Ministry of
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How to achieve Transport- and Trade-related SDGs

Greek Road Safety Statistics – Best Practices

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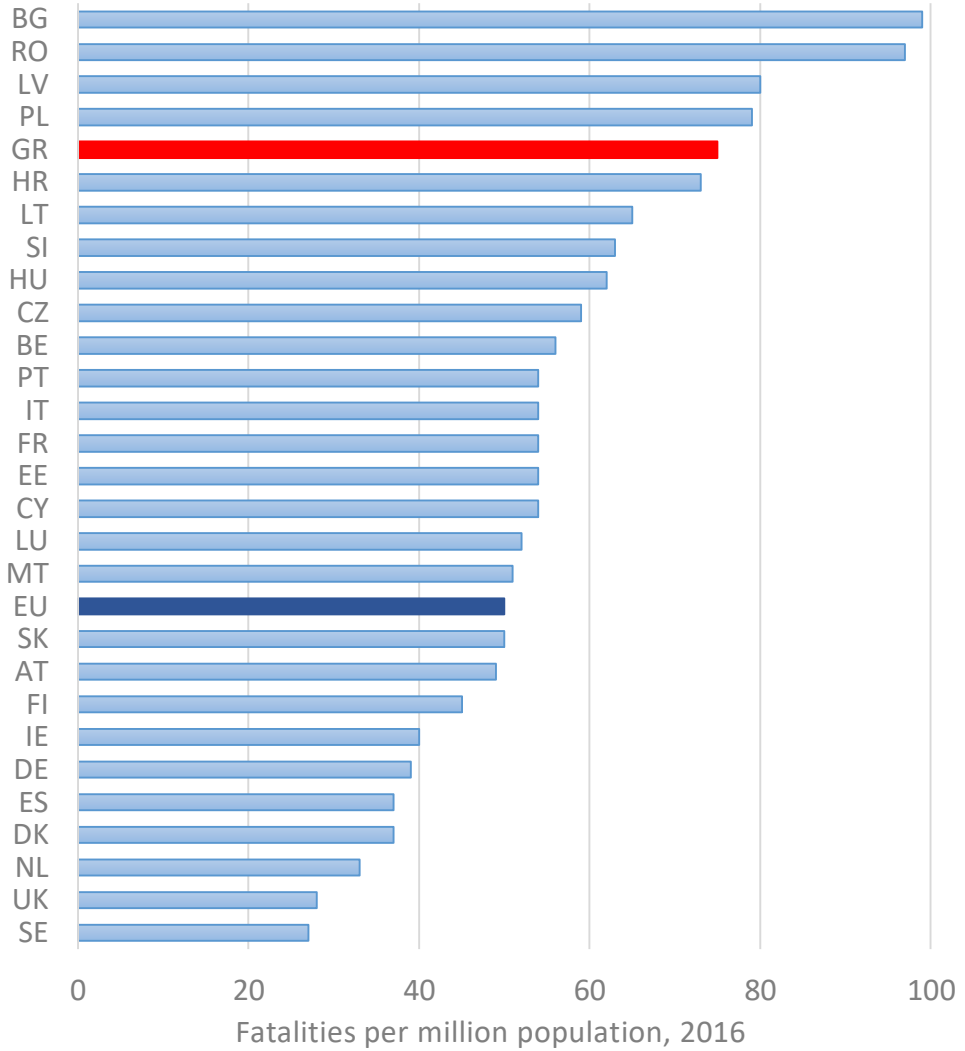
Podgorica, October 2017

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



Source: European Commission

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

Greece 2015

Road fatalities by age, gender, road user type

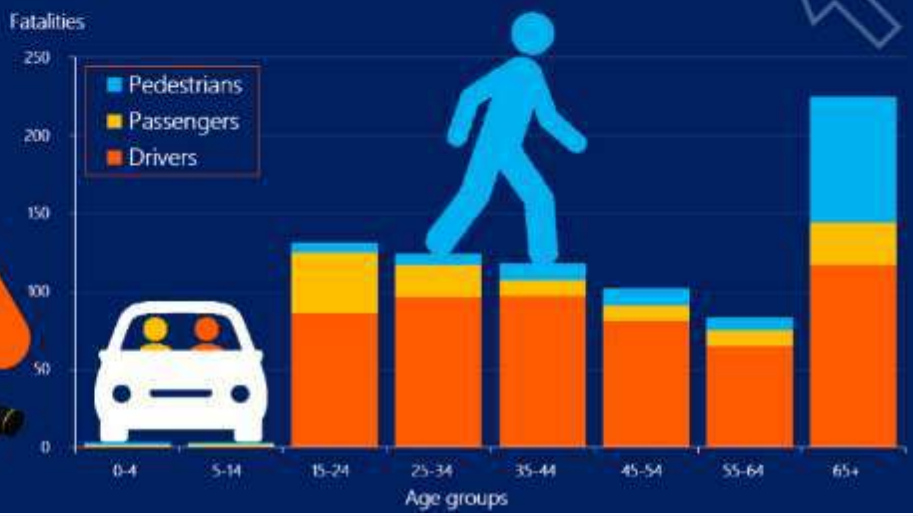
www.nrso.ntua.gr

Age	Drivers Male	Drivers Female	Passengers Male	Passengers Female	Pedestrians Male	Pedestrians Female	Drivers	Passengers	Pedestrians	Male	Female	Total	%	Severity
0-4	0	0	1	0	2	0	0	1	2	3	0	3	0%	2,9
5-14	0	0	0	2	0	1	0	2	1	0	3	3	0%	0,7
15-24	79	7	21	18	3	3	86	39	6	103	28	131	17%	4,4
25-34	86	10	10	11	5	2	96	21	7	101	23	124	16%	2,8
35-44	94	3	4	6	7	4	97	10	11	105	13	118	15%	2,7
45-54	75	6	3	7	6	5	81	10	11	84	18	102	13%	2,8
55-64	63	2	6	4	4	4	65	10	8	73	10	83	10%	3,5
65+	114	3	11	16	53	28	117	27	81	178	47	225	28%	7,6
Uknown	3	0	0	0	1	0	3	0	1	4	0	4	1%	
Total	514	31	56	64	81	47	545	120	128	651	142	793	100%	
%	94%	6%	47%	53%	63%	37%	69%	15%	16%	82%	18%			
Severity	3,5	1,0	5,4	3,6	7,8	4,6	3,1	4,4	6,2	4,0	2,4			

Male drivers aged 15-24 y.o. account for **15%** of male driver fatalities

Male drivers account for **65%** of all road fatalities in Greece

Older pedestrians account for **63%** of pedestrian fatalities



Notes: Severity: fatalities / 100 injury accidents
Issued: April 29th, 2017
About the data: www.nrso.ntua.gr/wp-content/uploads/nrso-data-gr5.pdf
Sources: Hellenic Statistical Authority (ELSTAT)
Processing: NTUA - Road Safety Observatory

