

Ministry of Transport and Maritime Affairs

**Ministry of Economy** 



#### How to achieve Transport- and Trade-related SDGs

# Greek Road Safety Statistics – Best Practices

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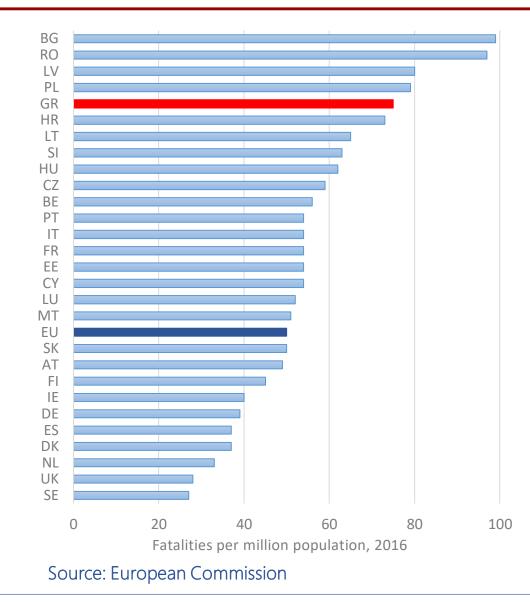
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National Technical University of Athens

Podgorica, October 2017

### Road Safety in the EU

- In 2016, about 25.500 people were killed and 135.000 were seriously injured in road accidents in the EU
- In 2016, road accident fatalities were reduced by 2% after two years of stagnation and by 19% since 2010
- The mean number of road fatalities per million population was 50 in 2016 and was reduced by 43% compared to 2007
- Only 10 countries have a better performance than the EU average





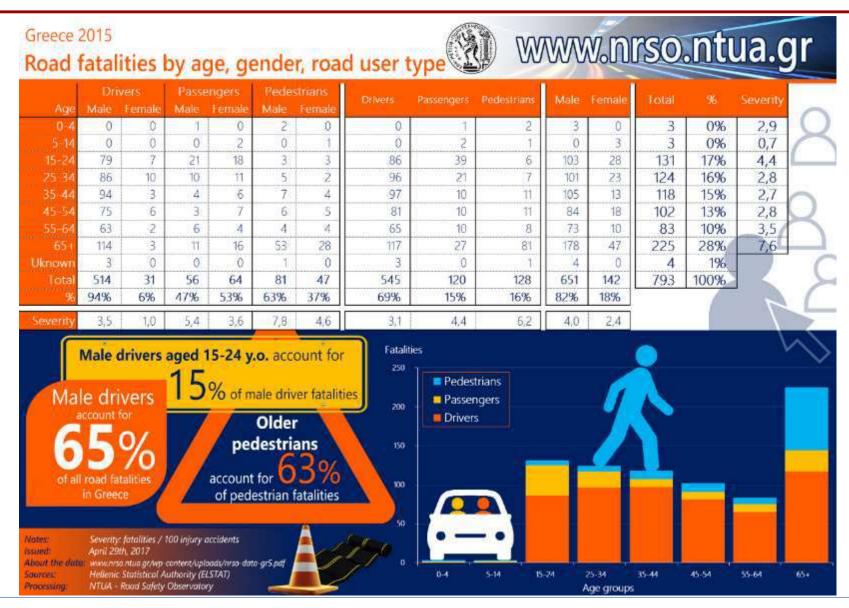
#### Road Safety in Greece

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Change 2006-2016
Fatalities	1.657	1.612	1.553	1.456	1.258	1.141	988	879	795	793	807	-51%
Injured persons	20.675	19.766	19.010	18.641	19.108	17.259	15.640	15.175	14.564	14.096	13.795	-33%
Accidents	16.019	15.499	15.083	14.789	15.032	13.849	12.398	12.109	11.690	11.440	11.439	-29%
Vehicles (x1000)	6.996	7.380	7.729	7.911	8.062	8.087	8.070	8.035	8.048	8.076	8.173	17%
Fatalities/million vehicles	237	218	201	184	156	141	122	109	99	98	99	-58%
Fatalities/million population	149	146	140	131	115	98	89	80	73	73	75	-50%
Source: ELSTAT												

- During the past decade, Greece was among the EU countries with the worst road safety performance
- However, Greece recorded an impressive reduction in road fatalities by 46% during the period 2009-2015
- This impressive reduction in road fatalities during economic crisis was stopped in 2015



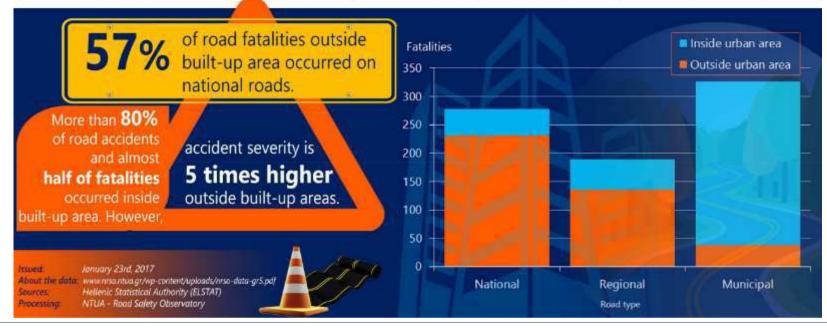
### Road Fatalities by Age, Gender and Road User Type



