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# Road Safety Data, Knowledge and Decision Support Systems Global Challenges in the Digital Era

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#### **Initial Considerations**



- Road Safety is a typical field with high risk of important investments not bringing results.
- Absence of monitoring and accountability limits seriously road safety performance.
- Decision making in road safety management is highly dependent on appropriate and quality data.
- Very often we look where the data are and not where the problems and solutions are.



#### Data needed for Road Safety Decision Support





#### Data to identify the problems

- Crash data
- Risk exposure and performance indicators

#### Data to identify the solutions

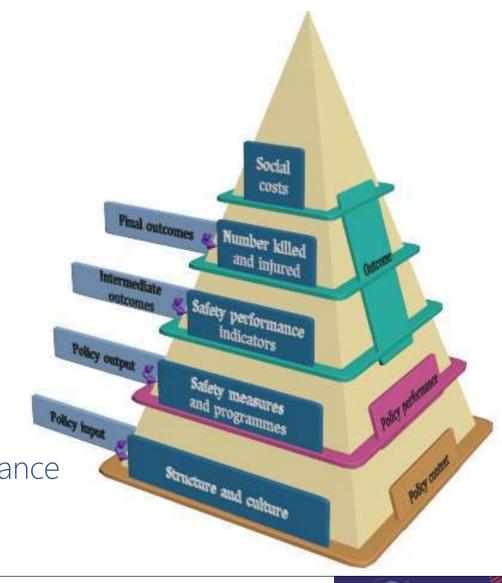
- Data on measures implementation
- Data on measures effectiveness

#### Macroscopic data

- For the whole population
- For a city, region, country, globally

#### Microscopic data

- driver, passenger pedestrian behaviour and performance
- junction, road segment, small area performance
- specific accident analysis data





## Critical Data Properties



- Crash data are meaningful only if they are combined with exposure data (crash per km driven, per traffic characteristics, per time, etc.)
- Crash causalities are revealed when crashes are correlated with **safety performance indicators** (behaviour, infrastructure, traffic, vehicles)
- The evaluation of safety measures effectiveness provides valuable information, necessary for matching problems with solutions
- Analysis of high resolution data reveals hidden and critical crash properties



#### Road Safety Observatories and Decision Support Systems Transport Forum









- ERSO, European Road Safety Observatory
- OISEVI, Ibero-American Observatory
- African Road Safety Observatory
- IRTAD, ITF Road Traffic and Accident Group
- Dacota, EC Project Knowledge Centre
- NRSO NTUA Road Safety Observatory
- National Observatories

- SafetyCube, EU Road Safety DSS
- SafeFITS, UNECE-Global Road Safety Model
- iRAP, Road Safety ToolKit
- PRACT, CEDR
- PIARC, WRA Road Safety Manual
- US NHTSA/FHWA CMF Clearinghouse
- AustRoads Road Safety Engineering Toolkit





#### **Road Safety Observatories**





#### European Road Safety Observatory, EC (1/2)





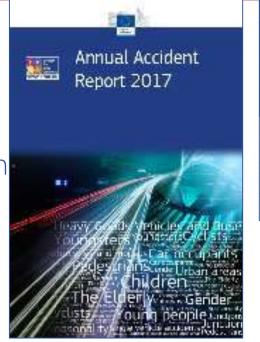
The ERSO is the information system of the European Commission with harmonised specialist information on road safety practices and policy in European countries.

ERSO and CARE are Managed by the European Commission

- DG Move Road Safety Unit (EC DG Move),
- Cooperation with **Eurostat** (EC Statistical Office)
- Assisted by the Road Accident Statistics National Experts Group (CARE Experts Group)

#### Methodology

- Definition of common protocols for data collection
- Availability, systematic collection and analyses of data and information
- Presentation of the results responding to users' needs
- Continuity in making all results publicly available









