Road Safety Data, Collection, Transfer and Analysis

Deliverable D3.8 “Data Warehouse – Final Report”

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EXECUTIVE SUMMARY

During the last two decades, the systematic efforts for gathering and harmonising road accident data at the European level have led to a significant upgrade and enhancement of the CARE database. Moreover, important data collection and harmonization efforts have provided very useful results as regards exposure data and safety performance indicators; however, the availability, completeness and level of harmonization of this data varies significantly.

At the same time, additional data and related information sources have been established at EU level, including in-depth data, behaviour / attitudes data, programmes and measures data, social cost data etc., mainly in the framework of European research projects. However, these data sources are still not of sufficient comparable quality, are still not sufficiently linked, and the aggregate data are not always accessible. Finally, an important amount of national data remains unexploited at the European level.

Consequently, there is a clear need for the consolidation of the various data (at least at an aggregate level) into an integrated system, a data warehouse. This will allow not only for better integration of the various data assembly processes, but also for the provision of a complete set of data services, with full documentation of the data and their sources, in order to support road safety knowledge and the related decision making. This data warehouse will be developed as a complete working tool for road safety stakeholders, for which not only a full description of the structure, format and content will be designed and specified, but also the related content will be provided, consisting in fact of a new system with road safety related data/information in aggregate form.

The objective of the DaCoTA WP3 is the development of the DaCoTA System, being a road safety data warehouse to be used as a comprehensive and integrated system with aggregate data and information consolidating, organising and making available all existing data and information, necessary for the support of the decision making.

Aggregate road safety data concern road accident data, risk exposure data and road safety performance indicators, but also causation indicators (as those resulting from in-depth data) and health indicators (as those resulting from epidemiological data).

These indicators will be combined with additional information on other important aspects of road safety, as those related to behavioural, social and political aspects. In particular, an integrated approach for supporting road safety decision making needs to include quantitative information on road users' attitudes and behaviour, on road safety measures implemented, rules and programmes (including enforcement), and on their social costs and benefits.

The expected outcome of DaCoTA WP3 is the establishment of a solid but easily accessible, integrated road safety system that will allow for road safety policy and decision making to use a complete set of aggregate road safety related data (road accident data, risk exposure data, safety performance indicators, in-depth data, health indicators/data) and information (programmes, measures, legislation, social cost, behaviours/attitudes, regulations).

During the second and last phase of the DaCoTA WP3, the initially designed Data Warehouse structure, format and content were continuously assessed by the members of the CARE/RSPI Experts Group and the DaCoTA partnership during the entire project life-cycle and by policy-makers and other road safety stakeholders during the DaCoTA project Conference in Athens in November 2012. The Data Warehouse structure and content were finalised according to the feedback and additionally, a final set of national and

international data and information was defined and gathered through appropriate templates, along with the related explanatory meta-data and the related links.

Regarding the output interfaces three new, updated editions of the Annual Statistical Report for 2010, 2011 and 2012 were developed, as well as seventeen (17) Basic Fact Sheets on selected road safety topics. These statistical outputs are enhanced with additional non-CARE data that were gathered and were further included in the data warehouse, either in the form of interactive data (exposure data) or in the form of static data (in-depth accident data, health indicators), the necessary data/information for countries benchmarking and statistical analyses were defined in collaboration with the DaCoTA WP4 (Decision Support) and data/information were provided through the Master Tables to other DaCoTA WPs to conduct analyses (WP1, WP4).

0. INTRODUCTION

0.1 General description of Work Package 3

The objective of the DaCoTA WP3 was the development of a road safety data warehouse as a comprehensive and integrated system with aggregate data and information consolidating, organising and making available all existing data and information, necessary for the support of decision making.

Aggregate road safety data concern road accident data, risk exposure data and road safety performance indicators, but also causation indicators (as those resulting from in-depth data) and health indicators (as those resulting from epidemiological data).

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For the achievement of the DaCoTA WP3 objectives, a methodology of six distinct Tasks was adopted, as it can be seen in Figure 1.

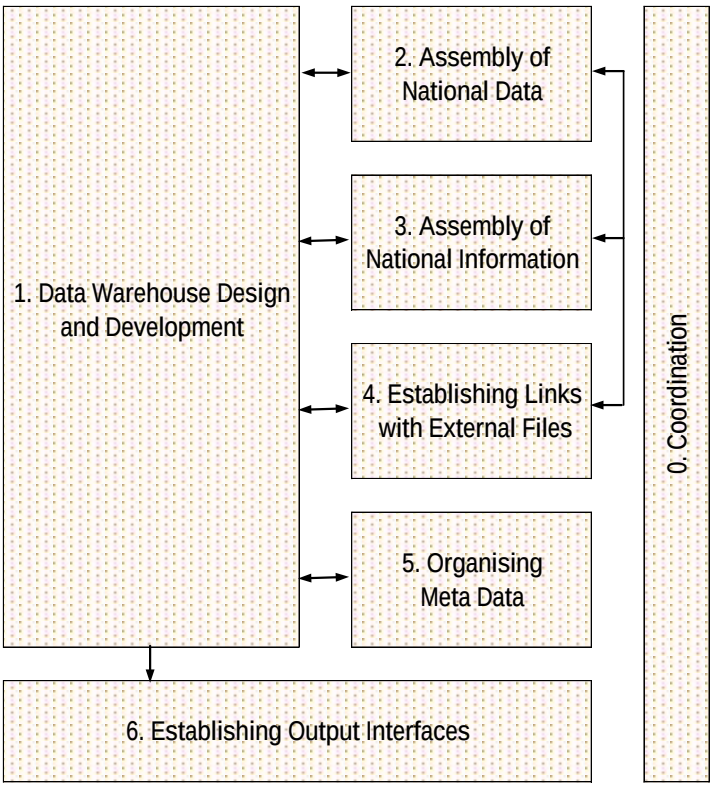

Figure 1: Structure of the DaCoTA WP3 - Data Warehouse

The objective of D3.8 "Data Warehouse – Final Report" is to describe the progress of the work in all DaCoTA WP3 Tasks during the project life-cycle, introduce the concept of the Data Warehouse by providing its structure, format and content, and define the first set of national and international data and information, gathered through appropriate templates, along with the related explanatory meta-data and the related links. Moreover, the new updated editions of the output interfaces (three editions of Annual Statistical Report and 17 Basic Fact Sheets for 2010, 2011 and 2012) are presented.

0.2 Work Package 3 Time – Schedule & Milestones

According to the WP3 working programme and time-schedule, the work in all Tasks was carried out within two phases. During the first phase (months 1-15) the most important milestones concerned the design and the beginning of development of the Data Warehouse, the assembly of a first set of data and information, accompanied with the necessary links and the related meta-data to be the content of the DaCoTA Warehouse, but also the preparation of an updated and enhanced edition of the Annual Statistical Report - 2010, as well as of 17 Basic Fact Sheets - 2010.

During the second phase (months 16-36) of the DaCoTA project the structure and content of the DaCoTA Warehouse were finalised and two more editions for 2011 and 2012 of the Annual Statistical Report and Basic Fact Sheets were prepared.

	Tasks and sub-tasks	Partners	1st Year	2nd Year	3rd Year
WP3	DATA WAREHOUSE	NTUA			
3.0	**Coordination**	**NTUA**	1 2 3 4 5 6 7 8 9 10 11 12	13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32 33 34 35 36
	3.0.1. WP Management	NTUA		■	■
	3.0.2. Links with other WPs	NTUA			
3.1.	**Data Warehouse Design and Development**	**NTUA**			
	3.1.0. Coordination	NTUA			
	3.1.1. System design	NTUA, SWOV, KfV, TRL, INRETS, MTI, DGT, VSRC		■	■
	3.1.2. Development of databases and interfaces	SWOV, NTUA			
3.2.	**Assembly of National Data**	**KfV**			
	3.2.0. Coordination	KfV			
	3.2.1. Assembly of road accident data	NTUA, SWOV, KfV, TRL, INRETS, MTI, DGT			
	3.2.2. Assembly of risk exposure data	KfV, NTUA, SWOV, TRL, INRETS, MTI, DGT			
	3.2.3. Assembly of performance indicators	SWOV, NTUA, KfV, TRL, INRETS, MTI, DGT			
	3.2.4. Assembly of causation indicators	VSRC			
	3.2.5. Assembly of health indicators	KfV, INRETS			
3.3.	**Assembly of National Information**	**TRL**			
	3.3.0. Coordination	TRL			
	3.3.1. Assembly of safety programmes data	KfV, SWOV, INRETS, DGT			
	3.3.2. Assembly of safety measures	NTUA, KfV, MTI			
	3.3.3. Assembly of traffic rules data	MTI, TRL, DGT			
	3.3.4. Assembly of user behaviour/attitude data	SWOV, KfV, INRETS, MTI			
	3.3.5. Assembly of accident cost data	INRETS, NTUA, SWOV			
3.4.	**Establishing Links with External Files**	**SWOV**			
	3.4.0. Coordination	SWOV			
	3.4.1. Establishing links with national data files	KfV, NTUA			
	3.4.2. Establishing links with international data files	NTUA, SWOV, INRETS			
	3.4.3. Establishing links with research project data	SWOV, INRETS			
	3.4.4. Establishing links with stakeholders data	VSRC, SWOV			
3.5.	**Organising Meta Data**	**KfV**			
	3.5.0. Coordination	KfV			
	3.5.1. Development of references system	SWOV, NTUA			
	3.5.2. Managing meta data	KfV, NTUA, SWOV			
3.6.	**Establishing Output Interfaces**	**NTUA**			
	3.6.0. Coordination	NTUA			
	3.6.1. Preparing Annual Statistical Reports	KfV, NTUA, SWOV, TRL		■	■ ■
	3.6.2. Preparing Basic Fact Sheets	TRL, NTUA, SWOV, KfV		■	■ ■

0.3 List of Work Package 3 partners

There are 8 partners involved in the DaCoTA Work Package 3 from 8 different EU countries.