Road Fatalities by Area and Road Type

Greece 2015

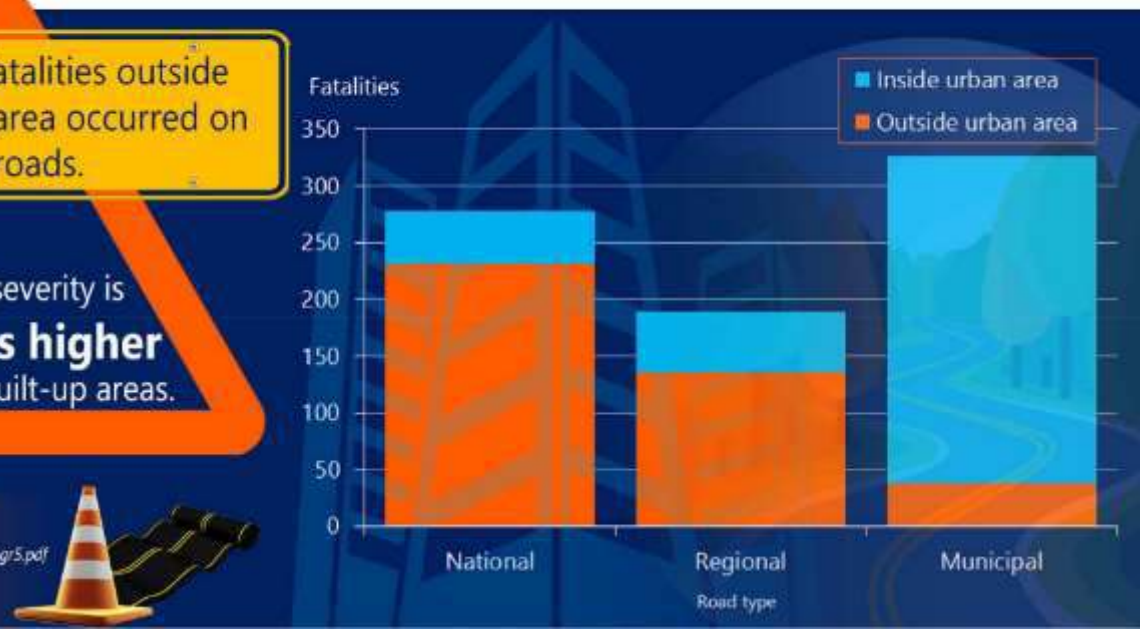
Road fatalities by area and road type

www.nrso.ntua.gr

Road Type	Fatalities						Road accidents						Fatalities per 100 accidents		
	Inside built-up area		Outside built-up area		Total	%	Inside built-up area		Outside built-up area		Total	%	Inside built-up area	Outside built-up area	Total
National	47	12%	231	57%	278	35%	395	4%	1.106	52%	1.501	13%	11,9	20,9	18,5
Regional	53	14%	136	34%	189	24%	430	5%	786	37%	1.216	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	18,9	6,9
%	49%		51%		100%		81%		19%		100%				

57% of road fatalities outside built-up area occurred on national roads.

More than **80%** of road accidents and almost **half of fatalities** occurred inside built-up area. However, accident severity is **5 times higher** outside built-up areas.



Issued: January 23rd, 2017
About the data: www.nrso.ntua.gr/wp-content/uploads/nrso-data-gr5.pdf
Sources: Hellenic Statistical Authority (ELSTAT)
Processing: NTUA - Road Safety Observatory

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

What to Measure?

- Accident Data
- Exposure Data
- Road Safety Performance Indicators

Road Safety Data Collection and Storage

- Importance
- Accident recording
- Data processing and storage

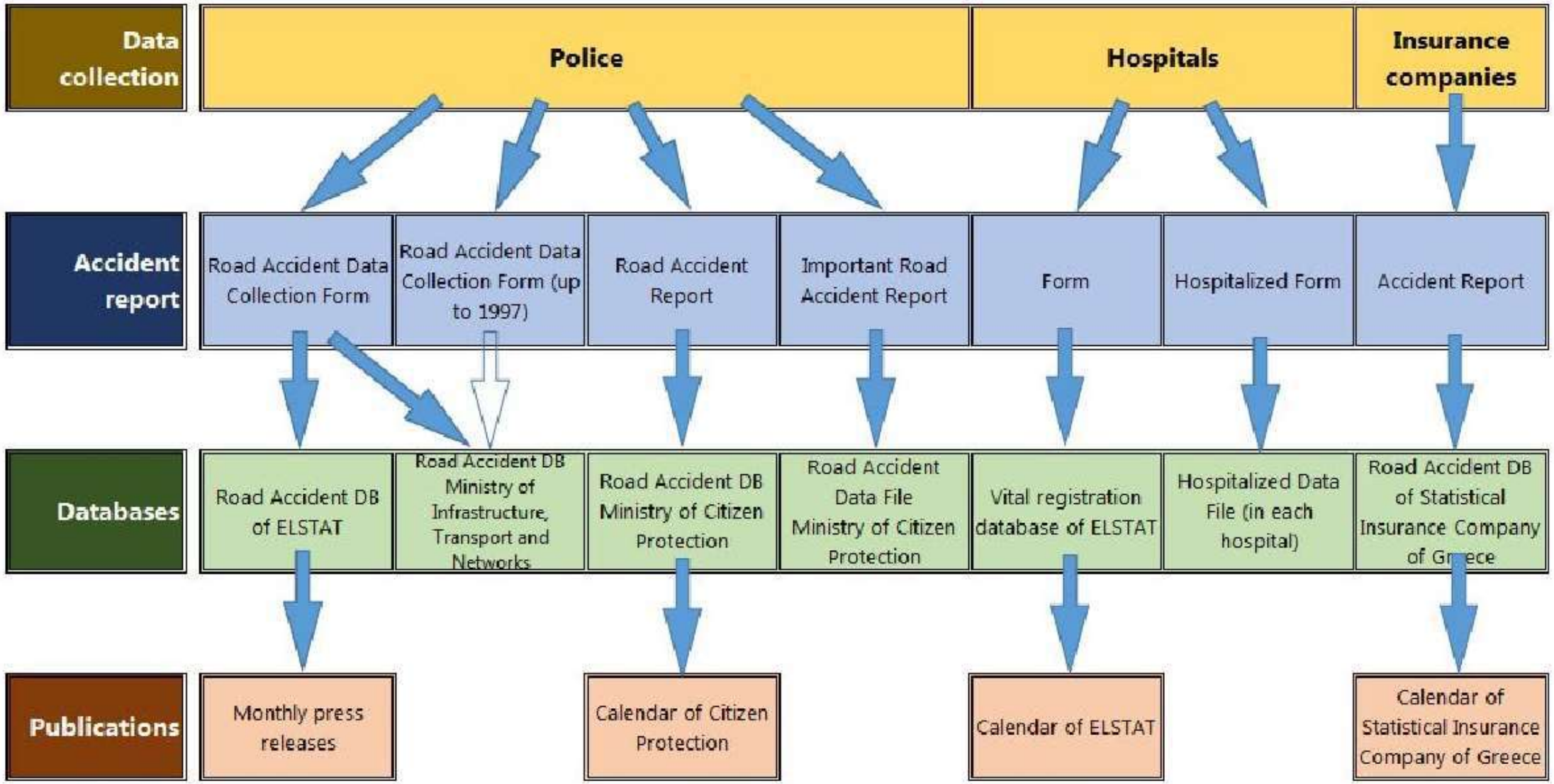
Importance of Road Safety Data Collection and Storage

- 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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– Το περιεχόμενο του προσωπολογίου είναι απαραίτητο και θα χρησιμοποιηθεί αποκλειστικά για στατιστικούς σκοπούς.
– Η παροχή στοιχείων είναι υποχρεωτική (Ν.Δ. 3627/1956, Ν. 2392/1996 και Ν. 3432/2006, άρθρο 30).

STOP ...στα τροχαία ατυχήματα

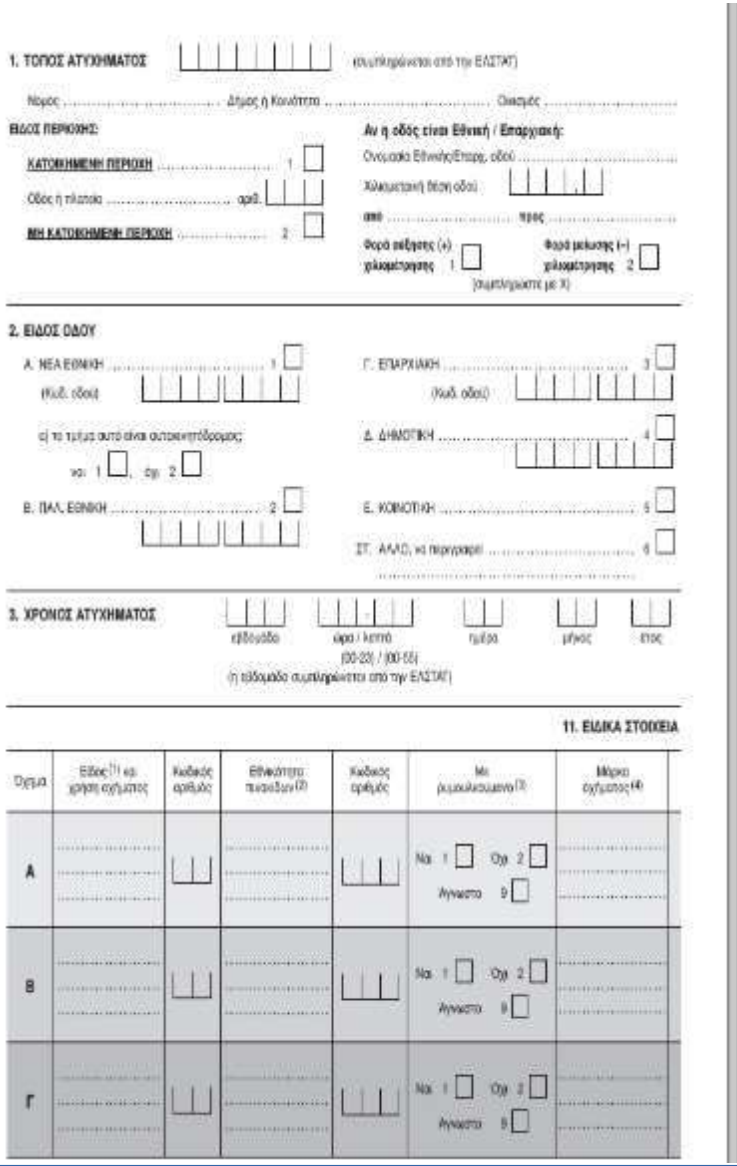
ΔΕΛΤΙΟ
ΟΔΙΚΟΥ ΤΡΟΧΑΙΟΥ ΑΤΥΧΗΜΑΤΟΣ
(για τη συμπλήρωσή του, διαβάστε προσεκτικά τις οδηγίες στο τέλος)