### Road Fatalities by Area and Road Type

Greece 2015

www.nrso.ntua.gr Road fatalities by area and road type Fatalities **Road accidents** Fatalities per 100 accidents Outside Inside Outside Inside Inside Outside Road Type built-up area built-up area built-up area built-up area built-up area 231 278 35% 4% 13% 18,5 National 47 12% 57% 395 1.106 52% 1.501 11,9 20,9 189 24% 1.216 Regional 53 14% 136 34% 430 5% 786 37% 11% 12,3 17.3 15,5 Municipal 288 74% 38 9% 326 41% 8.468 91% 255 12% 8.723 76% 3,4 14,9 3,7 Total 388 100% 405 100% 793 100% 9.293 100% 2.147 100% 11.440 100% 4,2 6,9 18,9 51% 100% 49% 81% 19% 100%





### Why Collect Road Safety Data?

- 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





- Accident Data
- Exposure Data
- Road Safety Performance Indicators





#### Road Safety Data Collection and Storage

- Importance
- Accident recording
- Data processing and storage





## Importance of Road Safety Data Collection and Storage

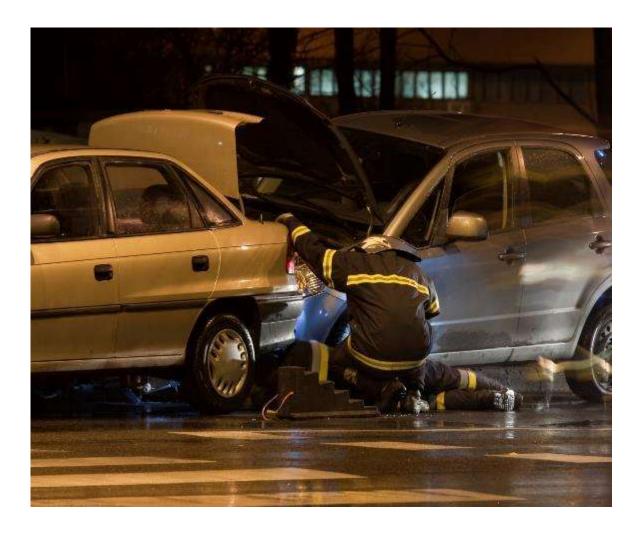
- Highlight high-risk sites, hierarchize needs and plan necessary improvements
- Investigate the impact of various factors (geometric characteristics, electric lighting, parking, driver training, enforcements, etc.) on accidents reduction
- In the documentation of projects (e.g. signaling, lighting, signage, etc.) and actions (e.g. increased enforcement, parking ban) in order to improve road safety
- In "before and after" studies in order to determine the effect of an intervention at a road section or intersection
- Performing an expert's report on a particular accident





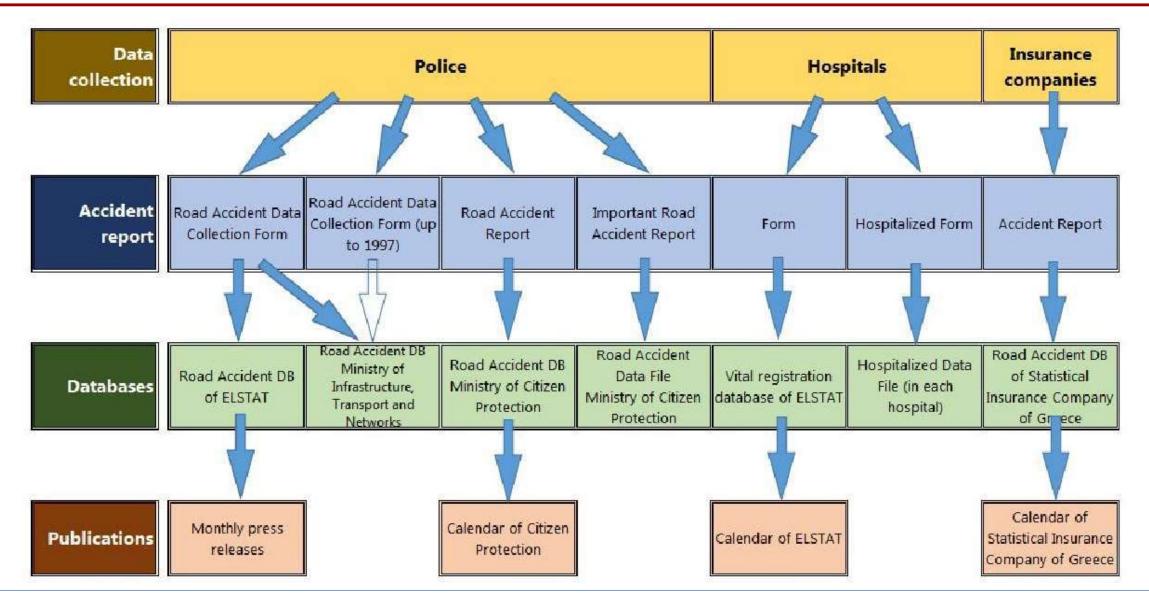
#### Problems when Recording Road Accidents