#### European Road Safety Observatory, EC (2/2)

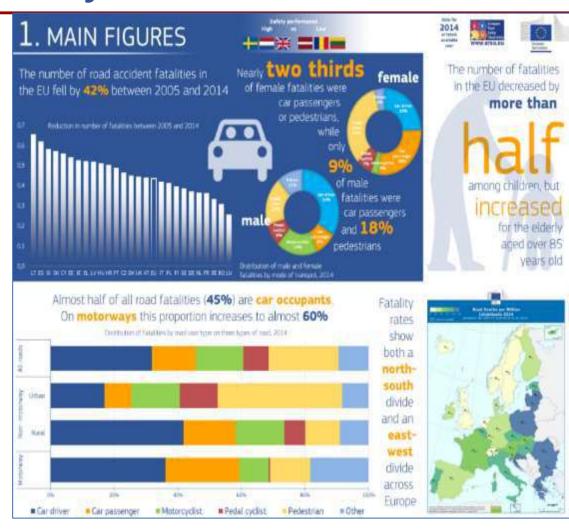




#### 22 Traffic Safety Syntheses

- Pedestrians and Cyclists
- Work-related Road Safety
- Speed & Speed Management Roads
- Cell Phone Use while Driving Speed Enforcement
- Fatique
- Power Two Wheelers
- Novice Drivers
- Quantitative Targets
- Road Safety Management
- Driver Distraction
- Integration of road safety in other policy areas

- e-Safety
- Post Impact Care
- - Vehicle Safety
  - Cost-Benefit Analysis
  - Older Drivers
  - Children
  - Serious injuries
  - Safety Ratings
  - Alcohol



• 64 Infographics based on the above reports are available online at https://ec.europa.eu/transport/road\_safety/specialist/erso\_en





#### OISEVI, Ibero-American member countries





- The Ibero-American Road Safety Observatory (OISEVI): an international cooperation instrument comprising the highest road safety authorities of Ibero-American member countries.
- OISEVI conducts **critical surveillance** over national road safety policies and fosters their dissemination.
- A forum for analyzing public policies on road safety at the highest level of stakeholders
- Promotes public policy formulation for road safety, creation of National Lead Agencies or governing organizations and National Observatories.
- Standardizes traffic data collection, processing, analysis and dissemination.
- An **Ibero-American database** to reflect the evolution of road safety statistics and their comparability, for assessing actions.
- Promotes the participation of different technical or financial cooperation agencies

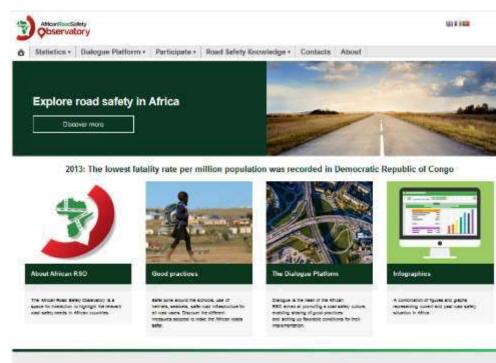


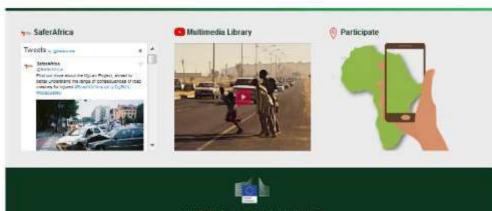
#### African Road Safety Observatory, a Horizons 2020 Project



Global dialogue for better transport

- The African RSO aims to create **favorable conditions** and opportunities for the effective implementation of actions for road safety and traffic management in African countries
- Is being created alongside a **Dialogue Platform** between Africa and Europe (SaferAfrica project until Sep 2019)
- Objectives:
  - Assess the implementation of the African Action Plan, alongside needs of stakeholders
  - Activate Twinning Programs between Africa and Europe
  - Conduct sharing of good practices, capacity-building activities and capacity reviews
- Structure:
  - Statistics Road Safety Management
  - Good Practices Capacity Building
  - Dialogue Platform News









### IRTAD, ITF/OECD (1/2)



- IRTAD Objectives:
  - Exchange of information and methodologies on safety trends and road safety policies
  - Suggest **possible improvements** to road accident and related traffic data collection and analyses.
  - Collect accident data, complementary to other sources
  - Conduct data analysis to provide advice on specific road safety issues.
  - Contribute to **international co-operation** on road accident data and its analysis.
- The IRTAD Group publishes regularly special reports on its analyses of topical data collection and methodology issues.
- IRTAD organises open Conferences







