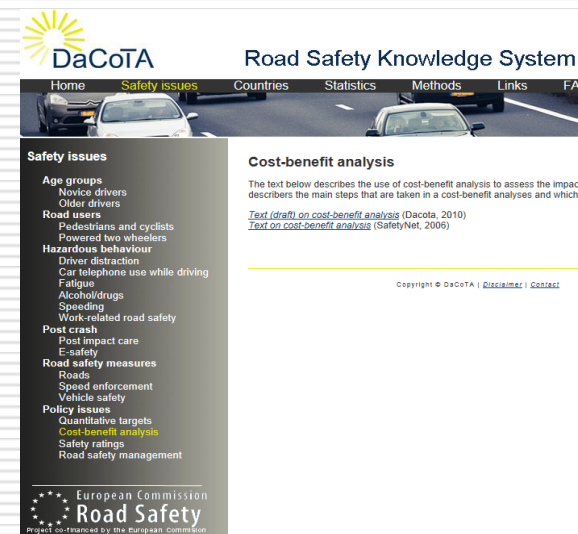
Key resources

- The SUPREME Handbooks (2007)
Best practices in road safety
- Handbook of measures at country level
- Handbook of measures at European level
 - Best practice (B/C ratio available)
 - Good practice (sound theoretical basis)
 - Promising practice (new measures)
- Nine thematic areas
 - Education, campaigns, driver training
 - Rehabilitation and diagnostics
 - Vehicles
 - Infrastructure
 - Enforcement
 - Statistics and in-depth analysis
 - Institutional organisation
 - Post-accident care



Key resources

- **The European Road Safety Observatory**
- ERSO helps policy makers & researchers to find their way into the European road safety world.
 - Knowledge & webtexts on safety issues
 - Data (fatalities, exposure, SPI, attitudes & behaviours, in-depth data)
 - Basic Fact Sheets, country profiles, forecasts & benchmarking
- **CMFs and economic appraisal in the ERSO**
 - Inventory of measures implemented in Europe
 - Webtext on Cost-Benefit Analysis
 - Links to key resources and publications

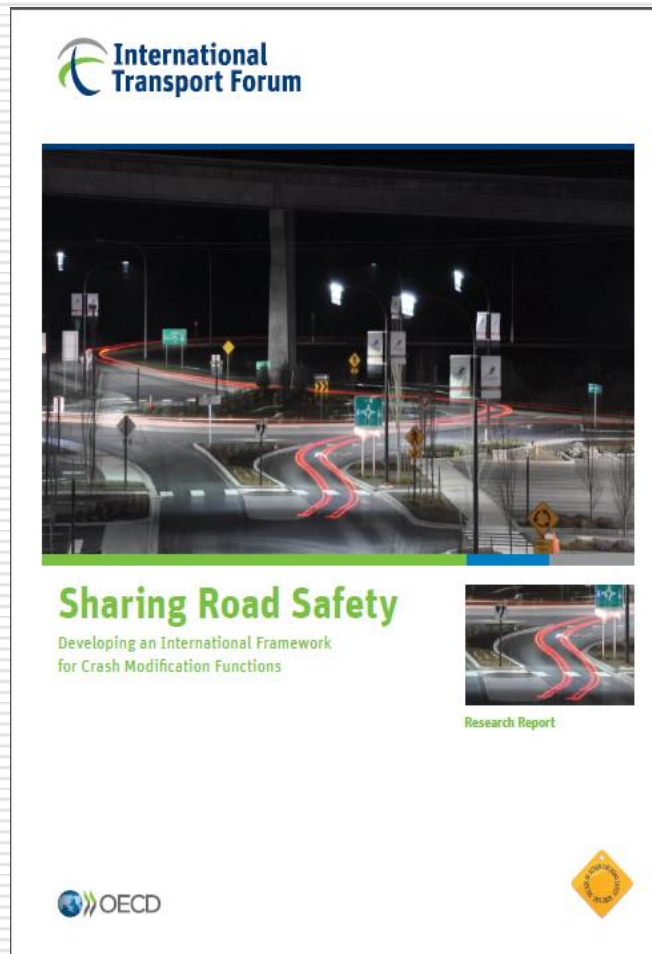


Key resources

- **International Transport Forum
Sharing Road Safety**

Developing an International Framework
for Crash Modification Functions

- Crash modification functions
- Review of existing approaches and initiatives
- Challenges and opportunities for transferability
- Assessing transferability of road safety evaluation studies
- Quantitative framework for enhancing transferability of crash modification factors or functions
- Overcoming barriers to implementation
- Recommendations



Technical challenges in the European context

- While most countries use APMs and CMFs from other countries, the process of transferring is imperfect - research findings not well documented.
- Properly planned, conducted and documented (including circumstances under which the CMF was developed) research will improve transferability of CMFs.
- At the moment relatively few studies meet these standards.
- Lack of uniformity in the performance of related research and the reporting of research results.
- Lack of common functional form for APMs.
- Lack of CMFs for assessing the impacts of combined measures.
- Lack of CMFs for assessing road safety programmes.