- Unclear determination of road accident location
- Insufficient or incorrect recording
- Insufficient accident coverage





#### Data Processing and Storage





### The Role of Police (1/2)

- The Police are the first to arrive at the accident site and the last to update the related data
- Responsible to
  - Forward the data to the Hellenic Statistical Authority (ELSTAT)
  - Maintain the National Data File
- Draw up an accident report by filling-in an accident data collection form





### The Role of Police (2/2)

- Task on accident site
  - Carry out an investigation
  - Fill-in autopsy report, and part of the road accident data collection form (completed later on at the police headquarters)
- The road accident data collection forms are finalised with the necessary updates within 30 days from the day of the accident
- The source with the most detailed data collected at national level, in terms of variables and values collected





### **ELSTAT** Database

- Detailed Disaggregate Data (1985-2012)
- Accident
- Vehicle
- Injured persons
- Road Accident Data Collection Form (DOTA)
- Updated since 1996
- Fatality Definition: Common European definition (Killed within 30 days from the day of the accident)
- Statistics
- Publication of aggregate statistics
- Provide with data international organizations (CARE, Eurostat, OECD etc.)



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#### ΔΕΛΤΙΟ

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HEIPAIAX, 2010



### Road Accident Data Collection Form (1/3)

- Type of accident
- Type of area (inside/ outside built-up area)
- Type of road
- Time of accident (week/ time/ day/ month/ year)
- Injured persons (fatally, seriously, slightly)
- Number of vehicles involved
- Type of road surface
- Weather conditions
- Road surface conditions
- Night-lighting
- Specific characteristics of vehicles (type of vehicle, nationality, brand, cc, technical inspection, number of drivers and passengers)

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#### Road Accident Data Collection Form (2/3)

- Road characteristics
- Geometric road characteristics
- Type of accident
- Vehicle maneuver type
- Injured pedestrians' position and movement
- Traffic regulation, signage and signaling
- Driver's license category and year
- Sketch

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#### Road Accident Data Collection Form (3/3)

- Restraints systems in vehicle
- Alcotest results
- Driver's and injured persons' information

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#### Hospitalized Data Files

#### **In Hospitals**

- Recording causes of hospitalization
- Recording road accident injured persons
- These files show the lowest degree of incomplete recording
- No central archive is kept, not electronic form

#### **ELSTAT Vital Registration Database** (demographic data included)

- Recording time and cause of death
- Statistics
- Publication of aggregate statistics





#### Database of Vehicle Insurance Companies

**Vehicle Insurance Companies of Greece** 

- Disaggregate data of road injury accidents and road accidents with only material damages
- Accident
- Driver
- Damage
- It's the unique source of data on road accidents with only material damages
- Only the accidents that are declared are recorded in the database





#### **Comparison of Data from Different Sources**

		Source		Corre	ection Coefficient	
	ELSTAT*	Police*	Hospital*	Police-ELSTAT	Hospitals/ELSTAT	Average
1990	1.737	1.986	2.247	249	1,29	
1991	1.790	2.013	2.246	223	1,25	
1992	1.829	1.995	2.252	166	1,23	1.20
1993	1.830	2.008	1.986	178	1,09	1,20
1994	1.909	2.076	2.221	167	1,16	
1995	2.043	2.149	2.435	106	1,19	
1996	2.157	2.175	2.540	18	1,18	
1997	2.105	2.141	2.333	36	1,11	
1998	2.182	2.229	2.324	47	1,07	
1999	2.116	2.181	2.226	65	1,05	
2000	2.037	2.103	2.288	66	1,12	
2001	1.880	1.911	2.035	31	1,08	
2002	1.634	1.655	1.865	21	1,14	
2003	1.605	1.613	1.794	8	1,12	
2004	1.670	1.547	1.984	-123	1,19	
2005	1.658	1.470	1.971	-188	1,19	1,15
2006	1.657	1.493	1.851	-164	1,12	
2007	1.612	1.449	1.793	-163	1,11	
2008	1.553	1.550	1.722	-3	1,11	
2009	1.456	1.463	1.647	7	1,13	
2010	1.258	1.281	1.430	23	1,14	
2011	1.141	1.092	1.339	-49	1,17	
2012	988	976	1.191	-12	1,21	
2013	879	865	1.096	-14	1,25	
2014	795	801	1.025	6	1,29	