National Technical University of Athens	Greece	NTUA
Institute for Road Safety Research	Netherlands	SWOV
Transport Research Laboratory	United Kingdom	TRL
Kuratorium für Verkehrssicherheit	Austria	KfV
Institut Français des Sciences et Technologies des Transports, de l'Aménagement et des Réseaux	France	IFSTTAR
Transport Safety Research Centre - Loughborough University	United Kingdom	TSRC
Jefatura Central de Tráfico (subcontracting the Research Institute on Traffic and Road Safety - University of Valencia)	Spain	DGT (sub. INTRAS – UVEG)
Instytut Transportu Samochodowego	Poland	ITS

1. DATA WAREHOUSE DESIGN AND DEVELOPMENT

One of the main objectives of DaCoTA is to build a pilot Data Warehouse, or DaCoTA System. The purpose of the DaCoTA Data System is to provide a complete web-based system containing in a structured way specific outputs of DaCoTA WP3 and WP4 (safety issues, country statistics, methods, interactive and static data), which will be gradually transferred into the European Road Safety Observatory (ERSO) of the European Commission (EC). It is a pilot system, in which different types of road safety data and knowledge are included and respective structures are tested, allowing their future exploitation into the EC ERSO system by giving easy access to data, information and tools, and thus supporting the road safety policy making in Europe.

1.1 User groups and general specifications

In general, the DaCoTA system is meant to serve any person who is interested in the data, information and tools that are made available. More specifically, persons using the system will be those interested in road safety related issues, in conducting their own analysis on basis of this data, or in comparing the performance of countries to determine what can be done to improve road safety. For those users who want to do their own analysis, it means that a certain level of knowledge of the quality and analyses of road safety data and tools is required. It is therefore expected that the users of the DaCoTA system will consist of the following groups:

- policy makers (particularly use of general information and country information);
- researchers (particularly use of data for new analyses);
- press (both data types).

Based on the stated objectives and the target groups, the DaCoTA system should meet several specifications:

- the data should be easily accessible;
- the data should be as interactive as possible.

1.2 Content of the DaCoTA System

The DaCoTA System will contain the following issues:

- Safety issues
- Countries
- Statistics
- Methods
- Links

1.2.1 Safety issues

The safety issues part is the knowledge base meant for the European Road Safety Observatory of the European Commission. On this part of the website, the visitor can find high quality information on important road safety issues in the form of webtexts. The information is scientifically founded, easy to read and ready to use. For each of the subject treated, the information consists of an overview of the magnitude of the problem, prevalence and countermeasures. The subjects are broadly related to Age groups, Road users, Hazardous behaviour, Post crash, Road safety measures and Policy issues..

1.2.2 Countries

To help policy makers and researchers to have a good view of the road safety state of European countries, a number of country tools have been developed within DaCoTA.

More information about the road safety state of a country, including costs, SPI's, measures, culture and context can be found in the country overviews. The composite indices are developed to summarise the road safety state of all European countries and make them comparable. Furthermore, this section contains forecasts for each European country and for Europe as a whole.

- Country overviews

Country reports, giving the most actual situation of a country, comprising basic data, road safety measures, safety performance indicators, road safety figures and social costs related to road safety. The information follows the five levels of the road safety pyramid.

- Forecasts per country

For road safety policy, it is important to know in what direction the annual casualties are developing, and how fast this development is expected to go. Within DaCoTA, forecasts are made for all 30 European countries, with exposure as most important explaining variable. Forecasts of the road safety situation in every country, including a description of the method adopted to produce these forecasts.

- Composite index per country

Comparing the road safety performance of one country with that of other countries can be very interesting and stimulating. Within DaCoTA, a road safety performance index is formulated in order to allow for comparison and benchmarking.

1.2.3 Statistics

The statistics part contains road safety related data and important information on what to do with crash data. The data is organised either as part of an interactive data browsing tool (e.g. crash and exposure data) or as static data (ASR BFS, data about Safety Performance Indicators and driver behavior/attitude).

Interactive data browsing tool contains for the time being crash data and exposure data.

while static data contain:

- Annual statistical reports

- Basic fact sheets

- Data about performance indicators

- Data about Attitudes and self-reported behaviour

For more information on Statistics see Deliverable D3.7 “Design and development of the road safety data warehouse – Final Report” and visit the following website: http://safetyknowsys.swov.nl.

1.2.4 Methods

To get high quality data, information and well-structured tools, for each road safety product included in the DaCoTA pilot System a respective methodology has been developed and is described. More specifically, the procedures of gathering safety issues and collecting information for the country tools are presented, as well as the procedure for collecting statistics and the related information (meta-data) and in-depth accident investigation.

1.2.5 Links

The links to external files is a copy and update of the links available on the ERSO website, using initially input from the DaCoTA partners. The main objective was to gather, link and standardise road safety data as well as other sources. This should enhance the exploitation for decision making in a reliable and integrated way. The best way to deliver this type of information is by providing reciprocal web links. The type of information that can be disclosed includes:

- National data files
- International data files
- Research project links
- Stakeholder links

A short description is provided with each link to give the user an idea about its content. It should be noted though that the reliability of the information can only be assured as far as it concerns the work of the DaCoTA partners and not links to other sources.

The updated list includes links to:

- National and international databases;
- Governments, institutes and other organisations relevant to road safety;
- Road safety project websites throughout Europe.

The list includes the link to the website, a brief description of the organisation, project or database. Also the country and the type of link are specified and can be used to search.

Some general, worldwide road safety related information is also included in the list.

Links to governmental departments responsible for traffic and transport (e.g. the Austrian Ministry for Traffic, Innovation and Technology) are also part of the list, as well as many active road safety research institutes (i.e. VTI) and organisations such as operation and support institutes (i.e. CROW) or public authorities (i.e. FIA foundation). These links lead to more information about road safety programmes, strategies and measures.

Finally, links to specific road safety projects are included in the pilot system. These projects can be directed at:

- Governments and policy makers (e.g. CAST Campaigns and awareness-raising strategies program)
- Road safety professionals in general (e.g. ROSEBUD)
- Public (e.g. EuroNCAP)

More than 400 links are organised in several user-friendly ways, allowing the users to search for the information/data they need by:

Alphabetic order

Country

Focus (each divided by sub-categories)

Organisation

1.4 Functionalities of the Data Browser Tool

It should be immediately clear which data are available through the Data Browser Tool. In the current DaCoTA system crash data and exposure data are available in an interactive form. Once the user has arrived at the desired table (e.g. crash data), he/she is able to query the table i.e., to choose which of the variables in that table he/she wants to see (for example the type of crash, the month, the number of involved vehicles). It is also easy to change the selection of variables and to go back to the main page (list of available tables).

1.5 Process and current state

The general features of the DaCoTA system in particular have been worked out based on the functional specifications that have been defined within WP4 (D4.3). These functional specifications have been defined in consultation with the CARE experts.

The type of software that is used to design the interface has been the object of substantial discussions with the European Commission. Some possible interfaces have been examined (i.e. PC-AXIS), however, it has finally been decided that Cognos PowerPlay (not compatible with the current EC software) will be used. This is IBM software that allows the user to browse large amounts of data through a web-interface. This tool was selected because it is the only choice that allows the project partners to develop a full-fledged data browser tool within the budget and the time available in the project. The Cognos PowerPlay software was used only in the framework of the DaCoTA project for the development of the DaCoTA pilot system and consequently the European Road Safety Observatory (ERSO) will on one hand exploit the experience of the development of this pilot system (structure, features, etc.) and on the other hand will acquire all data and knowledge contained in this pilot system to be incorporated at the ERSO under the ERSO structure and functionalities (web intelligence).