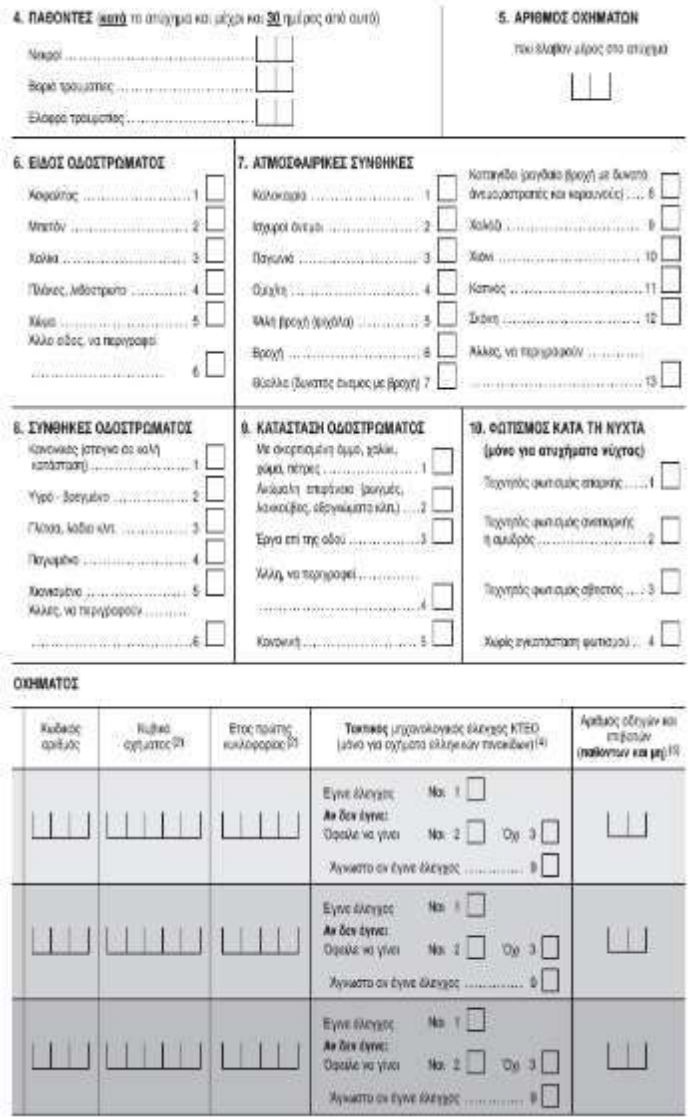
ΝΟΜΟΣ .....
Α/Α ΔΕΛΤΙΩΝ ΔΕΣΜΙΔΑΣ .....
ΑΣΤΥΝΟΜΙΚΗ/ΛΙΜΕΝΙΚΗ ΑΡΧΗ: .....
(στην οποία παραδόθηκε το Δελτίο)
Ονοματεπώνυμο συντάξαντος .....
Βαθμός ..... Τηλέφωνο .....
Ημερομηνία συντάξεως Δελτίου .....
Α/Α Δελτίου στο Νομό
(συμπληρώνεται από την ΕΣΥΕ)

ΠΕΙΡΑΙΑΣ, 2010

Road Accident Data Collection Form (1/3)

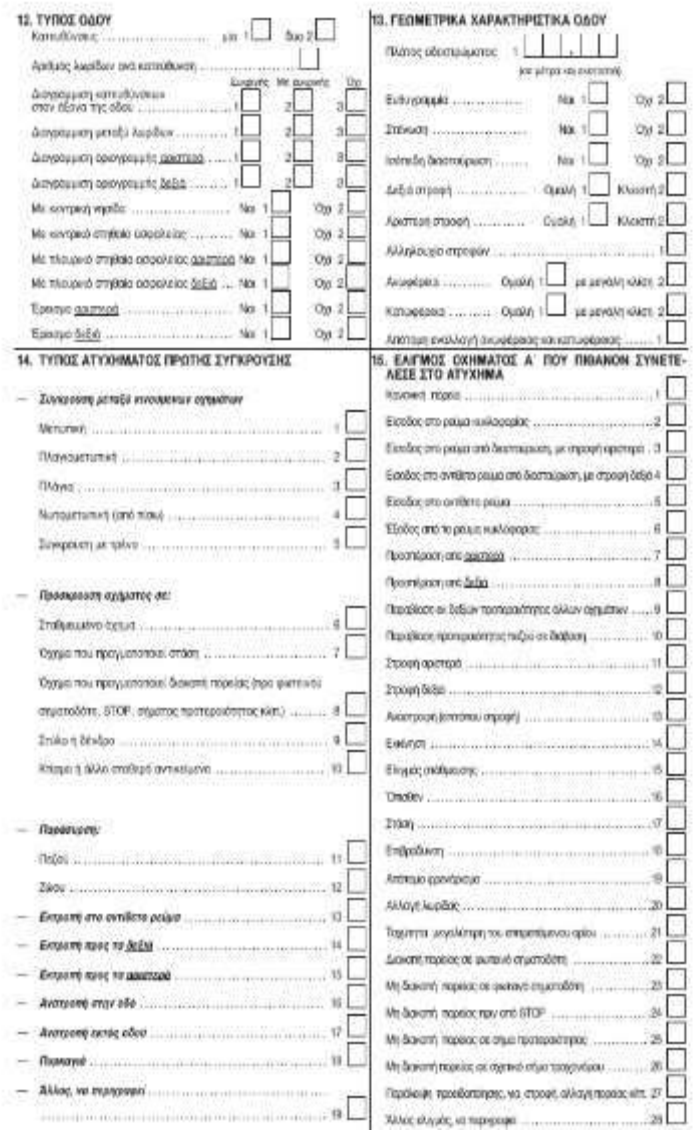
- Type of accident
- Type of area
  (inside/ outside built-up area)
- Type of road
- Time of accident
  (week/ time/ day/ month/ year)
- Injured persons
  (fatally, seriously, slightly)
- Number of vehicles involved
- Type of road surface
- Weather conditions
- Road surface conditions
- Night-lighting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

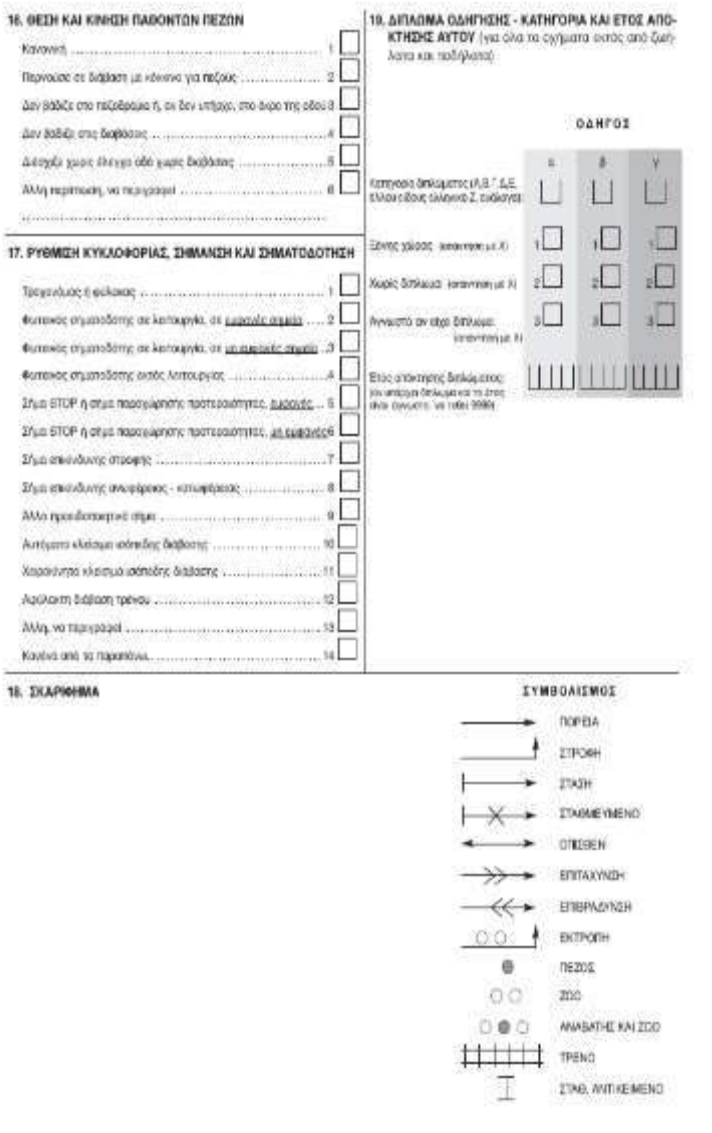




Road Accident Data Collection Form (2/3)