\* up to 1995 on accident site, since 1996 within 30 days



#### **Overview**

- Road traffic estimates (road length, vehicle kilometres, and vehicle fleet)
- Road user at risk estimates (person kilometres, population, number of trips, time in traffic, **driver population**)
- Basic requirements
  - Travel/mobility surveys for collecting of veh-km
     or persons-km data
  - Traffic measuring systems to be established on the national and main interurban road network
  - Common vehicle classification by all countries
  - Common method for calculating veh-km
     from the traffic measurements



#### Exposure Data (2/2)

#### **Specific Indicators**

- Population
- Driver population
  - Total number of active driver licences
  - Number of driver licences by licence group and by age group
- Road length
- Vehicle fleet
  - Total number of registered vehicles
  - Number of vehicles by vehicle type and by age group
- Vehicle kilometres
- Person kilometres





### Traffic Volume

- The **main purpose** of road traffic measurements is traffic management and consequently their use for road safety purposes (accident rates) is not always easy
- The frequency and the level of detail of these traffic volume counts varies considerably
- There are numerous urban and non urban road networks which are **not covered**





#### Traffic Data - Surveys

#### Data

- Motorway tolls
- Traffic Management Centre
- Other individual studies
- Previous studies
- Louis Berger Study (1979-1989)
- Annual Average Daily Traffic (AADT) of the main country's road network
- New National Survey of Origin Destination (1993)
- Measurements with equipment and observations in the sections of all main road nodes

#### Surveys

- In the context of the Metro Development Study (1996-2000), detailed origin - destination data were gathered for the area of Athens
- Vehicle mileage data for urban and intercity buses are available through the Athens Urban Transport Organization (OASA) and KTEL buses respectively







### Traffic Measurement Technology

- Most common methods for collection of data on traffic volume:
  - permanent pneumatic tubes under the pavement (mainly in big cities)
  - tolls at motorways
  - traffic cameras (Athens and Athens Ring Road Motorway)
  - removable pneumatic tubes on the pavement surface (random – occasional measurements)





Database of Vehicles in Traffic (Ministry of Infrastructure, Transport and Networks)

- Disaggregate data
- Technical characteristics of vehicles
- Characteristics of registration licenses
- Data could be used in statistical road accident analyses providing useful indicators

# Parameters limiting the potential of their exploitation

- Invalid recording of withdrawals
- No information for vehicles that are no longer in traffic
- No information on mopeds





#### Vehicle Fleet Statistics

- **ELSTAT** provides data regarding the vehicle fleet, derived from the Ministry of Infrastructure, Transport and Networks (MITN)
- Data are based on the issuing of **new vehicle registrations**
- The monthly report provides information, at country level, on the brand and type of the motor vehicle, as well as whether it is new or used
- The **annual data** present the breakdown of vehicles by type of vehicle and by geographical area
- The database **does not include** vehicles that move on rails, trolley busses, agricultural tractors and machinery, all motor vehicles of the armed forces, police, fire brigade, state services, diplomatic corps, foreign missions, and invalids of wars, as well as motorcycles with a cylinder capacity less than 50 cc
- Vehicle fleet data can be used as **exposure data** for the accidents and the accident involved vehicles

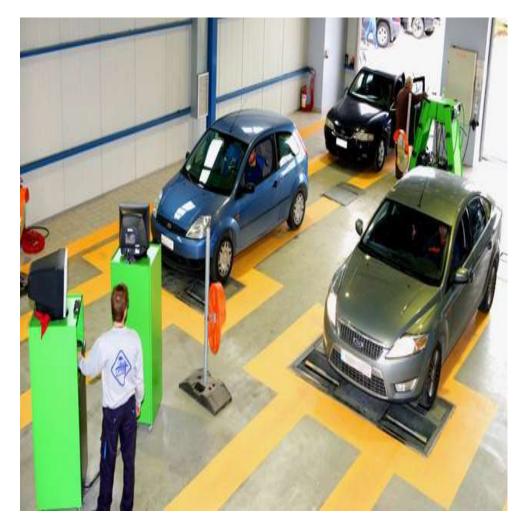




#### Vehicle technical inspections

in Greece are carried out by public and private vehicle technical control centres

- Data are collected by MITN
- Monthly statistics are commonly available since 2015
   (by year, region , type of inspection, vehicle type and final outcome of the control test)





### Road Safety Performance Indicators (1/4)

#### **Overview**

- Simply counting crashes or injuries, is often an imperfect indicator of the level of road safety
- The number of road accidents and injuries, is subject to random fluctuations
- In order to develop effective measures to reduce the number of accidents/ injuries it is necessary to understand the **processes** that lead to accidents

#### Safety Performance Indicators can serve this purpose





### Road Safety Performance Indicators (2/4)

#### Definition

- Measurements related to crashes or injuries, used in addition to the figures of accidents or injuries, in order to **indicate** safety performance or **understand** the process that leads to accidents
  - link between the casualties from road accidents and the measures to reduce them