The DaCoTA pilot System can now be used as a point for discussing the usefulness of such tool and the wish to have it elaborated further into a full-grown ERSO-tool with the EC. The further development of the system can take place at a later stage, outside the DaCoTA project life-cycle.

2. ASSEMBLY OF NATIONAL DATA

This Task deals with making an assembly and standardising additional available national data to be incorporated in the DaCoTA system. Within this framework, road accident data are less examined, as they are already processed in CARE, and efforts focus on gathering additional risk exposure data and performance indicators, but also health and causation indicators, through the related national sources. In particular, the Task can be is distinguished in the following sub-Tasks:

2.1. Assembly of road accident data

2.2. Assembly of risk exposure data

2.3. Assembly of performance indicators

2.4. Assembly of causation indicators

2.5. Assembly of health indicators

2.6. Assembly of other data

All necessary national data available were gathered through the international sources (EUROSTAT, IRTAD, CARE, WHO, etc) and research projects and were included in the Master Tables, along with selected parts of national information. These selected elements of the Master Tables were further verified and filled-in when necessary by national representatives of the European countries, mainly being part of the CARE and RSPI Experts Groups. The role of the CARE and RSPI National Experts or any other road safety related Working Group, established and operating under the coordination of the European Commission was essential for the successful execution of this work, as the national representatives enabled full exploitation of the available data, information and related sources at national and regional level for all EU Member States.

2.1 Assembly of road accident data

Within the framework of the DaCoTA project, an assembly of the available road accident data across European countries was attempted, in order to identify those that are appropriate for incorporation into the DaCoTA system. However, road accident data are already harmonised at the European level through CARE, the Community database with road accident data at disaggregated level, and road accident variables and values collected from all EU countries using a uniform protocol. Thus, the CARE accident data (especially road accident fatalities and fatal accidents) are compatible and comparable among all EU countries.

Within the DaCoTA project a list of 73 road accident elements based on existing CARE variables and values was developed. The main criteria for the selection of these basic figures were that the combined variables and values must be useful for macroscopic road accident analysis at EU level, but also that they are available and reliable in all EU countries.

More specifically, this set comprises of the following basic figures regarding number of persons killed: total figures, pedestrians killed, total vehicle occupants killed by vehicle age group, passenger car occupants killed by vehicle age group, motorcyclists killed by vehicle age group, moped riders killed, cyclists killed, buses or coaches occupants killed, lorries or trucks occupants killed, killed in accidents with HGV, females killed by age group, male killed by age group, young drivers killed (18-24), young riders killed (15-24),

older drivers killed (65+), children killed (0-14), men drivers killed, women drivers killed, non national drivers killed, non national riders killed, inside built up areas, in junctions, outside built up areas, on motorways, when raining, during daylight, during night-time, killed in single vehicle accidents, killed in alcohol related accidents.

The related template, which is filled-in with data for 29 European countries, is available in Appendix 1 of this Report.

2.2 Assembly of risk exposure data

A first assembly of risk exposure data took place in order to identify those that are appropriate at this stage to be incorporated into the DaCoTA system. EUROSTAT was the main source for the selection of all risk exposure data and data from IRTAD was used to fill-in any missing values, or values that were not correct. The data are prepared in two ways:

- in a most disaggregated Excel table with the original EUROSTAT structure (i.e. columns and labels) ready to be for imported in the DaCoTA system, including a standard meta-data sheet and label definitions at least up from year 1999.
- a pivot table based on these data, allowing to easily extract the different output tables necessary for Task 3.6 – Establishing output interfaces.

Finally, a list of 97 risk-exposure elements was developed and included in the Master Tables: Population by age group, vehicle fleet by vehicle type and vehicle age, person-kilometers by vehicle type, vehicle-kilometers by vehicle type, vehicle-kilometers by road class, ton-kilometers, road length by road type, traffic per road type, economic and social indicators such as GDP, unemployment rate, fuel and alcohol consumption, etc.

The related Tables filled-in with data for 29 European countries, are available in Appendix 1 of this Report.

2.3 Assembly of performance indicators

2.3.1 General

Safety performance indicators (SPI) are the measures (indicators), reflecting those operational conditions of the road traffic system, which influence the system's safety performance (Hakkert, A.S, Gitelman, V. and Vis, M.A. (Eds.), 2007). The purpose of safety performance indicators is:

- to reflect the current safety conditions of a road traffic system;
- to measure the influence of various safety interventions;
- to compare between different road traffic systems (e.g. countries, regions, etcetera).

Following the recommendations of the ETSC report "Transport Safety Performance Indicators" (2001), seven problem areas were selected in SafetyNet (Hakkert, A.S, Gitelman, V. and Vis, M.A. (Eds.), 2007). They are:

- Alcohol and drug-use
- Speeds
- Protection systems;
- Daytime running lights (DRL)
- Vehicles
- Roads
- Trauma management

SPI data on these topics have been collected within the SafetyNet project WP3 [see Vis & Van Gent (2007) and Vis & Eksler (2008)] to an adequate extent, for different years and as homogenised as possible between countries. These reports mainly contain data from 2006 and 2007 and sometimes earlier years if information of these years is not available. The update of these data will take place at a later stage, not within the DaCoTA project, as it is a very time-consuming process.

2.3.2 SPIs in the DaCoTA system

This paragraph describes the data that could be exploited within the DaCoTA system as SPIs and the data that are currently available and can be included in the system:

2.3.2.1 Alcohol and drugs use

No systematic information is available in EU countries on drugs' use in traffic. This may change in the future with the developments of legal drugs enforcement.

The data available on alcohol use widely differ across countries. In some countries, like England, road-side checks are prohibited. Therefore, the SafetyNet reports contain no information on the proportion of drunk drivers in traffic. As an alternative, the percentage of fatalities where the driver had a BAC above the BAC limit is reported and is included in the DaCoTA System. This indicator is, however, not available in other countries, such as the Netherlands, where no post-mortem test is allowed for testing the BAC-level.

For alcohol, the indicators included in the Master Tables are:

- The percentage of fatalities resulting from crashes involving at least one driver impaired by alcohol
- Percentage of drivers above legal limit for alcohol in roadside checks
- The amount of roadside checks by the police.

For drugs:

- Percentage of drivers above legal limit for drugs in roadside checks
- The amount of roadside checks

2.3.2.2 Speed

Included in the DaCoTA system: For speed, two types of measures can be reported:

- average speed (during day or night)
- the percentage of speed limit offenders

These measures are provided by speed limit of the road and for those roads with speed information available. It is not clear, at this stage, how comprehensive and statistically representative this data is being collected in all the EU countries.

Additionally, the following additional indicators are included in the Master Tables:

- Percentage of vehicles over speed limit by road type
- Speed limit by road type
- Average speeds by road type.

2.3.2.3 Protection systems

There are many of protective systems available in traffic, the most important of which being seat belts and helmets. Especially for the use of protective systems, the information that was gathered within SafetyNet can be enriched by data of other years as presented in the IRTAD Annual Report if 2010 (OECD, 2011).

Included in the DaCoTA system: For seat belt wearing, the following measures are included:

- Passenger cars: front seat (separated by driver and front seat passenger if available)
- Passenger cars: rear seats
- Passenger cars: correct protection of children < 12 years
- Heavy vehicles: front seat
- Coaches: passenger seats

Included: For helmet use, the following measures are included:

- Cyclist helmets
- Moped helmets
- Motorcycle helmets

Additionally, the following additional indicators are included in the Master Tables:

- Daytime seat belt wearing rates for drivers
- Daytime seat belt wearing rate on front seats of passenger cars and vans under 3,5 tons
- Daytime seat belt wearing rate on front passenger seats of passenger cars and vans under 3.5 tons
- Daytime seat belt wearing rate on rear seats of passenger cars and vans under 3,5 tons
- Daytime usage of child restraints by children <12 years old
- % of children totally unrestrained in cars

2.3.2.4 Daytime running lights

Relevant measures for the use of daytime running lights (DRL) are:

- The total usage of DRL
- The usage rate of DRL per road type
- The usage rate of DRL per vehicle type

For those countries that have data available on DRL, only the total usage and DRL by road type are known.

Included in the DaCoTA system, as well as in the Master Tables:

- DRL usage by road type
- Total DRL usage

2.3.2.5 Vehicles

The following measures are found to be relevant SPIs for vehicles:

- Vehicle fleet distribution by age
- Percentage of vehicle fleet tested by EuroNCAP
- Average EuroNCAP score for the vehicle fleet
- Vehicle fleet composition by vehicle type

From this list, the % of vehicles tested by EuroNCAP is not reported in the SafetyNet SPI-deliverables. Also the EuroNCAP-ratings are not known from the SafetyNet documents used, but there is a measure available for some countries on the crash worthiness of vehicles, defined as the presence within the fleet of a number of vehicles that will not protect the occupant well in a collision. Information on EuroNCAP ratings are available in the PIN-flash 13 of the ETSC.