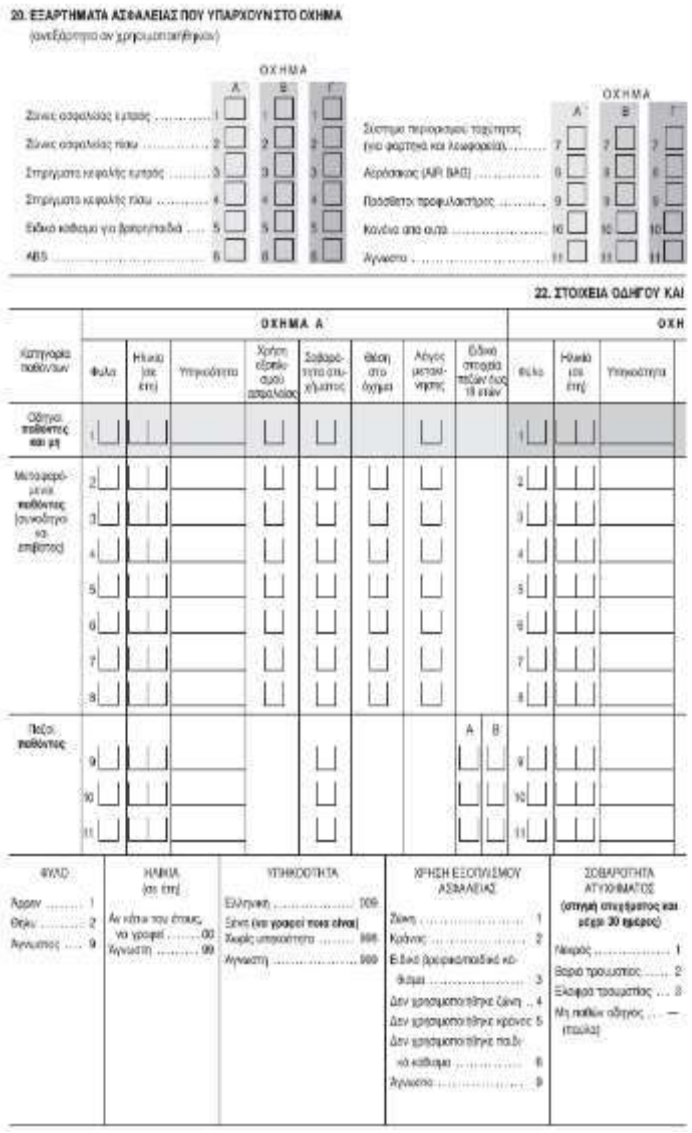
- Road characteristics
- Geometric road characteristics
- Type of accident
- Vehicle maneuver type
- Injured pedestrians' position and movement
- Traffic regulation, signage and signaling
- Driver's license – category and year
- Sketch

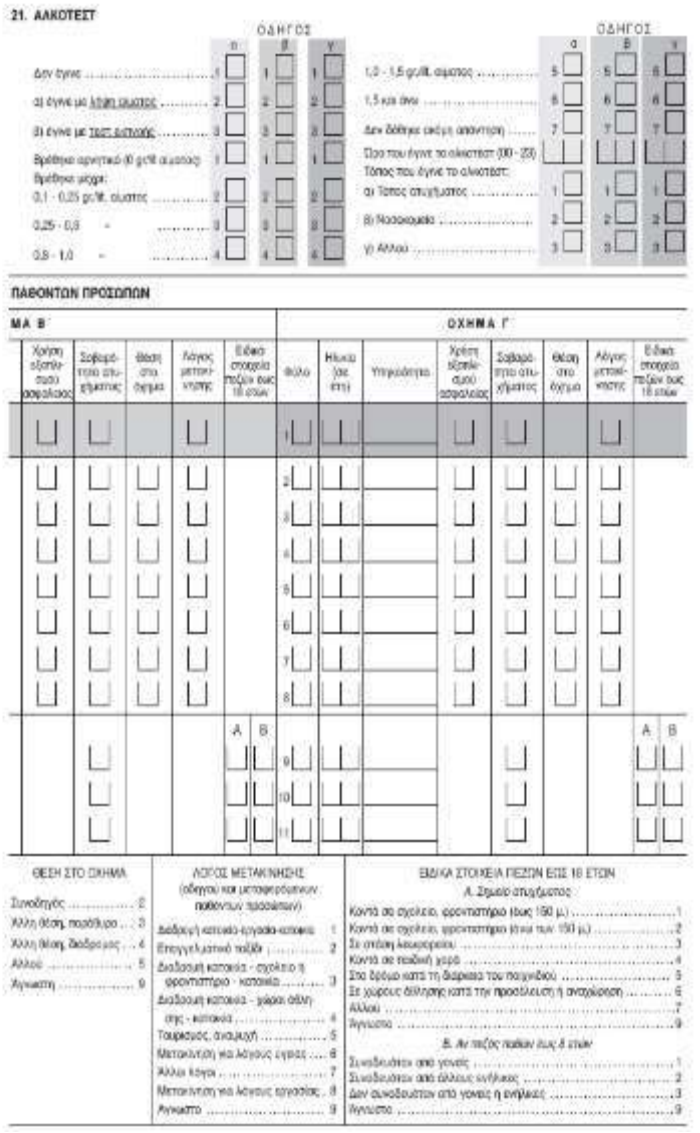




Road Accident Data Collection Form (3/3)

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





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

ΕΝΩΣΗ
ΑΣΦΑΛΙΣΤΙΚΩΝ
ΕΤΑΙΡΙΩΝ
ΕΛΛΑΔΟΣ

Comparison of Data from Different Sources

	Source			Correction Coefficient		
	ELSTAT*	Police*	Hospital*	Police-ELSTAT	Hospitals/ELSTAT	Average
1990	1.737	1.986	2.247	249	1,29	1,20
1991	1.790	2.013	2.246	223	1,25	
1992	1.829	1.995	2.252	166	1,23	
1993	1.830	2.008	1.986	178	1,09	
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	1,15
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	
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

Exposure Data (1/2)

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)