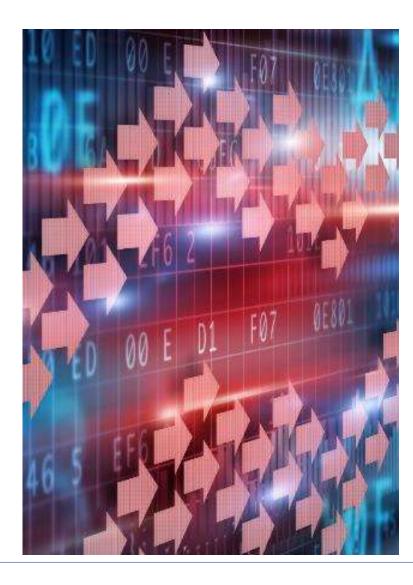




### Road Safety Performance Indicators (3/4)

#### Why Use SPIs?

- Provide more complete picture of the level of road safety
- Able to highlight the emergence of developing problems at an early stage, before these problems show up in the form of accidents
- Provide a means for monitoring, assessing and evaluating the effectiveness of safety actions applied
- Utilize qualitative and quantitative information to help determine a program's success in achieving its objectives
  - Able to reflect unsafe operational conditions
  - More general than direct outputs of specific safety interventions





### Road Safety Performance Indicators (4/4)

#### **Quality Levels**

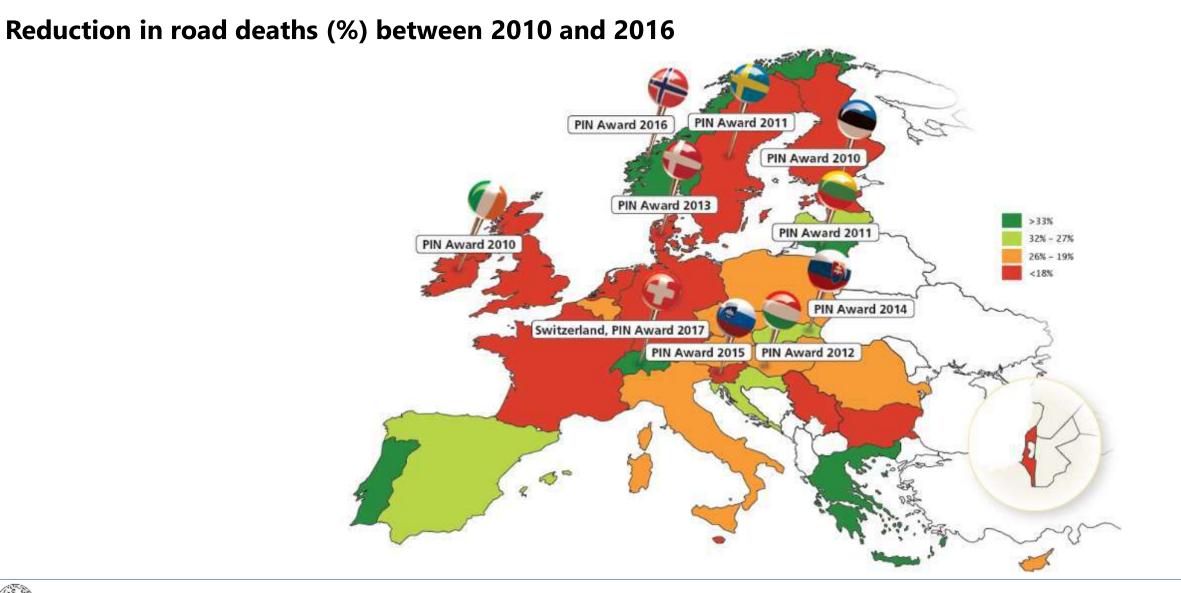
- Direct measurement of the identified unsafe operational conditions
  - the indicator covers the complete scope of the problem and reacts to all possible interventions
- Direct measurement of the identified problem is not possible
  - the identified problem is a hidden variable and is described by several indirect variables as indicators will bridge this gap
  - normal case in the SPI development
  - the solution should be in searching for several indicators, which are independent from interventions and describing the latent variable

• Considering the **expected availability of data** and **assessing** the reasonable effort for **data acquisition** 

- in some cases it would be difficult or even impossible to develop an SPI independent from interventions
- bridge the gap by sub-dividing the problem