Included in the DaCoTA System:

- Crash worthiness
- Fleet age (median age)
- Vehicle fleet composition (% of passenger cars, % of motorcycles and mopeds, % of public transport, % of other vehicles such as heavy goods vehicles and lorries)

Additionally, the following additional vehicle safety indicators are included in the Master Tables:

- Average EuroNCAP score 1994
- Age of passenger cars
- SPI (combined vehicle age/EuroNCAP indicator)
- Average percentage score of occupant protection for new passenger cars sold in 2008
- Average percentage score of pedestrian protection for new passenger cars sold in 2008
- Child protection of new passenger cars sold in 2008
- Annual renewal rate of passenger cars in 2007 (percentage of new cars among all registered passenger cars

2.3.2.6 Enforcement

The following measures are found to be relevant SPIs for enforcement and are included in the Master Tables:

- The number of speeding tickets by the Police
- The amount of alcohol tickets by the police
- The amount of seatbelt wearing tickers by the police
- The amount of helmet use tickets by the police

2.3.3 Current state and experiences

The SPIs that are mentioned in the previous paragraphs as “included” are gathered either in a central table for 29 European countries (see Appendix 2), or in the Master Tables (see Appendix 1). Data are gathered from the SafetyNet reports on SPIs and contain data from 2006 and 2007. The data have been sent to the National Experts to be validated and to be completed with extra information whenever available.

Information on protective systems appears to be most available: about two third of the countries have information on this issue. Vehicle data is available for about half of the European countries. Alcohol and speed data are only available for about one third of all countries. For use of DRL, only one fifth of all European countries have information.

Countries with none or nearly no SPI data are: Ireland, Italy, Cyprus, Latvia, Lithuania, Luxemburg, Slovenia, Slovakia and Finland.

Some of the data may be easily updated or added from other available international and even national sources. Usable international sources are IRTAD reports and PIN-flashes from ETSC.

2.3.4 References

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2.4 Assembly of causation indicators

2.4.1 General

The availability of harmonised accident data (both at macroscopic level and in-depth) continues to improve through the activities of EC projects such as STAIRS, SafetyNet and DaCoTA. Following a review of the available data, it is evident that the examination of causation data across Europe requires another layer of depth that is not yet available at European level, or rather not in a harmonised format that allows accurate comparison between countries.

Other tasks in DaCoTA WP3 have addressed elements of causation data as part of their focused activities;

- Task 3.2.3: Safety Performance Indicators
  Alcohol and Speed
- Task 3.3.4: Assembly of user behaviour/attitude data
  Alcohol & drugs, Speed and Distraction & fatigue

Whilst the information in these activities adds knowledge to the study of causation the data is not comprehensive in describing the full range of contributory factors – these were not the aims of either task. Also this data is not always being collected in terms of causation, for example, speed is being reported as being present but not necessarily as contributory.

The resource that does have harmonised information regarding causation, across a number of European countries, is the in-depth SafetyNet Accident Causation Database (Methodology: SafetyNet Deliverable D5.5 [1], Analysis: SafetyNet Deliverable D5.8 [2]). The data from 6 countries was collected in the SafetyNet project following a common methodology and, importantly, a detailed process for recording causation called the SafetyNet Accident Causation System (SNACS). This resource includes 1.006 cases split between Germany, Italy, The Netherlands, Finland, Sweden and the UK.

It was therefore decided to use this resource to supplement the Basic Fact Sheets (BFS) with some basic causation data that can provide a top level overview of the topic being examined in the BFS. In the 2010 and 2011 editions, ten fact sheets had causation data added; Young People (Aged 18-24), The Elderly (Aged >64), Pedestrians, Bicycles, Motorcycles and Mopeds, Car occupants, Heavy Goods Vehicles, Junctions, Single vehicle accidents and Gender. To reflect the nature of the basic fact sheets, each causation section was limited to two pages. The level of detail in the database is high and this conciseness limited the amount of analysis possible in each fact sheet. Interesting points emerged for each topic, though, and the work indicates the future investigations that would be possible using the database. The causation section in each fact sheet started with a short introduction to the database, to make each fact sheets ‘stand- alone’.

For the 2012 edition a separate Basic Fact Sheet on Causation is prepared presenting basic information about the causes of accidents based on the two separate databases gathered in the SafetyNet project: The Fatal Accident database, collected from police investigations, witness reports and reconstructions of fatal accidents, and the SafetyNet Accident Causation Database mentioned above. It differs from other Basic Fact Sheets as the data is not currently expected to be updated, unlike the CARE database, so it provides a snapshot of accident causation factors. Nevertheless it illustrates some of the value that can be gained from the collection and analysis of in-depth accident data.

2.4.2 References

SafetyNet D5.5, Glossary of Data Variables for Fatal and Accident Causation Databases

SafetyNet D5.8, In-Depth Accident Causation Database and Analysis Report

DaCoTA D3.6, Basic Fact Sheets - 2011

DaCoTA D3.9, Assembly of Basic Fact Sheets and Annual Statistical Report - 2012

[1] SafetyNet D5.5, Glossary of Data Variables for Fatal and Accident Causation Databases
[2] SafetyNet D5.8, In-Depth Accident Causation Database and Analysis Report

2.5 Assembly of health indicators

Combining road accident data with data on road accidents derived from the health sector could provide a better insight on the severity of the road accidents, but also on the identification of the appropriate measures to mitigate the impact of the road accidents. However, the use of health data in road safety is very limited, especially at EU level, mainly due to the lack of representative and reliable data from hospitals or emergency services. A first attempt to make an assembly of health data took place in order to identify any indicators that could be incorporated into the DaCoTA system. On that purpose, information on medical environment from EUROSTAT was exploited. Based on the available limited data, some health indicators were defined, with a similar structure to the Risk Exposure Data. More specifically, the following indicators are defined:

- Heath personnel by the type of personnel
- Hospital facilities
- Main causes of deaths

More details on these indicators are available in Appendix 3 of this Report.

In the 2011 edition of the Basic Fact Sheets a section 'Road Accident Health Indicators' was added to the Main Figures Basic Fact Sheet based on analyses of data from the EU Injury Database. In the 2012 edition, health indicator sections based on analyses of the EU Injury Database were added to nine of the Basic Fact Sheets: Main Figures, Children, Young people, The Elderly, Cyclists, Motorcycles & mopeds, Car occupants, Youngsters and Gender. For more details please see Deliverable D3.9 "Assembly of Basic Fact Sheets and Annual Statistical Report – 2012"

2.6 Assembly of other data

Several other data useful for road safety analyses were gathered through the Master Tables. More specifically:

Underreporting of casualties

- Under-reporting of fatalities - % of reported killed
- Hospitalised traffic participants

Country characteristics

- Area - km^2
- Amount of unused land - % of total area
- Average winter temperature of the capital city (November to April)
- Average summer temperature of the capital city (May to October)
- Annual precipitation level for the capital city (mm)
- Population density - inhabitabts per km2
  Population living in urban areas

All these data are available for 29 European countries in Appendix 1.

ASSEMBLY OF NATIONAL INFORMATION

This Task aims at assembling a variety of national information for 27 member states concerning road users' attitudes and behaviour, national rules and road safety programmes, and their social costs and benefits. The information collected will be the primary data source used to compile the Country Overviews in WP4. The task was divided into five subtasks, each led by a different partner with TRL being responsible for the overall co-ordination.

Subtask	**Subtask leader**
3.1.0. Coordination	TRL
3.1.1. Assembly of safety programmes data	KfV
3.3.2. Assembly of safety measures	NTUA
3.3.3. Assembly of traffic rules data	MTI
3.3.4. Assembly of user behaviour/attitude data	SWOV
3.3.5. Assembly of accident cost data	IFSTTAR

The Basic Principles for the DaCoTA Data Warehouse were applied, namely:

- **Quality:** Data and information are made public only after thorough quality control (availability, reliability, comparability, etc.),
- **Transparency:** All data and information available to everybody, accompanied with the related meta-data (sources, definitions, etc.),
- **Independence**: Data, information and especially analysis results should be checked for their consistency and any bias should be properly highlighted,
- **Usability and Accessibility**: An advanced user interface should guarantee easy access to all data and information.

Appropriate templates were developed as checklists for every type of information to be collected (see Appendices 4 - 8 of this Report). There are three levels of data collection. Firstly, all international and National sources, research projects and any other available sources and links identified within task 3.4 were explored and exploited. Secondly, the CARE/RSPI experts were consulted to validate and add any further information. Finally, in some cases missing information was collected through direct contact with national contacts.

The process used to collect the information for each subtask is described in sections 3.1 to 3.5 and the information is contained in the corresponding appendices.