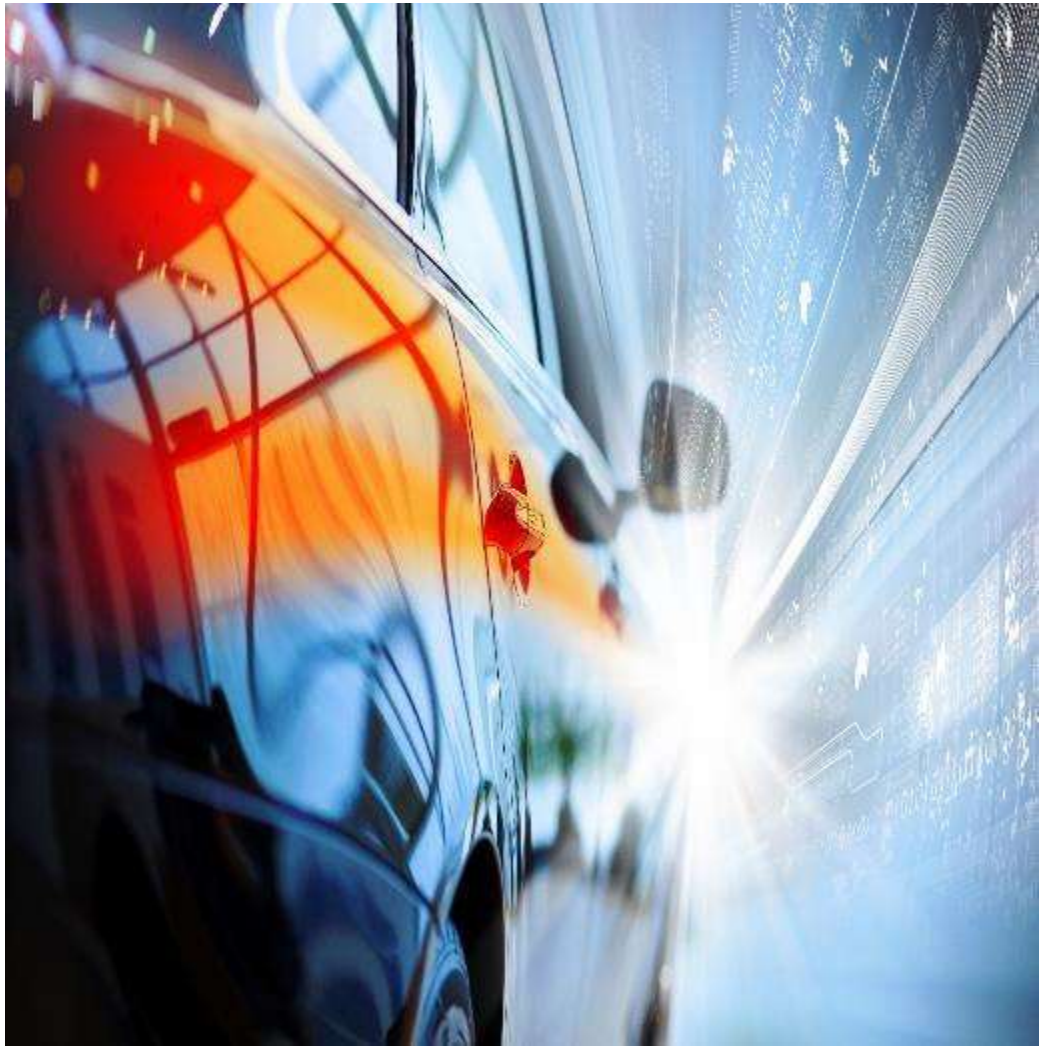
Database of Vehicles in Traffic (Ministry of Infrastructure, Transport and Networks)

- 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**

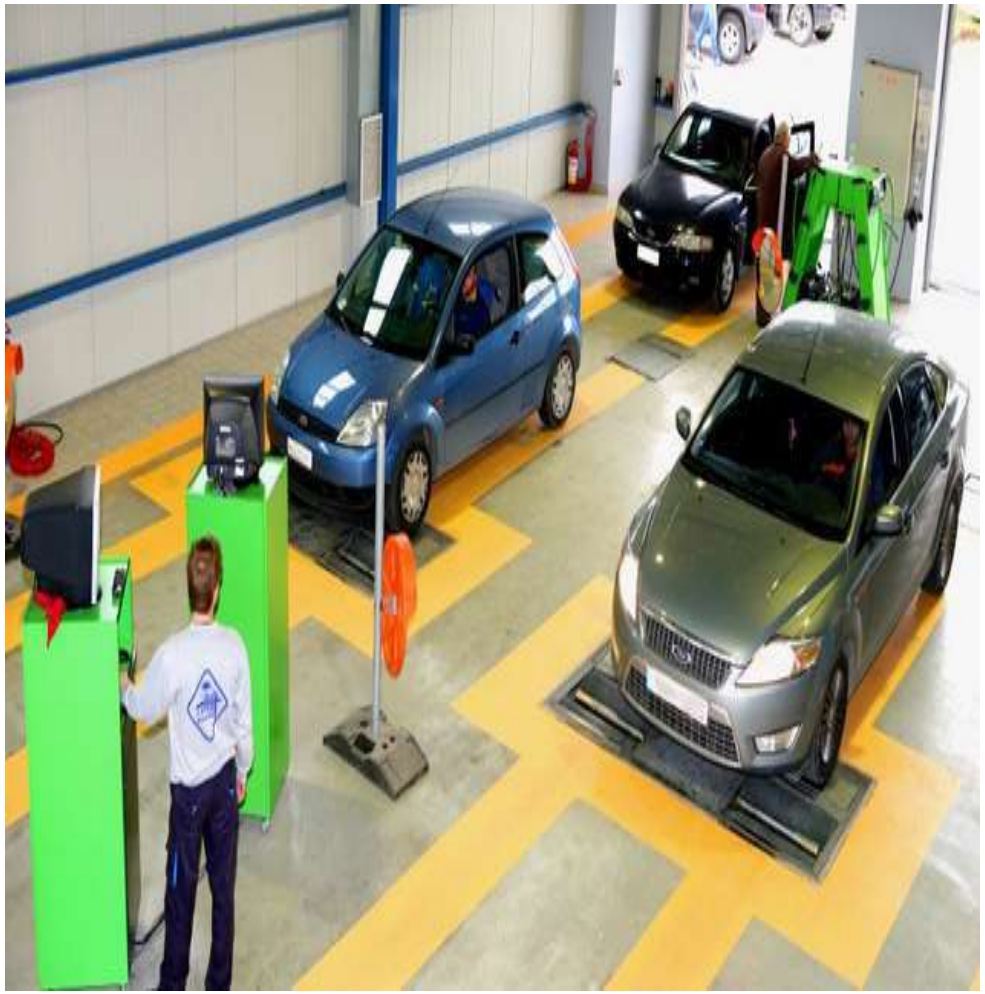
- The **monthly report** provides information, at country level, on the brand and type of the motor vehicle, as well as whether it is new or used
- The **annual data** present the breakdown of vehicles by type of vehicle and by geographical area

- 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 Inspection Data

- **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

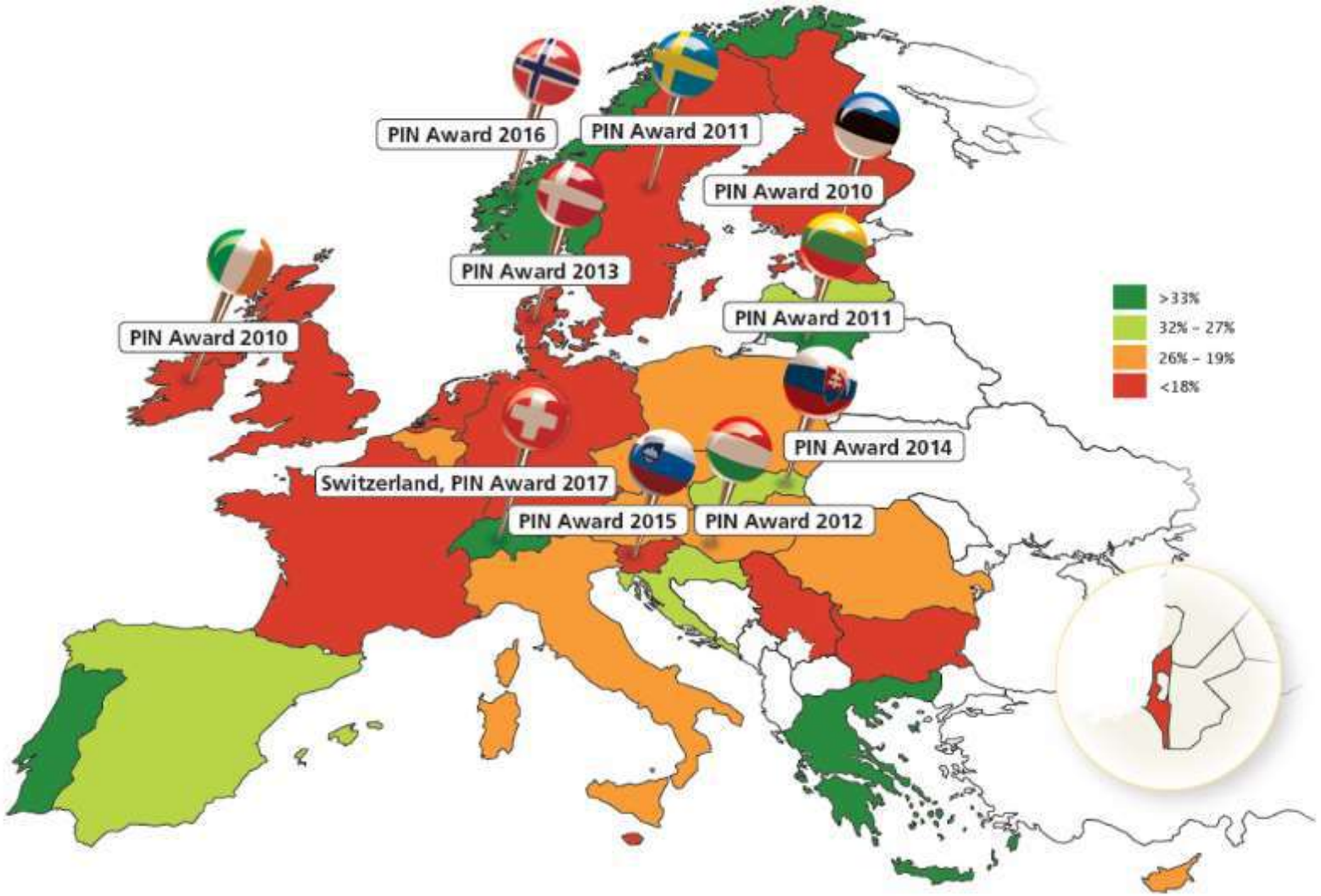
Road Safety Performance Indicators (4/4)