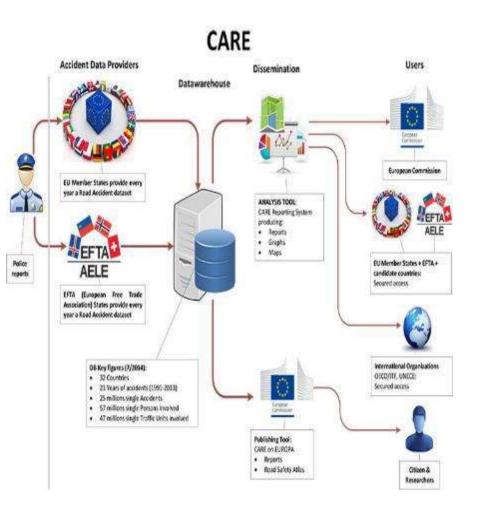


#### Europe



#### **CARE** Database

- CARE the **Community database on road accidents** resulting in death or injury
- Disaggregate road accident data since 1991
- Parts of the national data sets are integrated into the CARE database in their original national structure and definitions
- For the remaining data, the EC provides and applies a **framework of transformation rules** to the national data sets, allowing CARE to have compatible data
- Common Accident Data Set (CADaS)
   has been developed consisting of a minimum set
   of standardised data elements





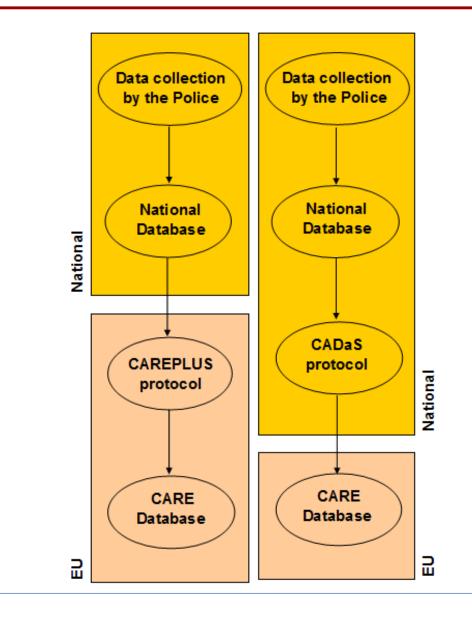
### Data Availability

	1	Not yet	proce	ssed/N	Vot ava	ailable		Loaded (Care format)								Loaded (CADaS format)									Only main figures available									
	AT	BE	BG	СН	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IS	IT	LI	LT	LU	LV	MT	NL	NO	PL	РТ	RO	SE	SI	SK	UK		
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#### Accident Data Transformation Process

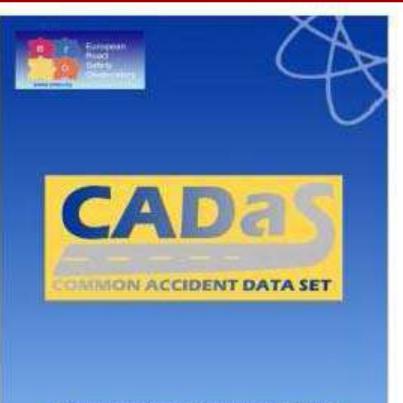
- CARE and CADaS process the national road accident data files
- The **compatibility** of the accident data **among EU countries** is **ensured**
- The main **difference** of the two approaches is related to the **degree of involvement** of the country in the process
- CADaS process allows for more common variables and values but also for higher quality





# Optional Adjustments of the National Systems (1/2)

- EU countries continue using their national accident data collection systems, by collecting data in the way they find it more suitable (manually, electronically, links with other databases, etc.)
- Adjustments are implemented in order to transform data according to the CADaS protocol and provide to EU more compatible data
- Certain variables might need to be collected under a different structure to meet local/regional/national needs



Recommendation for a Common Autodent Data Sel Reference Gode Version 3.0 Dictober 2004



# Optional Adjustments of the National Systems (2/2)

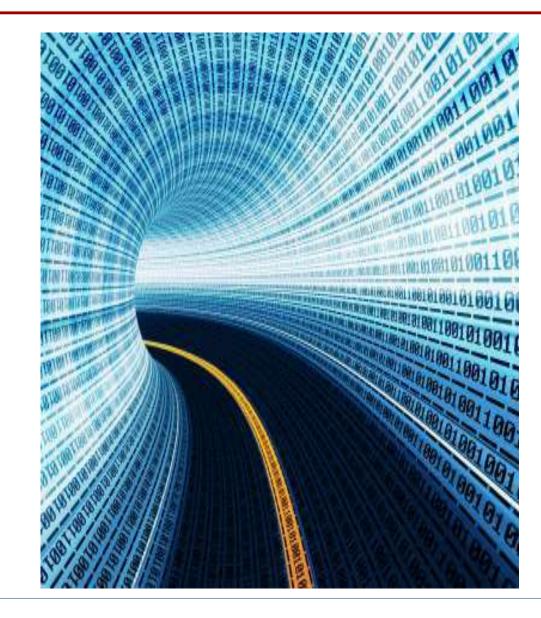
- EU countries are encouraged to adopt as many as possible CADaS variables and values
- CADaS is structured in a simple way, without levels of hierarchy, constituting in fact the record layout of the data set to be transferred to the EU
- CADaS may also be considered as recommendation for national police road accident data collection reports
- CADaS can be further enhanced (derived variables to be added) inside the CARE database allowing for a wide range of analysis reports