Transferability challenges in the European context

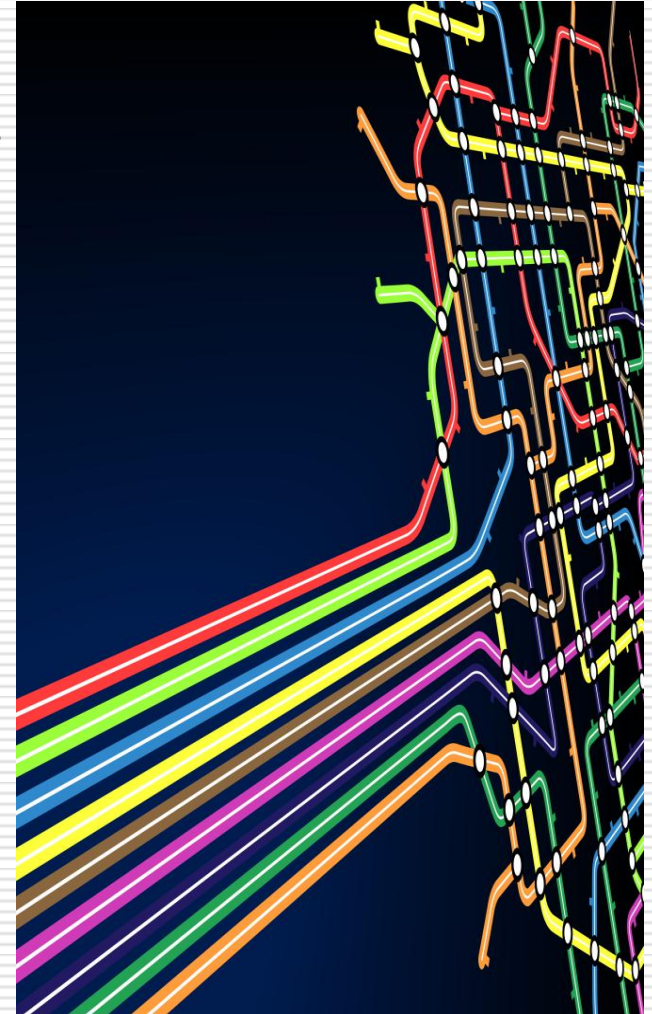
Manuals and handbooks have been developed, aiming to gather, harmonize and improve the existing knowledge on APMs/CMFs.

- These are often used by decision makers in European countries, by adopting the APM functional forms and CMF values.
- Due to the important gaps in the knowledge concerning the transferability of APMs/CMFs, several countries have developed their own methods.
- Lack of a uniform understanding of the value, importance and usage of APMs and CMFs in road safety forecasting and decision making.
- Need to assess the particularities of setting, context, and implementation features of a specific measure.
- Need to **define a common and reliable protocol** to adapt the APMs and the CMFs to local networks.



Opportunities for international collaboration

- The most important gaps and uncertainties in road safety forecasting and efficiency assessment concern the adoption of appropriate APMs and CMFs
- Advancement of thinking about what research produces a good APM/CMF.
- **CMF evaluation should become a required procedure for all road safety investments**
- Any following investments should be linked with the CMF results of the previous investments.
- Standard and uniform APM/CMF development procedure as established through continuous international cooperation in the field is the first step towards transferability of APM/CMF experiences.



Opportunities for international collaboration

APMs and CMFs can be transferred to conditions different from the ones for which they have been developed if selected based on scientifically valid criteria and adapted to local conditions based on historical crash data

- Increasing the accessibility of information, through the dissemination of APM/CMF development results.
- Communicating the value of certain measures across international boundaries and seeking their rapid adoption will help to maximize research investments.
- International dialogue and leadership to advance a broader global effort.
- Cooperation among selected researchers to expand international dialog.





European Road Safety Forecasts:

Experiences and future challenges for reliable and transferable safety measures

George Yannis, Eleonora Papadimitriou

National Technical University of Athens
Department of Transportation Planning and Engineering

TRB Annual Meeting, Washington, 15 January 2014
'Saving the World: Overview of Road Safety Initiatives
Around the Globe'