3.1 Assembly of safety programmes data

Within the framework of the DaCoTA WP3, data on basic road safety programmes in 29 European countries were gathered and examined, in order to be further included in the DaCoTA system. Elements related to road safety programmes implementation are considered such as the existence of a broad national road safety strategy with measurable targets, a specific national road safety plan with quantitative goals, the progress achieved, the responsible organization for implementing the safety strategy plans, etc. A Table containing all available information is available in Appendix 4.

Additionally, information on Road Safety Management for the various countries was gathered through the Master Tables. More specifically, 27 relevant elements were gathered regarding Key functions in road safety policy making, Road safety strategy or vision of the country, National plans and targets, availability of Road Safety Management components, Enforcement and Remarkable road safety policy issues. All these information are available for 29 European countries in Appendix 1.

3.2 Assembly of safety measures

3.2.1 Introduction

Within the framework WP3 of DaCoTA and more specifically within Task 3.3 of assembling national information data on road safety measures in European and other countries were gathered and organised in respective categories, in order to be included in the DaCoTA system. These measures covered different road safety areas and geographical levels. Additionally, various data sources were used, concerning mainly results from research projects (PROMISING, ROSEBUD, SUPREME, RIPCORD-ISEREST) and final reports/studies of CEDR, COWI and IRTAD. In addition, most of the reports/studies and projects are mainly based on “The handbook of road safety measures" (Elvik R and Vaa T.). A comprehensive table, which is available in Appendix 6 of this Report, was prepared containing all available information for each one of the 655 measures recorded. The components of this table (sources, categories, description, references) are presented in the following sections.

3.2.2 Sources of Measures

The sources used for the collection of all road safety measures recorded in the comprehensive Table are the following:

<u>Research Projects</u>

1. PROMISING
2. ROSEBUD
3. SUPREME
4. RIPCORD-ISEREST

Reports/Studies

5. CEDR

6. COWI

7. IRTAD

3.2.2.1 The PROMISING research project

The PROMISING project (Promotion of mobility and safety of vulnerable road users) aimed at developing measures that reduce the risk of injury to vulnerable and young road users as much as possible in a non-restrictive way. This project was commissioned by the European Union and was coordinated by the SWOV Institute for Road Safety Research. The duration of the project was from 1/07/1998 until 1/01/2001.

The main source of the PROMISING project measures is the WP5 "*Cost-benefit analysis of measures for vulnerable road users", July 2001.* Cost-benefit analysis was carried out for the measures described in tis WP.

The report examines examples of cost-benefit analysis of selected safety measures, designed to improve the safety of vulnerable and inexperienced road users (pedestrians, cyclists, motorcyclists, and young drivers). Two measures of efficiency are used in cost-benefit analysis, which are the net present value of a project and the benefit-cost ratio. The net present value of a project is defined as:

Net present value = Present value of all benefits – Present value of all costs

The benefit term includes all effects that are valued monetarily in an analysis. Different benefits are usually added to obtain total benefits. Negative benefits, for example increased travel time, are subtracted. The cost term usually denotes the implementation costs of a measure. There is a simple definitional relationship between net present value and benefit-cost ratio. When the net present value is positive, the benefit-cost ratio exceeds the value of 1,0. The benefit-cost ratio is defined as:

$$\text{Benefit-cost ratio} = \frac{\text{Present value of implementation costs}}{\text{Present value of all benefits}}$$

3.2.2.2 The ROSEBUD research project

ROSEBUD (Road Safety and Environmental Benefit-Cost and Cost-Effectiveness Analysis for Use in Decision-Making) was a thematic network funded by the European Commission to support users at all levels of government (European Union, national, regional, local) with the assessment of the efficiency of road safety solutions for the widest possible range of measures. The duration of the project was from 1/10/2002 until 1/09/2005.

The source of the measures used is *"Examples of assessed road safety measures - a short handbook*", (July 2006) which is the main outcome of the Rosebud project. The handbook includes information about various assessed road safety measures and efficiency assessment results for these measures. The assessment methods used are Cost-Effectiveness Analysis (CEA) or Cost-Benefit Analysis (CBA). In cost effectiveness analysis (CEA) the costs of a measure are confronted with its effects. The effects of the measures are not expressed in monetary terms.

Economic evaluation of road safety measures using cost-benefit analysis is based on the costs incurred as a result of road accidents. The benefit-cost ratio represents the economic advantage of the safety measures. According to the Benefit-Cost (B-C) ratio, measures from Rosebud are ranked as poor, acceptable and excellent as follows:

	B/C-ratio
Poor	< 1
Acceptable	1 - 3
Excellent	> 3

Source: Rosebud, *Examples of assessed road safety measures - a short handbook*", July 2006

Measures from Rosebud consist of user-related, vehicle-related and infrastructure-related measures that are assessed by using the two methods described above.

3.2.2.3 The SUPREME research project

The SUPREME (Summary and Publication of Best Practices in Road Safety in the member States) research project was funded by the European Commission. Its goal was to collect, analyse, summarise and publish best practices in road safety in the Member States of the European Union, as well as in Switzerland and Norway. The target audiences of the project are decision and policy makers at all levels, from European to local, as well as the scientific community and practitioners in the field. The aim is to provide user specific information on outstanding safety measures with a view to implementation in other countries, or at the European level. The duration of the project was from 1/12/2005 until 1/06/2007.

SUPREME measures come from the final report (that consists of 14 parts) and mainly from Part C, D which are the *Handbook for measures at the Country level* and the *Handbook for measures at the European level,* (June2007) respectively. The evaluated safety measures described are ranked as best, good, and promising practices and concern the following categories:

- Licensing
- Policy
- Enforcement
- Campaigns
- Infrastructure interventions
- Safety equipment
- Data analysis
- Post impact care

The measures within the SUPREME research project were collected through a questionnaire sent to experts working for international or European organisations, NGOS, interest groups and industries. The information collected through the questionnaires was supplemented by additional research from the authors.

A distinction was made between best practice, good practice and promising practice due to lacking quantitative information about the effects. In those cases it is difficult to say whether it is really best practice. Sometimes, the information was missing, because a particular area does not have a tradition of evaluating measures in a quantitative way, often because a good scientific evaluation study is very difficult or even impossible to carry out (e.g. the area of driver training and safety education) In these cases, an example could not qualify for best practice, but it could for good practice if it was based on a sound theory. For other measures quantitative information was lacking, because it was very new or only available as a prototype, and not yet evaluated or only evaluated in laboratory conditions or small-scaled field studies. In these cases the measure was qualified as promising practice, if the theoretical foundation was good or if pilot studies yielded positive results. More specific, "best practice" measures are scientifically proven to lead to a reduction of road accidents and/or deaths and serious injuries, have a positive benefit-cost ratio and are expected to affect public acceptance or the sustainability of the effects of other measures. In addition, measures are rated as "good" when the available information on the above criteria was not sufficient to assess if they were the best practice in their category because there is a clear lack of systematic evaluations of implemented measures. Furthermore, measures that have not yet been implemented at the European or international level but have proven to be successful in one or several Member States were rated as "promising".

3.2.2.4 The RIPCORD-ISEREST research project

RIPCORD-ISEREST research project is an acronym for Road Infrastructure Safety Protection – Core-Research and Development for Road Safety in Europe, and Increasing Safety and Reliability of Secondary Roads for a Sustainable Surface Transport. The project started in 2005 and its duration was three years. Its main objective was to give scientific support to the European transport policy to reach the 2010th transport road safety target by establishing best practice tools and guidelines for road infrastructure safety measures. The main objective of the third work-package of Ripcord-Iserest project was to collect information on best practices concerning the design of self-explaining and forgiving roads.

The concept of self-explaining roads is based on the idea that roads with certain design elements or equipment raise certain about the effects of one's own driving behaviour and that of the other road users and induce, as a result, appropriate speed or steering manoeuvres. A self-explaining road is therefore a road designed and built in such a way as to induce adequate behaviour. A well designed self-explaining road is able to support motorists in their driving task and does in this way reduce the necessity of local speed limits or warning signs. However, the self explaining road concept is not only intended to influence driving behaviour but also should provide a safe road design in itself.

The fundamental objective of RIPCORD-ISEREST was to develop best practice guidelines based upon the current research results for:

Road Safety Impact Assessment tools and Accident Prediction Models

Road Design and Road Environment

Road Safety Audit

Road Safety Inspection

Black Spot Management and Safety Analysis of Road Networks

The sources of RIPCORD-ISEREST measures are the following final reports:

DaCoTA_WP3_NTUA_D3.8_FinalReport_6.doc

- WP3-D3-*Road design and Environment - Best practice of Self-Explaining and forgiving roads*
- WP5-D5-*Road Safety Inspection - Best Practice Guidelines and Implementation Steps*
- WP9-D9-*SEROES-Best Practice in Road Safety Measures*
- WP13-D13-*Safety Handbook for Secondary Roads.*

3.2.2.5 CEDR research project

The Conference of European Directors of Roads (CEDR) has been promoting collaboration and exchange of information and expertise amongst its members since 1998. In particular, it aims to: provide support to the activities of the Road Directors and their national road administrations, to promote a high level of common information and give assistance to the European Commission in the preparation of reports concerning the development of the Trans European Road Network (TERN). Within the O7 Task Group, (an ad-hoc group of the broader "Road Safety" Group of the Conference of European Directors of Roads (CEDR)), an effort has been initiated to understand, identify and disseminate best practice to ensure cost - effectiveness on road safety investments.