# Selection Criteria for CADaS Data

- Variables and values useful for road accident analysis, especially at EU level
- Level of detail of the variables and values appropriate for macroscopic data analyses
- Each country has the possibility to choose alternative level of detail
- Variables and values must be comprehensive and concise
- Data which are impossible or very difficult to be collected are not retained in the CADaS
- The **future perspective** of using certain variables and values is taken into account
- Existing variables and values of CARE v1 are of **first priority** within CADaS
- CADaS variables and values refer to casualty road accidents





### List of Variables

CAREPLUS 1 month hour day of month day of week person class injury severity (person) sex (person) age (person) lighting natural light street light accident severity person type area type vehicle type motorway collision type junction junction type weather

#### CAREPLUS 2

registration country nationality veficle age driving licence age road surface condition region/province speed limit alcohol test psychophysical circumstances alcohol level movement (pedestrian) carriageway type number of lanes manoeuvre (driver) manoeuvre (vehicle) junction control security equipment road markings hit and run



Stergios Mavromatis, "Greek Road Safety Statistics – Best Practices"

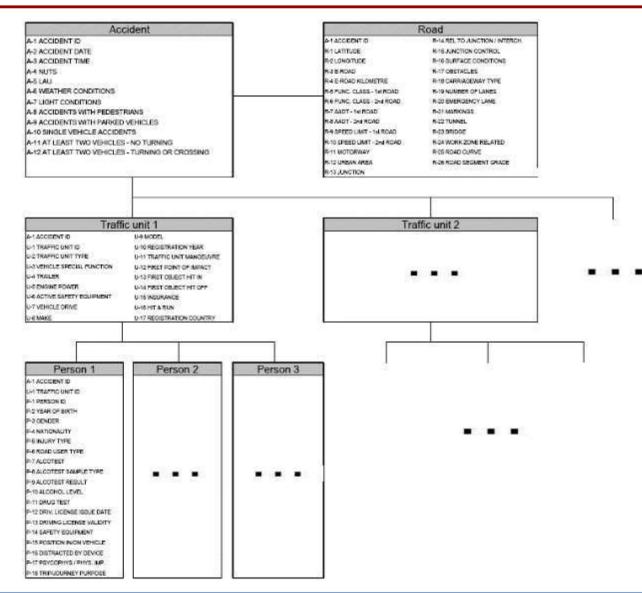
## Variable Categories

- The CADaS variables are divided into 4 basic categories, identified by the unique letter (code) which refers to the beginning of the respective variable's name :
  - A, for Accident related variables,
  - R, for Road related variables,
  - V, for Vehicle related variables,
  - P, for Person related variables





### **CADaS Structure**





Stergios Mavromatis, "Greek Road Safety Statistics – Best Practices"

## Variable Components

### • Variable Label:

- Section identifier (A, R, V or P)
- Numbering and Name
- Variable rating (H or L)

### Variable definition and scope:

- Variable definition
- Brief description
- Importance and usefulness (rational lying behind its selection)
- Values list





## Value Components

### Value Labels:

Each value is further identified by the code of the variable, followed by a number which corresponds to each value and its name

### Value definitions:

Definition of each value is given, indicating also any particularities and any relevant assumptions regarding its collection process

### • Data format :

- The possibility to attribute one or more values to a variable
- The format of the value (number of digits, decimal places etc.)





## Variable Example

#### A-6 WEATHER CONDITIONS (H)

#### Variable definition and scope

This variable defines the atmospheric conditions at the accident location at the time of the accident and allows for the identification of the impact of weather conditions to the road safety.

#### Values

A-6.01 Dry / Clear A-6.02 Rain A-6.03 Snow A-6.04 Fog, Mist, Smoke A-6.05 Sleet, Hail A-6.06 Severe winds A-6.07 Other A-6.99 Unknown

#### Value definitions

A-6.01: Dry / Clear

No hindrance from weather. Includes clear and cloudy sky.

A-6.02: Rain

Heavy or light rain at the time of the accident.

A-6.03: Snow

Snowing at the time of the accident.

A-6.04: Fog, Mist, Smoke

Existence of fog or mist or smoke at the time of the accident.

A-6.05: Sleet, Hail

Existence of sleet or hail at the time of the accident.

A-6.06: Severe winds

Presence of winds deemed to have an adverse affect on driving conditions.

A-6.07: Other

Other atmospheric conditions that affected the drivers or the road environment are not included in the list of the previous values.

A-6.99: Unknown

Atmospheric conditions not recorded or unknown.

#### Data format

A two digit number corresponding to one of the values is filled-in to indicate the weather conditions.