International Traffic Safety
Data and Analysis Group





#### IRTAD, ITF/OECD (2/2)

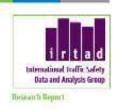


- Information comes directly from relevant national data providers.
- Data provided in a common format and common definitions, covering:
  - Injury **Accidents** by Road Network
  - Road Fatalities by Road Usage, Age, Gender and Age or by Road Network
  - Hospitalised Road Users by Road Usage, Age or Road Network
  - Accident Involvement by Road User Type and Associated Victim Data
  - **Risk Indicators**: Fatalities, Hospitalised or Injury Accidents Related to Population or Mileage figures
  - **Population** Figures by Age Bands
  - Vehicle Population by Vehicle Types
  - Network Length Classified by Road Network
  - Mileage Classified by Road Network or Vehicles
  - Passenger Mileage by Transport Mode
  - Seat Belt Wearing Rates of Car Drivers by Road Network
- Data concern 55 countries











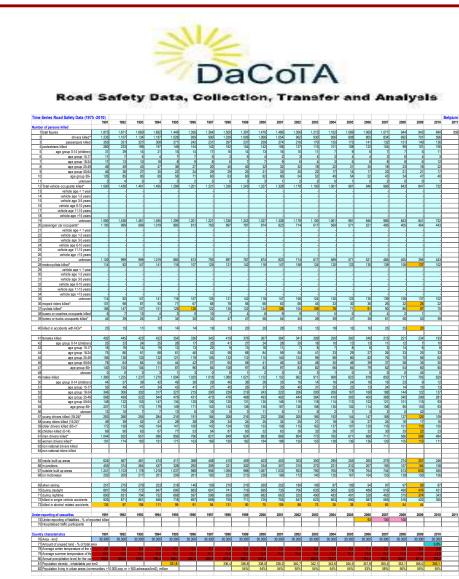




### DaCoTA, an EC-DG Move Project



- The purpose of the project was to develop and implement new approaches to gather, structure and apply policy-related safety data in order to be incorporated within the European Road Safety Observatory (ERSO).
- The DaCoTA EU Project Team gathered and analysed data from 30 European countries on a wide range of road safety topics.
- Creation of Master Data Tables, which were filled in for each European country for the period 1975-2010, containing
  - Road accident data
  - Risk exposure data
  - Safety Performance Indicators (SPIs)
  - Under-reporting of crashes
  - Country characteristics
  - Social Costs
  - Traffic Laws and Measures



## NTUA Road Safety Observatory



- An international reference website information system of road safety data and knowledge: <a href="www.nrso.ntua.gr">www.nrso.ntua.gr</a>
- More than 1.200 items since 2007, more than 500 scientific publications
- All important road safety news in Greece, in Europe and worldwide
- Updated reports covering all modern road safety issues
- Latest available road safety data for Greece and the European Union
- Scientific road safety conferences in Greece and worldwide
- Links to dozens of road safety resources worldwide



#### **Road Safety Decision Support Systems**





### SafetyCube, EC Horizons 2020 Project (1/2)





SafetyCube DSS aims to provide the European and Global road safety community a user friendly, webbased, interactive Decision Support Tool.

SafetyCube DSS combines existing with novel road safety knowledge using scientific studies as basis.

The main contents of the SafetyCube DSS concern:

- road accident risk factors and problems
- road safety measures
- best estimate of effectiveness
- cost-benefit evaluation
- all related analytic background

Special focus on linking road safety problems with related measures.



The SafetyCube DSS is the European Road Safety Decision Support System, which has been produced within the European research project SafetyCube, funded within the Horizons 202 Programme of the European Commission, aiming to support evidence based policy making. The SafetyCube Decision Support System provides detailed interactive information on a large list of road accident risk factors and related road safety countermeasures. A Quick Guide on using the SafetyCube DSS, with instructions on how to browse the system, make a search and further refine the results, is available for download here.