The source of CEDR measures is the Final report: "*Best Practice on Cost Effective Road Safety Infrastructure Investments*", April 2008. According to the report, the five most promising investments were identified (as results of preliminary assessment and related ranking of investments) and were selected for further analysis (in-depth analysis) analyzing existing literature in conjunction with the results of Questionnaire 2 of the CEDR task group of Road safety (O7). These investments concern the following categories of measures:

- Roadside treatment
- Speeding
- Junctions layout
- Junction traffic control
- Traffic calming

Cost-effectiveness (CEA) and cost-benefit analyses (B-C) are standardised techniques used for the evaluation of road safety investments. It is noted that a "positive" or "negative" safety effect depends on the consideration of the safety effect in the analysis. For instance, in an analysis estimating the percentage of accidents reduction, a positive percentage indicates a reduction of accidents and a negative percentage reflects an increase of accidents.

The cost-effectiveness ratio of a road safety measure is defined as the number of accidents prevented by the measure per unit cost of implementing the measure (ROSEBUD, 2005), whereas the Benefit-cost ratio is defined as Benefit-cost ratio = Present value of all benefits/ Present value of implementation costs as it is already mentioned above.

3.2.2.6 COWI study

COWI is a northern European consulting group which undertakes studies within the fields of engineering, environmental science and economics.

The source of COWI study measures is the Final report of "*Technical Assistance in support of the Preparation of the European Road Safety Action Programme 2011-2020*", January 2010, carried out for the European Commission DG-TREN. The main sources of this report are ERSO, ETSC, EuroRAP, Global Status Report on Road Safety -Time for Action (WHO 2009), IRTAD and national sources.

According to the report, performance of enforcement on speed, drink driving, seat belt wearing in the European countries are evaluated by using two types of rankings: a qualitative r ranking: (good/ improving/ need to do more, source: ETSC) and quantitative ranking (scale 0-10, source: Global Status Report on Road Safety). Effectiveness of helmet wearing enforcement and child restraints are also provided by using a scale from 0-10 according to the respondents' evaluation from the Member states that took part in the Global Status Report on Road Safety questionnaire.

In addition, infrastructure interventions concerning engineering actions such as formal audits on new roads, regular inspections on existing roads, EuroRAP assessment (risk mapping or star rating) are also included. It is noted that the EuroRAP assessment of the roads is focused on addressing 4 types of accidents (head on collisions, single-vehicle accidents, intersection collision, accidents involving vulnerable road users) accounting mainly fatalities on non-urban roads.

Roads are assessed according to: separation of directions (how well the medians are treated), the design standard and frequency of intersections, how well the road sides are protected, how the edge of the carriageway is treated and the availability of fatalities for pedestrians and cyclists.

Concerning the education and campaign measures of the safety measures Table, COWI study presents the most common campaigns on speed, seatbelts, alcohol, helmets, young drivers and school children education.

As for trauma management, COWI study presents the performance for several countries according to the Safetynet study ranking (high level, medium level, low level, relatively low level).

3.2.2.7 IRTAD

In 1988, the OECD Road Transport Research Programme established the International Road Traffic and Accident Database (IRTAD) as a mechanism for providing an aggregated database, in which international accident and victim, as well as exposure data, are collected on a continuous basis. IRTAD includes both a database and a working group.

The source of IRTAD measures is the "*IRTAD -Road Safety Annual Report 2009"* that includes road safety data from 27 countries-members. This report summarizes the recent road safety measures (2007-2009) as well as the National Road safety targets and Strategies without indicating their effectiveness. The measures concern:

- Speeding
- Alcohol
- Seat belt

- Helmet
- Licensing
- Child restraints
- Infrastructure interventions
- Education and training
- Campaigns
- Enforcement, Campaigns
- Policy (regulations)
- Safety equipment

3.2.3 Measures Categories

The measures that were collected from the reported sources were then categorised into 4 main categories concerning Road User Behaviour, Road Environment, Vehicle and Road Safety Management consisting of the following sub-categories:

1. Road user behaviour:

Speeding

Alcohol

Seat belt

Helmet

Cell phone

Licensing

Physical examination of drivers

Child restraints

Pedestrian/ Cyclists

Education

Campaigns

Enforcement

2. Road Environment

Traffic calming

Roadside treatments

Roadside guard rails

Junction layout

Junction traffic control

Signs

Road lighting

Infrastructure interventions

Maintenance

Infrastructure safety management

3. Vehicle

Safety equipment (for motorcycles)

Vehicle safety equipment

ITS

Trucks

4. Road Safety Management

Policy

Legislation

Road safety assessment

Road Safety Audits

Road safety inspection

Management of hazardous locations

Data Analysis

Post impact care

Trauma management

3.2.4 Measures description

The “safety measures” table that is available in Appendix 5 of this Report covers different road safety areas, geographical levels and evaluation of the measures described above. The Table columns contain the following information:

Source of the measure: Studies or reports containing information about each measure.

Measure title: The title which was used for this measure.

Measure category: The category assigned to this measure. It is noted that in some cases measures could concern more than one category, and the most relevant category was used.

Reference country: The country in which the measure is implemented.

Description of the measure: A brief description of the measure is provided.

Engineering actions - formal audits on new roads: It is mentioned whether the measure examined refers to formal audits on new roads.

Engineering actions -regular inspections on existing roads: It is mentioned whether the measure examined refers to regular safety inspections on the road network.

Engineering actions- EuroRAP assessment: It is mentioned whether the measure examined refers to road assessment including risk mapping or star rating.

Speed -from (km/h): The initial speed limit before the change of the speed limit.

Speed -to (km/h): The final speed limit after the change of the speed limit.

Junction layout -before changing: The initial junction layout before the implementation of the measure in question.

Area (Local): The concerning measure is implemented at local level.

Area (whole area): The concerning measure is implemented at a broader area.

Area (interurban/interstate area): The measure is implemented at the interurban/interstate area.

Road network-urban: The measure refers to urban roads.

Road network-highways: The measure refers to highways.

Road network-motorways: The measure is implemented at motorways.

Road network-number of sites/section: The number of sites or section where the measure is implemented.

Measure cost -Official data: The source of a measure cost is based on official data.

Measure cost- Literature: The source of a measure cost is based on literature.

Measure cost- Assumptions: It is mentioned whether the source of each measure cost is based on assumptions.

Accident cost - Official data: The accident cost of the concerning measure is based on official data.

Accident cost- Literature: The accident cost of the concerning measure is based on literature.

Accident cost- Assumptions: The accident cost of the concerning measure is based on assumptions.

Evaluation period: The evaluation period of each measure is provided (in many cases is not available).

Evaluation method: The method used for the evaluation of each measure is divided into the 6 categories below:

- Before-and-after analysis
- Regression model
- Meta-analysis
- Statistical model
- Literature

- Assumptions

Other effects: It is mentioned whether each measure is related to the following 4 types of effects:

- Emissions
- Noise
- Time
- Other

Other effects: This category refers to safety measures' effects such as emissions, noise, time and other general effects.

Best estimate: It is the estimated percent change in a potential accident risk attributed to each measure.

Safety effect: It describes the safety effect of each measure on the following types of accidents:

- all accidents
- fatal accidents
- injury accidents
- pedestrian accidents
- material damage accidents

Implementation cost: The implementation cost of each measure in terms of monetary values (whenever is available from the sources mentioned).

Effectiveness results CBA/ CEA: The availability of the effectiveness results according to the technique used (CBA or CEA) or generally the quantitative or qualitative ranking of a measure.

3.2.5 References

Several references, especially those used in the four research projects (PROMISING, ROSEBUD, SUPREME, RIPCORD-ISEREST) and the three reports/studies (CEDR, COWI, IRTAD), were considered while establishing the assembly of road safety measures. However, the main ones are listed below:

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CEDR - Conference of European Directors of Roads (2006). Most Effective Short-, Medium- and Lon-Term Measures to Improve Safety on European Roads. Final Report prepared by the Conference of European Directors of Roads.

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3.3 Assembly of traffic rules data

3.3.1 General

The aim of this part of the DaCoTA project is to gather information about Traffic Rules in the European Union member states. Almost every regulation of Traffic Rules is relevant for road safety. Several rules were examined and a list of most appropriate in terms of importance and EU availability was selected.