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

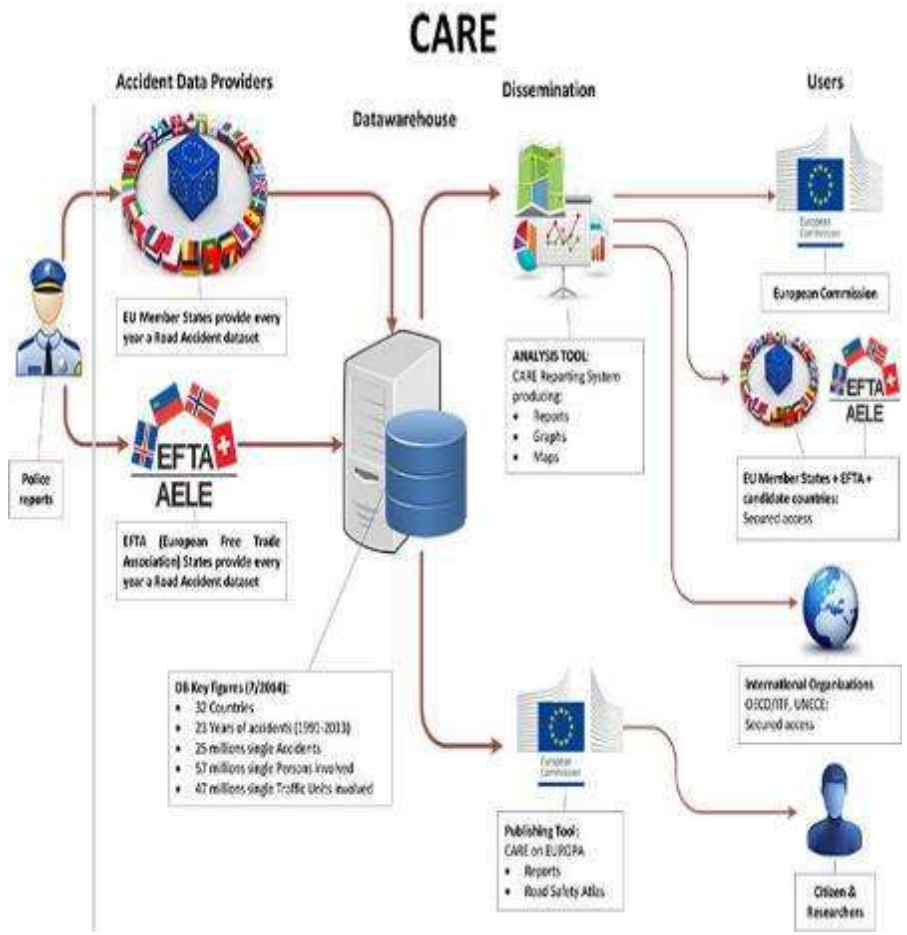
Europe

Reduction in road deaths (%) between 2010 and 2016

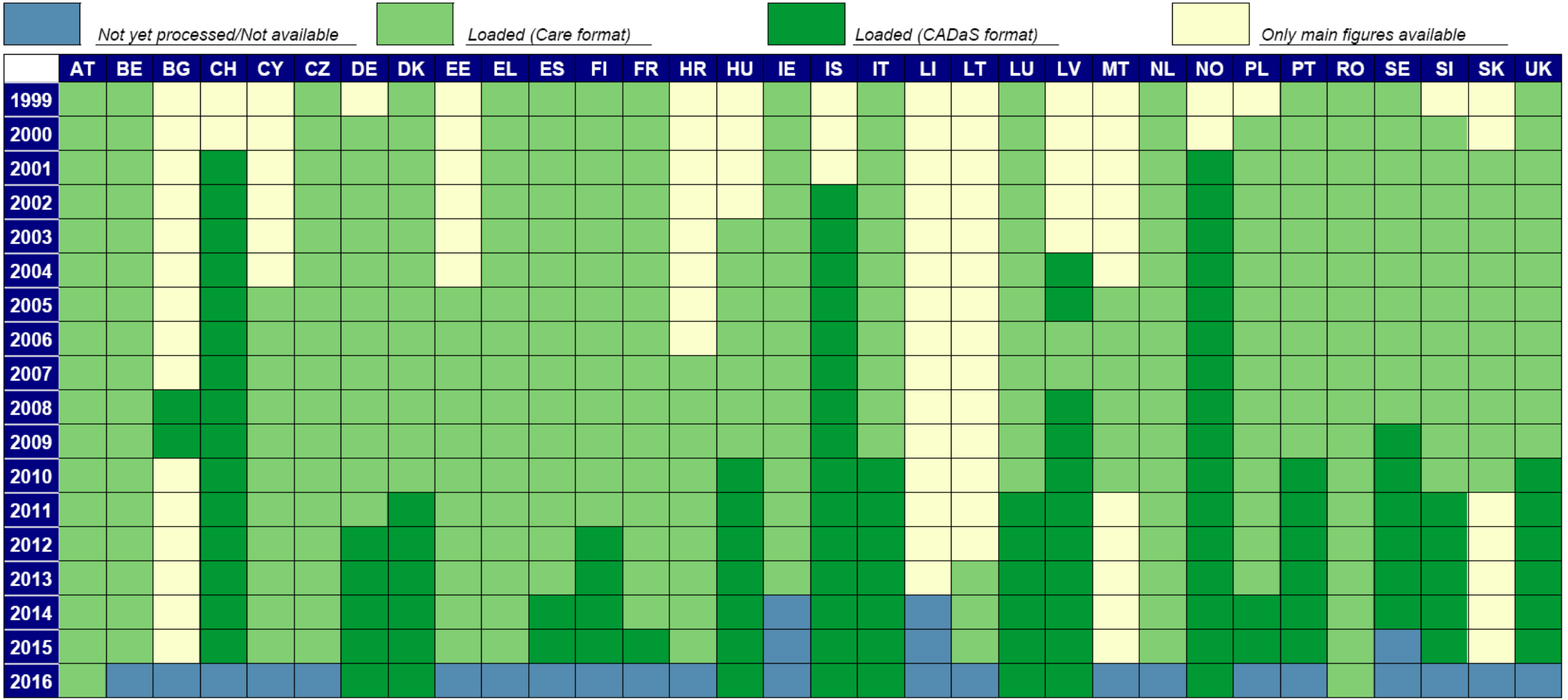


CARE Database

- 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

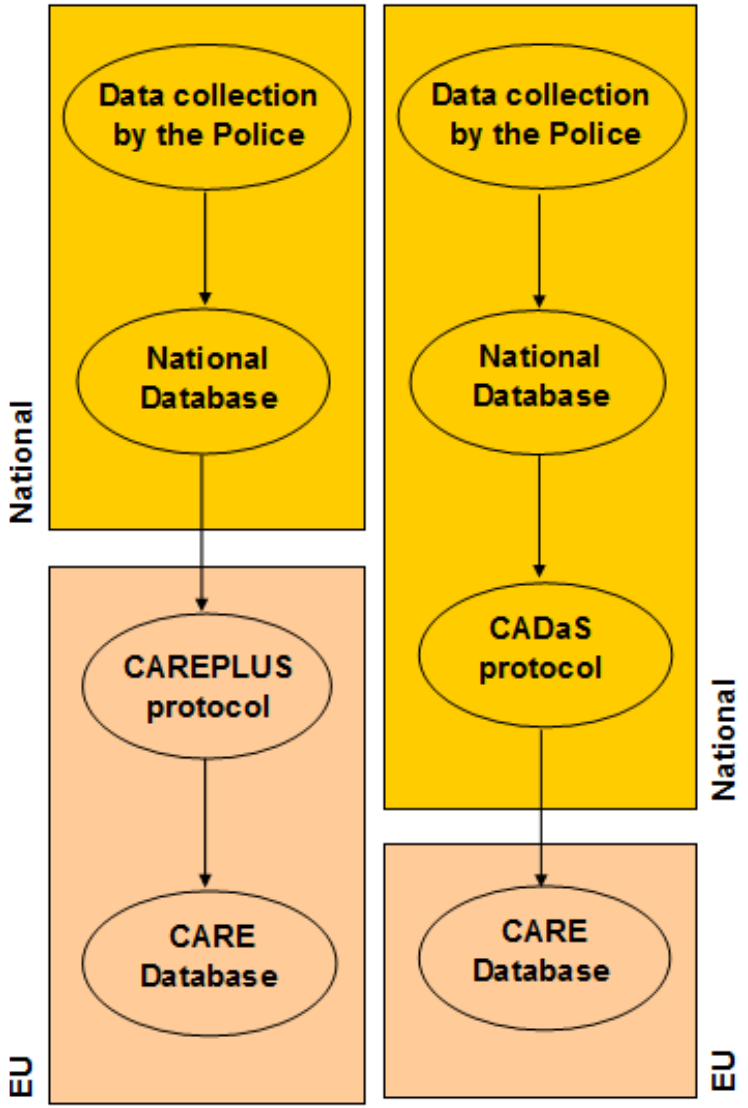


Data Availability



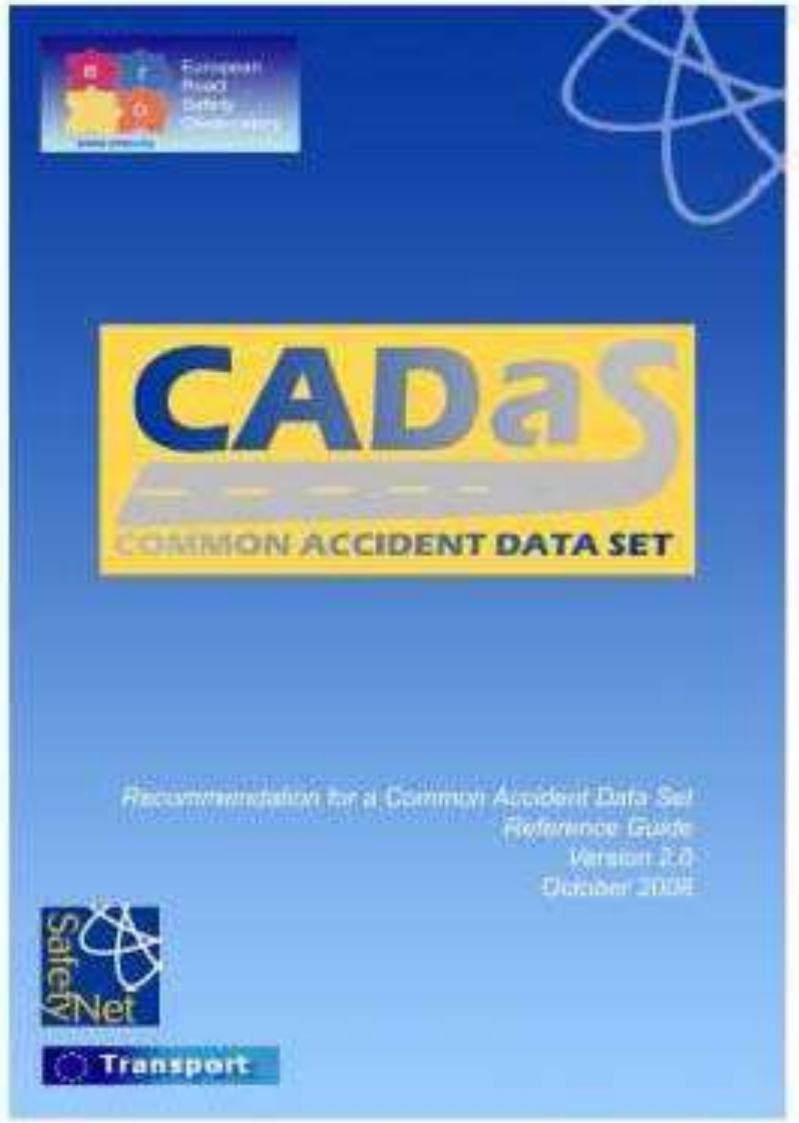
Accident Data Transformation Process

- 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



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**

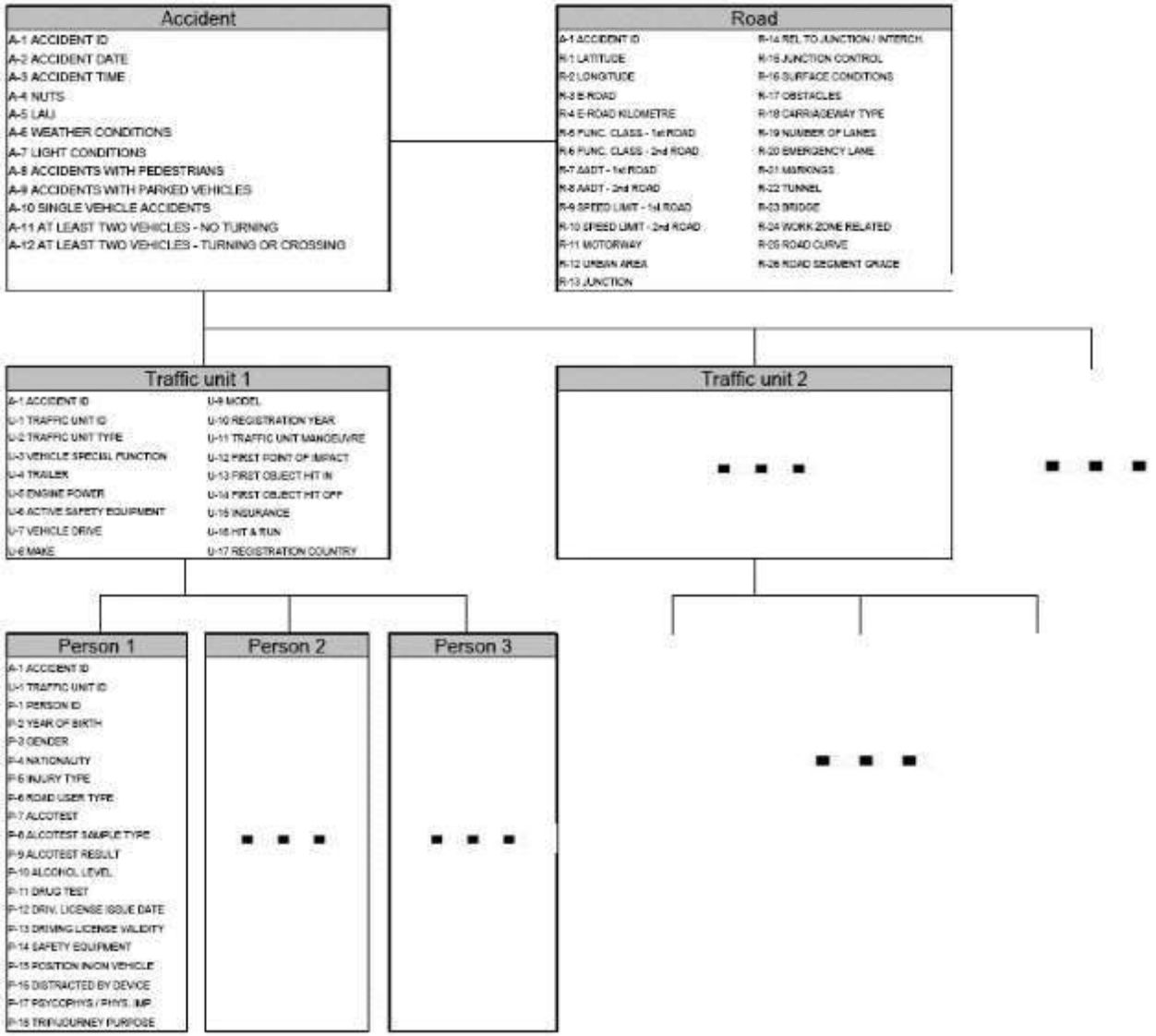
List of Variables

CAREPLUS 1	CAREPLUS 2
month	registration country
hour	nationality
day of month	veficle age
day of week	driving licence age
person class	road surface condition
injury severity (person)	region/province
sex (person)	speed limit
age (person)	alcohol test
lighting	psychophysical circumstances
natural light	alcohol level
street light	movement (pedestrian)
accident severity	carriageway type
person type	number of lanes
area type	manoeuvre (driver)
vehicle type	manoeuvre (vehicle)
motorway	junction control
collision type	security equipment
junction	road markings
junction type	hit and run
weather	

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



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.