### SafetyCube, EC Horizons 2020 Project (2/2)

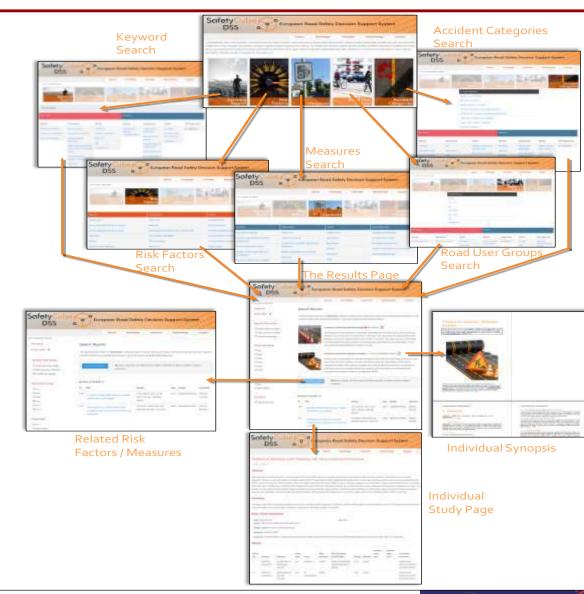




#### The SafetyCube DSS contains:

- more than 1,250 scientific studies,
- with more than 7,500 **estimates** of risks/measure effects on
- 4 Categories: road user, infrastructure, vehicle, post impact care
- 38 risks, 50 measures (88 in total) e.g. distraction, roadside factors,
- 120 specific risks, 193 specific measures (313 in total) e.g. mobile phone use,
- 211 Synopses
- 36 cost-benefit analyses (adjustable)

All available at: <a href="https://www.roadsafety-dss.eu/">www.roadsafety-dss.eu/</a>





### SafeFITS Global Model, UNECE (1/2)



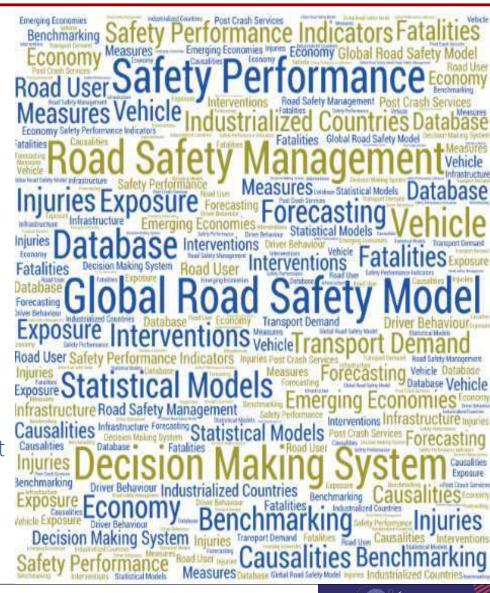
- A macroscopic road safety decision making tool to aid stakeholders in developed and developing countries, decide the most appropriate road safety policies - measures to achieve tangible results.
- Based on the related scientific knowledge available worldwide, with emphasis on recent academic research and project results.
- Developed within the framework of the "Safe Future Inland Transport Systems (SafeFITS)" project of the United Nations Economic Commission for Europe (UNECE), financed by the International Road Union (IRU).

#### SafeFITS layers

- Economy and Management
- Transport Demand & Exposure
- Road Safety Measures
- Road Safety Performance Indicators
- Fatalities and Injuries

#### SafeFITS pillars

- Road Safety Management
- Road Infrastructure
- Vehicle
- User
- Post-Crash Services







### SafeFITS Global Model, UNECE (2/2)





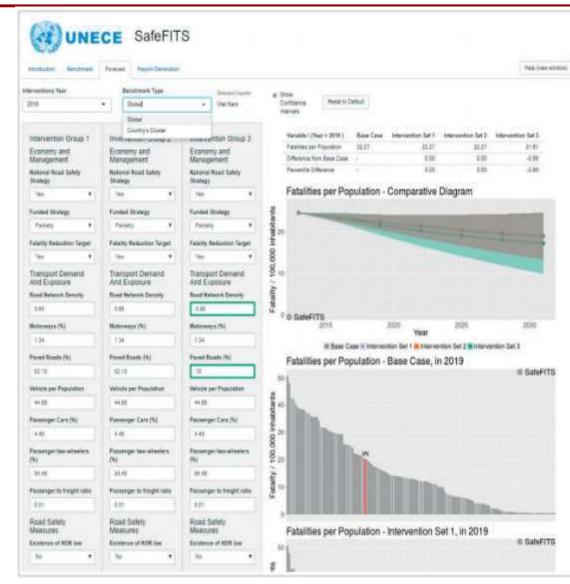
The SafeFITS Tool consists of two background components:

- SafeFITS database with data on indicators from all layers of road safety management system for 130 countries worldwide
- SafeFITS set of statistical models of global causalities, estimated on the basis of the database

The SafeFITS Tool is composed by three complementary modules:

- Intervention analysis: allows the user to examine the effects of single interventions at national or country cluster level
- Forecasting analysis: allows the user to define own scenarios of measures (or combinations of measures) in a country and obtain medium/long term forecasts of each scenario
- Benchmarking analysis: allows the user to benchmark a country against a group of countries (e.g. all countries, countries of similar economic or road safety performance)

Available at: <a href="https://unecetrans.shinyapps.io/safefits/">https://unecetrans.shinyapps.io/safefits/</a>



## iRAP Road Safety Toolkit

- International Transport Forum

- Includes 58 treatments (infrastructure, vehicle & user related)
- No CMFs included
- Rough assessment of each treatment's effectiveness using a four scale system (0-10%, 10-25%, 25-40%, 60% or more)
- Is available online: <a href="http://toolkit.irap.org/">http://toolkit.irap.org/</a>



Latest Casa Studies

Spe practical examples of how

deaths and serious injuries have

Did you know?

Hiprovided with dvertaking lanes.

dangerous overtaking attempts.

drivers will be less likely to make

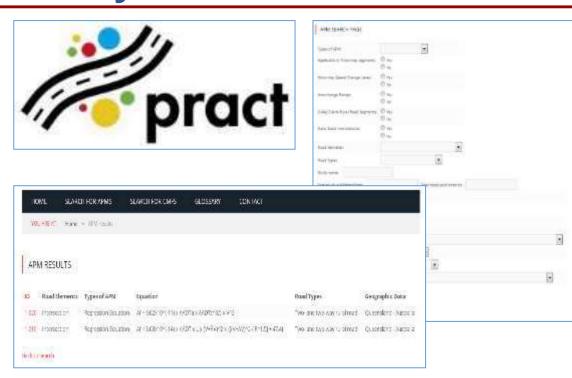


### PRACT APM and CMF Repository, CEDR





- A Trans-European Accident Prediction Model with a single structure and different parameters for different countries. The model has been fitted to data from 5 Countries (Italy, UK, Greece, Netherlands, Germany).
- A user friendly tool to assist in the application of APMs according to data availability and local conditions. Enables Search for APMs and CMFs.
- All types of data required in accident prediction are available (CMFs, SPFs, and Regression Equation APMs).
- The quality of included CMFs has been verified through an evaluation process.
- A procedure to check the **transferability of CMFs**, incorporated in the tool.
- A CMF and APM Repository has been developed and is freely available online: <u>www.pract-repository.eu</u>







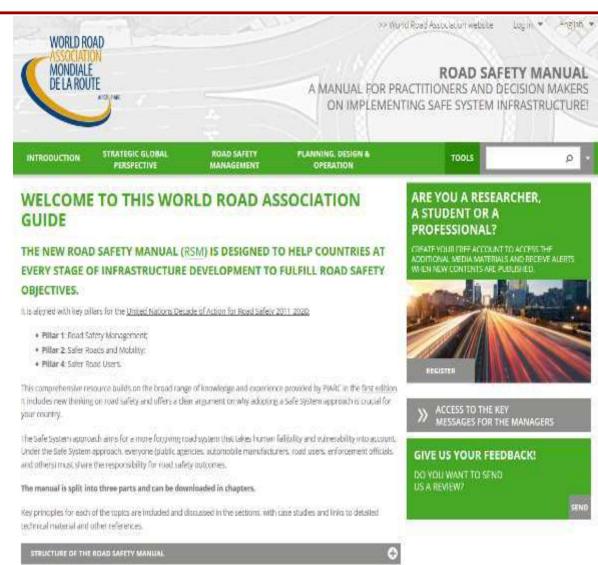


## PIARC - WRA Road Safety Manual





- The PIARC Road Safety Manual is intended to provide clear and accessible information on the effective management of road safety infrastructure.
- Includes 15 case studies, with the possibility of additions and updates.
- Estimates of high/medium/low cost for up to 35 Treatments
- Categorized for 3 effectiveness categories and for up to 6 accident types.
- Organization of the Manual is in three Parts:
  - Part I "Strategic Global Perspective"
  - Part II "Road Safety Management"
  - Part III "Planning, Design & Operation"
- Available online: <a href="https://roadsafety.piarc.org/en">https://roadsafety.piarc.org/en</a>