In accordance with those arrangements, the data was divided into 4 groups:

- drivers,
- pedestrians,
- vehicles,
- emergency phone number

The scope of data collection was defined for each group:

drivers: eligibility for driving license (age), training system, physical/psychological examination, special requirements related to speed limits, BAC limits, protective equipment use, mobile use, etc;

pedestrians: pedestrians' right of way on the zebra stripes, fluorescent elements, parking on the pavement, riding bicycles on the pavement;

vehicles: technical inspection, fluorescent safety vest, fluorescent triangle, fire extinguisher, first-aid kit, winter tyres;

emergency phone number: emergency number, emergency ambulance service, Police, Fire Service, emergency road services.

Overall for 4 categories 54 variables were defined. Data for each country are presented in a separate Table in Appendix 6. Countries have been placed in alphabetical order according to country names in native languages. The data were gathered for each of 27 member states and Switzerland. Many websites were reviewed (95) in search for information, such as:

European Commission (DG MOVE),

World Health Organization,

International organizations (e.g. ETSC - European Transport Safety Council, International Transport Forum),

Research Institutes (SWOV, KfV Austrian Road Safety Board etc.)

National sources as Ministry or road safety organizations (e.g.IRLAND RSA Road Safety Authority, NETHERLANDS The Ministry of Transport, MALTA Ministry of Transport, SLOVENIA Police).

Data sources evaluation:

Most of the data concerning Speed limits, Alcohol legal limit - BAC, mandatory safety equipment for car, day time running lights and winter tyres are available on the DG Move official website about road safety (http://ec.europa.eu/transport/road_safety/going_abroad/index_en.htm). However, these data are incomplete and the year of origin is not known. A

lot of data have been found in EU research projects (6 and 7 Framework Programmes for Research and Technological Development) and other:

Traffic rules study: Comparative Study of Road Traffic Rules and Corresponding Enforcement Actions in the Member States of the European Union http://ec.europa.eu/transport/road_safety/projects/doc/traffic_rules_study.pdf

Traffic Law Enforcement across the EU An Overview ETSC–European Transport Safety Council http://www.etsc.eu/documents/ETS%20May%202006.pdf

DRUID - Driving under the Influence of Drugs, Alcohol and Medicines – drugs limits and enforced Deliverable 6.1State-of-the-Art on Withdrawal of Driving Licence – Results of a Questionnaire Survey http://www.druid-project.eu

BESTPOINT Criteria for BEST Practice Demerit POINT Systems: Deliverable 1 European Demerit Point Systems: Overview of their main features and expert opinions.

European status report on road safety, World Health Organization 2009 http://www.euro.who.int/__data/assets/pdf_file/0015/43314/E92789.pdf

Unfortunately, some projects have covered only certain member states (EU 15). Due to projects completion dates, the data are from various years (e.g. 2003) and it is not know whether they are still valid or have been already changed. The rest of the data were gathered from national sources. However, not all the member states had the data available in English. Data on licensing and age thresholds, training and emergency numbers were the most difficult to be found. Due to lack of other more reliable sources, the data available in Wikipedia were used (e.g. Traffic rules in various EU-countries June 2012 / ECC-Belgium, http://en.wikipedia.org/wiki/List_of_countries_by_minimum_driving_age, http://en.wikipedia.org/wiki/Emergency_telephone_number). However, this source cannot be considered as fully reliable. Furthermore, there was overall lack of information on trucks, buses and bicycles. The dates of changes in traffic codes and their scope were hard to identify. Therefore, the historical data for each country and category are not complete.

In summary, although traffic rules data are available (80%), it is very difficult to gather them because they are scattered throughout many sources. Some of the data are missing in official and reliable sources, many are of uncertain quality and validity. The date and scope of implementation of various measures and the historical data are crucial if the data are to be fully useful in road safety analyses, particularly in time series analysis

Moreover, if the process of gathering data for the Data Warehouse is to be effective, each country (e.g. CARE/RSPI Experts) should receive the Traffic Rules table for verification. This process should be repeated every 2-3 years. If the reliable and current data were gathered in one database accessible to many recipients, it would constitute a valuable basis for numerous road safety analyses

In Table 1 the detailed list of categories and sub-categories is presented. Each category is marked with a different colour.

Table 1: Traffic Rules – scope of gathering data

	DRIVER
	Eligibility for driving license (age):
1	motorcycles cat. A1
2	motorcycles cat. A
3	passenger cars cat. B
4	buses or coaches cat. D
5	lorries or trucks cat. C
6	moped
7	bicycle
	Training
8	Assistance / accompanying driving licence
9	Trial driving licence
10	Theoretical training (how many hours?)
11	Practical training (how many hours?)
	Physical/psychological examination
12	Future drivers
13	Elder drivers (how old?)
	Speed limits
14	Motorways
15	Urban road
16	Non-urban
	Alcohol legal limit – BAC / Drugs
17	BAC drivers of passenger cars
18	BAC novice drivers
19	BAC proffesional
20	Drugs limits
	Helmet/seat belts/others use obligatory
21	Obligatory helmets for motorcycles/mopeds
22	Obligatory helmets for bicycles
23	Obligatory seat belts: passenger cars - front seat
24	Obligatory seat belts: passenger cars - back seat

25	Obligatory seat belts: bus
26	Obligatory seat belts: truck
27	Obligatory child restrain
28	DRL
29	Hand-held mobile phone
30	Temporary limited traffic of HGV
	Penalties
31	Penalties points (existing or not?)
32	Exceeding the speed limit urban road (how many for what?)
33	Exceeding the speed limit outside urban road (how many for what?)
34	Exceeding the speed limit - automatic enforcement (speed camera)
35	Alcohol (how many for what?)
36	Drugs enforced

	PEDESTRIAN AND BICYCLISTS
37	Pedestrians' right of way on the zebra stripes
38	Fluorescent elements
39	Parking on the pavement
40	Riding bicycles on the pavement

	VEHICLES
41	Technical inspection passenger cars
42	Technical inspection motorcycles
43	Technical inspection buses or coaches
44	Technical inspection lorries or trucks
45	Fluorescent safety vest
46	Fluorescent triangle
47	Fire extinguisher
48	First-aid kit
49	Winter Tyres

	EMERGENCY TELEPHON NUMBERS
50	Emergency number (standard across Europe)*
51	Emergency ambulance service
52	Police
53	Fire service
54	Emergency road service

The template of the Table for gathering data for each of 27 member states has been designed and the country order was determined by WP 3 Team Leader, i.e. alphabetically, according to country names in native languages. After the scope of essential data was set, a number of accessible EU and National websites were reviewed. In order to find adequate and reliable sources ERSO and DG MOVE websites were used.

A complete list of the references (websites and reports) reviewed follows at the end of this section. However, the majority of data was found on the following websites:

1) European Commission - DG MOVE, Mobility and Transport (*http://ec.europa.eu/transport/road_safety/glance/index_en.htm*)
2) Comparative Study of Road Traffic Rules and Corresponding Enforcement Actions in the Member States of the European Union (*http://ec.europa.eu/transport/road_safety/projects/doc/traffic_rules_study.pdf*
3) Transport Research Centre (*http://www.internationaltransportforum.org/jtrc/index.html*)
4) ETSC - European Transport Safety Council (*http://www.etsc.eu/home.php*)
5) Traffic Law Enforcement across the EU - An Overview (*http://www.etsc.eu/documents/ETS%20May%202006.pdf*)
6) Bulgaria: The State-Public Consultative Commission on the Problems of Road Safety (*http://dokkpbdp.mvr.bg/en/drivers/point_system.htm)*
7) Estonia: Estonian Road Administration (*http://www.mnt.ee/atp/?keel=en)*
8) Estonia: Estonia Traffic Code (*http://www.legaltext.ee/en/andmebaas/ava.asp?m=022http://www.legaltext.ee/en/andmebaas/ava.asp?m=022*)
9) Ireland: RSA Road Safety Authority (*http://www.rsa.ie/en/*)
10) Ireland: (*http://www.rotr.ie/pdf-downloads/english/rules-of-the-road%20eng.pdfhttp://www.rotr.ie/*)
11) Malta: The Highway code (*http://www.gov.mt/frame.asp?l=2&url=http://www.doi.gov.mt/en/archive/highwaycodeeng/hcfrombutton.asp?menu=smnu3*)
12) Malta: The Local Enforcement System (*https://les.gov.mt/detailedinfo.aspx?ID=Traffic%20Signs*)

13) Netherlands: The Ministry of Transport: (*http://english.verkeerenwaterstaat.nl/english/topics/road_traffic_safety/alcohol_drugs_and_driving/)*

14) Netherlands: SWOV - Dutch National Road Safety Research Institute (*http://www.swov.nl/index_uk.htm*)