Classification of the Variables

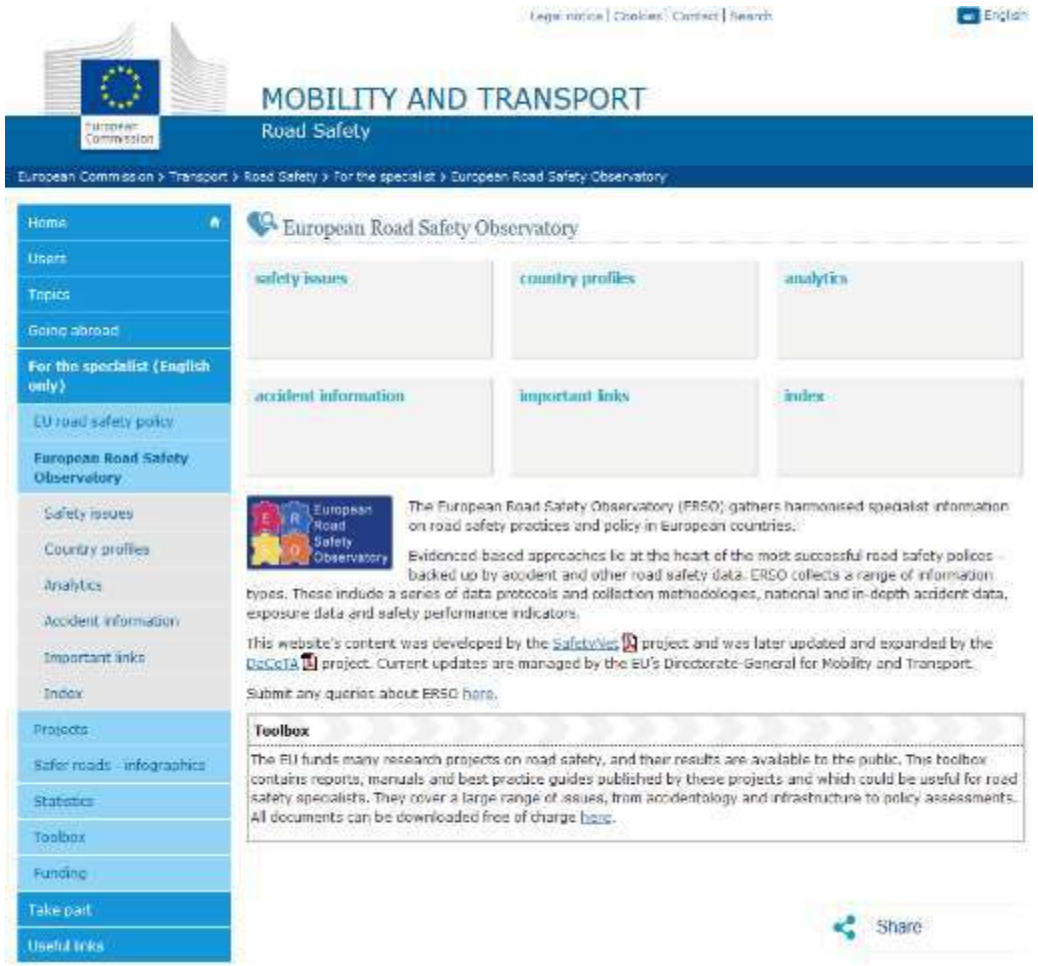
- At a first stage, each country can adopt (if they wish) only a subset of CADaS variables
- This selection can be based on the importance of the recommended variables
- For that reason, all variables were separated into two broad categories, according to their importance for road accident analysis:
  - 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	A	7	6	13	91	13	104
Road	R	12	13	25	92	13	105
Traffic Unit	U	8	10	18	181	15	196
Person	P	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



Current interface of ERSO

DaCoTA Master Tables

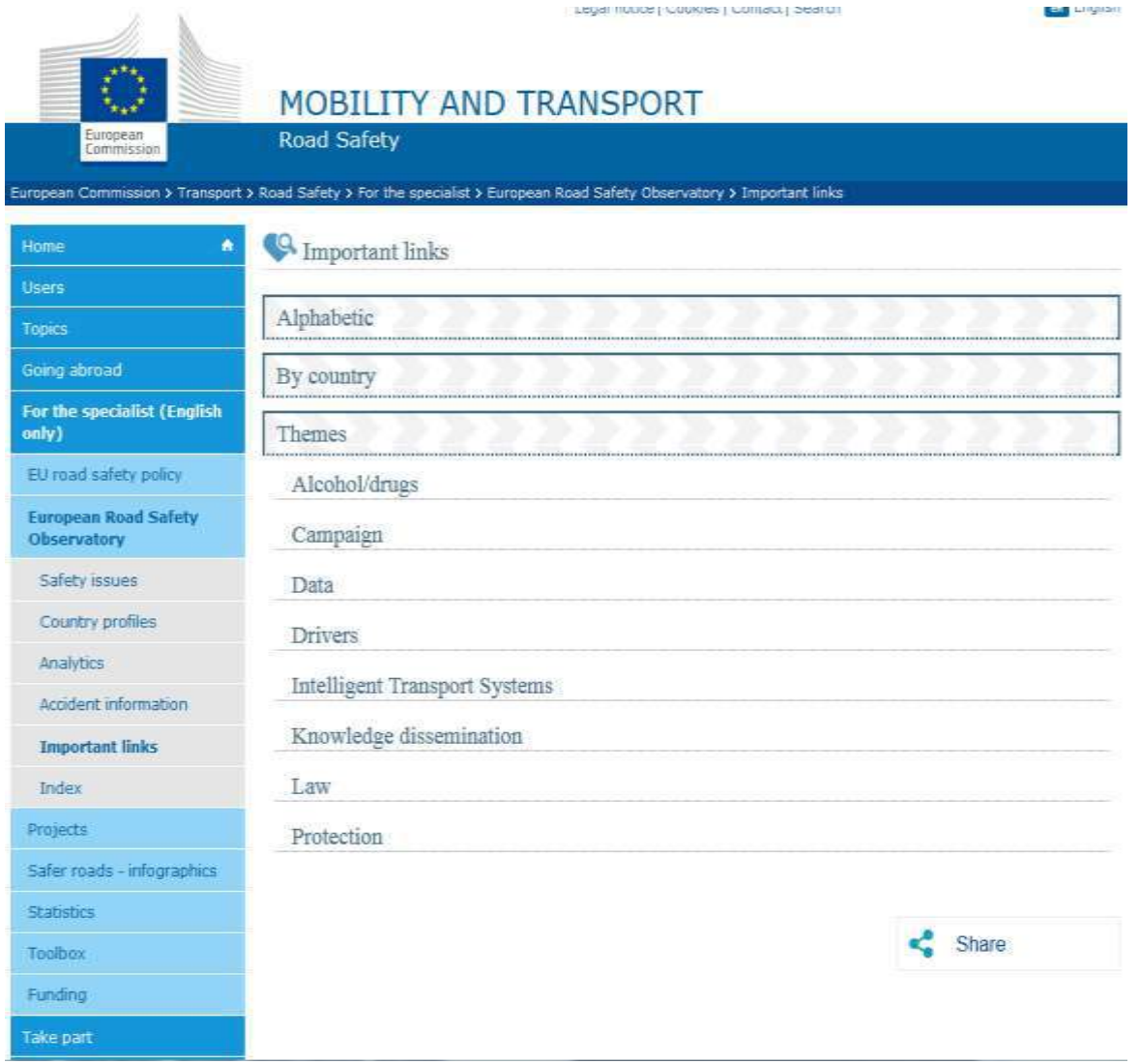
- A wide range of data was gathered together in the form of Master Data Tables, which were filled in for each European country for the period 1975-2010
- The Master Tables contain the following data:
  - Road accident data
  - Risk exposure data
  - Safety Performance Indicators
  - Under-reporting of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

ERSO Data

- Data included in ERSO (macroscopic and in-depth) concern:
  - Road accidents
  - Risk exposure
  - Safety performance indicators
  - Under-reporting of accidents
  - Country characteristics
  - Social costs
  - Traffic laws and measures
  - Accident causation data
  - Accident injury data

- 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

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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