IF THIS IS YOUR FIRST VISIT

## US NHTSA/FHWA CMF Clearinghouse



Global dialogue for better transport

- **Directly related** to the Highway Safety Manual (AASHTO, 2010)
- Includes 5,378 CMFs on road infrastructure
- Detailed background information on presented CMFs is available
- Is available online: <u>http://www.cmfclearinghouse.org</u>



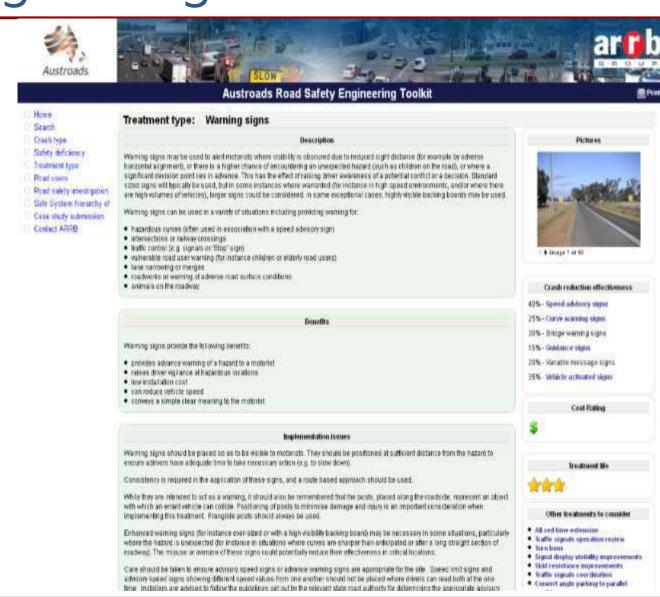


#### AustRoads Road Safety Engineering Toolkit





- 67 treatments are included
- Searchable database according to:
  - Treatment type/name,
  - Crash type,
  - Safety issue,
  - Road user group
- Detailed background information on included CMFs generally not available
- Is available online: <u>http://www.engtoolkit.com.au</u>



## In Synopsis



- During the last 15 years, several Road Safety
   Observatories and Decision Support Systems have
   been developed, adding significant value to the
   quest for safer roads worldwide.
- The more developed Information Systems are associated with Countries and Regions with higher road safety performance and are a direct sign of advanced road safety culture.
- Road Safety Information Systems are key management tools for developing road safety capacity and engaging stakeholders (not only for providing scientific evidence but also for monitoring efforts)





## Future Challenges



Global dialogue for better transport

- The current **great potential** of current Road Safety Systems should be multiplied with:
  - more data and knowledge
  - broader geographical coverage
- Upgraded usefulness of the Systems entail:
  - more accurate road accident data (LMIC Counties)
  - exposure data and performance indicators
  - measures and policies effectiveness evaluation
- Global impact will be optimized through:
  - a network of Regional Observatories (Global coverage)
  - standardisation of data, processes and systems
  - evidence-based & customized best practice guidelines





## The Digitalisation Challenges



Global dialogue for bette transpor

- Digitalization opens great new data possibilities for evidence based road safety decision making at all levels
- New great potential for seamless data driven procedures from safety problems identification to selection and implementation of optimal solutions
- New increased net present value of road safety data, available for early problem detection and prompt and customised decision support





#### In Conclusion



- Data, knowledge and systems require **serious effort with equivalent budget**, which however are highly profitable in terms of return of investment:
  - with thousands of lives and injuries saved and
  - road safety investments properly exploited
- The **deployment** of national, regional and international road safety observatories and decision support systems, should be:
  - progressive
  - inter connected
  - properly funded
- Regional and Global coordination and funding are current key challenges for the serious upgrade of the current systems







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