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Stergios Mavromatis, "Greek Road Safety Statistics – Best Practices"

### Classification of the Variables

- At a first stage, each country can adopt (if they wish) only a subset of CADaS variables
- This selection can be based on the importance of the recommended variables
- For that reason, all variables were separated into two broad categories, according to their importance for road accident analysis:
  - Variables of high importance (H)
  - Variables of lower importance (L)





### Summary of CADaS Variables and Values

		Number of variables			Number of values		
Category	Code	High (H) Importance	Lower (L) Importance	Total	Detailed values	Alternative values	Total
Accident	А	7	6	13	91	13	104
Road	R	12	13	25	92	13	105
Traffic Unit	U	8	10	18	181	15	196
Person	Ρ	13	8	21	92	10	102
Total		40	37	77	456	51	507



# European Road Safety Observatory

- The ERSO is the information system of the European Commission with harmonised specialist information on road safety practices and policy in European countries
- The framework of ERSO was developed within the SafetyNet project (2004-2008), in which 22 institutes from 17 countries cooperated
- Its content was updated and expanded within the DaCoTA project (2010-2012), in which 17 institutes participated
- Current updates of the ERSO (2015-2018) are carried out by NTUA, KFV and ERF for the EC DG-MOVE





### DaCoTA Master Tables

- A wide range of data was gathered together in the form of Master Data Tables, which were filled in for each European country for the period 1975-2010
- The Master Tables contain the following data:
  - Road accident data
  - Risk exposure data
  - Safety Performance Indicators
  - Under-reporting of crashes
  - Country characteristics
  - Social Costs
  - Traffic Laws and Measures
- Various data sources were used (European, international, projects)







### The DaCoTA EU Road Safety Project is complete

Traffic crashes have a tragic impact of on peoples' lives and immense consequences on societies. Reducing road casualties is a high priority for the European Commission and National Governments. Over 38,000 road users died in 2008 in Europe alone and a further 1.2 million people were injured, which were estimated as costing over €160 billion for 15 EU countries. It was found that countries performing the best on road safety based their most effective policies on scientific evidencebased knowledge.

The DaCoTA EU Project Team gathered and analysed data from 30 European countries on a wide range of road safety topics. The aim is to share the benefits of this leading-edge research and the decisionmaking tools with the international Road Safety Community in an effort to reduce casualties worldwide through data and knowledge-based policy-making. <u>Read more</u>

Introducing the new website

The DaCoTA Final Project Report is now available

Final report

Executive Summary and recommendations for ERSO

You are also invited to review the

DaCoTA EU Conference



### ERSO Data

### Data included in ERSO (macroscopic and in-depth) concern:

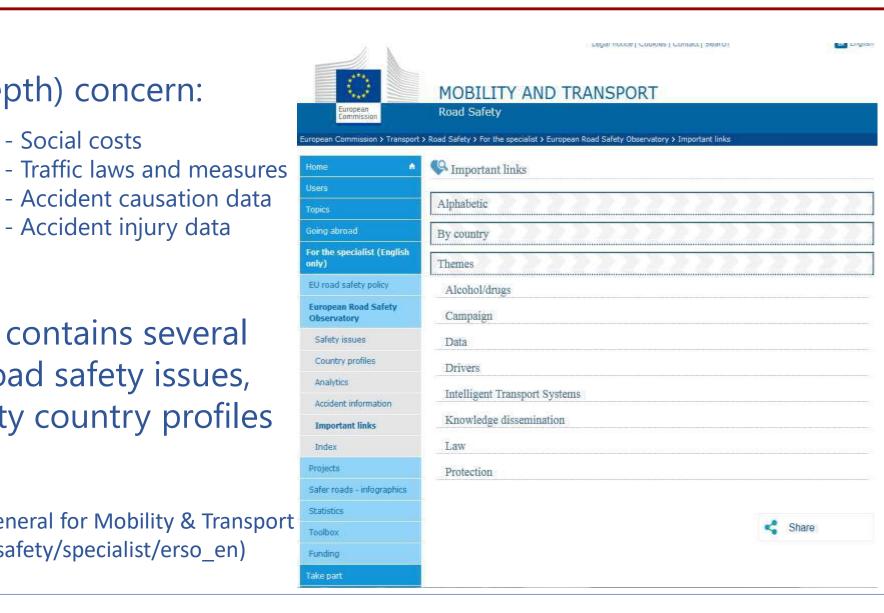
- Road accidents

- Social costs

- Accident injury data

- Risk exposure
- Safety performance indicators Accident causation data
- Under-reporting of accidents
- Country characteristics
- The knowledge section contains several reports on important road safety issues, as well as the road safety country profiles

Current interface of ERSO: European Commission, Directorate - General for Mobility & Transport (https://ec.europa.eu/transport/road safety/specialist/erso en)







Ministry of Transport and Maritime Affairs

**Ministry of Economy** 



### How to achieve Transport- and Trade-related SDGs

# Greek Road Safety Statistics – Best Practices

### Stergios Mavromatis, Katerina Folla, Alexandra Laiou, George Yannis, Panagiotis Papantoniou

National Technical University of Athens



Podgorica, October 2017