15) Netherlands: SWOV (*http://www.swov.nl/rapport/Factsheets/UK/FS_Accompanied%20_driving.pdf)*

16) Netherlands: SWOV (*http://www.swov.nl/rapport/Factsheets/UK/FS_Demerit_points.pdf)*

17) Austria: KfV (*http://www.kfv.at/department-transport-mobility/safety-measures-in-austria/multi-phase-driving-license/*)

18) Slovenia: Slovenian Police (*http://www.policija.si/eng/index.php/component/content/article/11/78-traffic-safety*)

19) Finland: The Finnish Transport Agency (*http://www.tiehallinto.fi/servlet/page?_pageid=68&_dad=julia&_schema=PORTAL30&kieli=en&menu=8289&_pageid=71&kieli=en&linkki=14460&julkaisu=5346)*

20) Sweden: The National Society for Road Safety (*http://www.ntf.se/english/default.asp*)

21) United Kingdom: (*http://www.direct.gov.uk/en/TravelAndTransport/Highwaycode/DG_070304*)

22) United Kingdom: (*http://www.direct.gov.uk/en/Motoring/DriverLicensing/index.htm*)

23) United Kingdom: Road Safety Scotland (*http://www.road-safety.org.uk/walking/*)

24) United Kingdom: Lawontheweb - UK's legal information website - Table of Driving Offences (*http://www.lawontheweb.co.uk/Road_Traffic_Law/Table_of_Driving_Offences*)

Finally, the data gathered was inserted into the template prepared earlier. The source is specified for each obtained data. If needed brackets for comments and for the date of implementation of each regulation in each country are provided. Data are available for 28 EU countries, as can be seen in Appendix 6 of this Report. The gathered data was verified during the second phase of the DaCoTA project by national CARE Experts, who also filled-in any missing information. In order to simplify their task, for each country a separate table was prepared.

3.3.2 References

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2) Comparative Study of Road Traffic Rules and Corresponding Enforcement Actions in the Member States of the European Union (*http://ec.europa.eu/transport/road_safety/projects/doc/traffic_rules_study.pdf*)

3) European Commision - DG Research (research for road safety) (*http://ec.europa.eu/research/transport/transport_modes/road_en.cfm#*)

4) Transport Research Centre (*http://www.internationaltransportforum.org/jtrc/index.html*)

5) UNECE - United Nations Economic Commission for Europe (*http://www.unece.org/trans/publications.html#road*)

6) TISPOL - European Traffic Police Network (*https://www.tispol.org/frontpage*)
7) The International Commission For Driver Testing (*http://www.cieca.be/*)

8) ETSC - European Transport Safety Council (*http://www.etsc.eu/home.php*)

9) ETSC - Traffic Law Enforcement across the EU An Overview (*http://www.etsc.eu/documents/ETS%20May%202006.pdf*)

10) ETSC - Traffic Law Enforcement across the EU Time for a Directive (*http://www.etsc.eu/documents/ETS%2012%20March%202007.pdf*)

11) WHO - Road Safety Legislation database (*http://apps.who.int/violence_injury_prevention/roadsafety/roadsafety.aspx*)

12) Austria: Federal Ministry for Transport, Innovation and Technology (*http://www.bmvit.gv.at/en/verkehr/transportation/index.html*)

13) Austria: KfV (*http://www.kfv.at/department-transport-mobility/safety-measures-in-austria/multi-phase-driving-license/*)

14) Belgium: Belgian Institute for Road Safety (*http://www.bivv.be*)

15) Belgium: Belgian Road Research Centre (BRRC) (*http://www.brrc.be/brrc/e15/e15_01.php*)

16) Bulgaria: The State-Public Consultative Commission on the Problems of Road Safety (*http://dokkpbdp.mvr.bg/en/drivers/point_system.htm)*

17) Czech Republic: Transport Research Centre (CDV) (*http://www.cdv.cz/en/*)

18) Cyprus: Cypriot Police (*http://www.police.gov.cy/police/police.nsf/*)

19) Denmark: Danish road safety and transport agency (*http://www.trafikstyrelsen.dk/?sc_lang=en*)

20) Denmark: Danish Transport Research Institute DTU Transport (*http://www.transport.dtu.dk/English.aspx*)

21) Germany: BASt -The Federal Highway Research Institute (*http://www.bast.de/*)

22) Germany: Federal Ministry of Transport, Building and Urban Development (*http://www.bmvbs.de/EN/TransportAndMobility/TransportPolicy/RoadSafety/road-safety_node.html*)

23) Estonia: Estonian Road Administration (*http://www.mnt.ee/atp/?keel=en*)

24) Estonia: Estonia Traffic Code (*http://www.legaltext.ee/en/andmebaas/ava.asp?m=022http://www.legaltext.ee/en/andmebaas/ava.asp?m=022*)

25) Estonia: Estonian Police (*http://www.politsei.ee/en/nouanded/liiklus/*)

26) Ireland: RSA Road Safety Authority (*http://www.rsa.ie/en/*)

27) Ireland: (*http://www.rotr.ie/pdf-downloads/english/rules-of-the-road%20eng.pdfhttp://www.rotr.ie/*)

28) Greece: National Technical University of Athens (*www.ntua.gr*)

29) Greece: HIT Hellenic Institute of Transport (*http://www.hit.certh.gr/site/indexen.php*)

30) Greece: (*http://www.elpa.gr/*)

31) Spain: INTRAS (Research Institute on Traffic and Road Safety) (*http://www.uv.es/intras/eng/index.wiki*)

32) Spain: The Transport Studies Centre (Centro de Estudios de Transporte) (*http://www.cedex.es/ingles/home.html*)

33) Spain: Policía (*http://www.policia.es/*)

34) Spain: Dirección General de Tráfico (*http://www.dgt.es/portal/*)

35) Spain: Ministry of Transport and Public Works (*http://www.fomento.es/*)

36) Spain: FITSA, Technological Institute Foundation for Security in the Automobile (*http://www.fundacionfitsa.org/*)

37) France: National Institute Of Statistics And Economic Studies (*http://www.insee.fr/en/bases-de-donnees/*)

38) France: INRETS - Institut national de recherche sur les transports et leur securite (*http://www.inrets.fr*)

39) France: Sécurité Routière (*http://www.securite-routiere.gouv.fr/*)

40) Hungary: Institute for Transport Science (*http://www.kti.hu/index.php/home*)

41) Hungary: Ministry of Economy and Transport (GKM) (*http://nfm.gov.hu/en/introduction/the_ministry*)

42) Hungary: Hungarian Road Association (*http://www.maut.hu/*)

43) Italy: Sulla Buona Strada (*http://www.mit.gov.it/mit/site.php?p=cm&o=vd&id=1332*)

44) Italy: Ministero delle Infrastrutture e dei Trasporti (*http://www.mit.gov.it/mit/site.php*)

45) Italy: Italian web site on road safety (*http://www.sicurauto.it/*)

46) Latvia: National Road Safety Council (*http://www.csizpete.lv/files/Road%20Traffic%20safety.html*)

47) Latvia: Ministry of Transport (*http://www.sam.gov.lv/satmin/content/?cat=134*)

48) Latvia: (*http://www.vvc.gov.lv/export/sites/default/docs/LRTA/Likumi/Road_Traffic_Law.doc*)

49) Lithuania: Lithuanian Road Administration under the Ministry of Transport and Communications (*http://www.lra.lt/en.php/*)

50) Lithuania: Ministry of the Interior (*http://www.vrm.lt*)

51) Lithuania: Police (*http://www.policija.lt/En/*)

52) Luxembourg: Sécurité Routière (*http://www.securite-routiere.lu/*)

53) Luxembourg: Association Prévention Routière (*http://www.preventionroutiere.asso.fr/*)

54) Luxembourg: Central service of legislation (*http://www.legilux.public.lu/*)

55) Luxembourg: Ministry of transport (*http://www.gouvernement.lu/ministeres/developpement-durable-infrastructures.html*)

56) Malta: The Highway code: (*http://www.gov.mt/frame.asp?l=2&url=http://www.doi.gov.mt/en/archive/highwaycodeeng/hcfrombutton.asp?menu=smnu3*)

57) Malta: The Local Enforcement System: (*https://les.gov.mt/detailedinfo.aspx?ID=Traffic%20Signs*)

58) Malta: Ministry for Justice and Home Affairs (*http://www.mjha.gov.mt/*)

59) Malta: Government of Malta official electronic Portal: Motoring and Transport (*http://www.gov.mt/servicecluster.asp?s=53&l=2*)

60) Netherlands: The Ministry of Transport: (*http://english.verkeerenwaterstaat.nl/english/topics/road_traffic_safety/alcohol_drugs_and_driving/)*

61) Netherlands: SWOV - Dutch National Road Safety Research Institute: (*http://www.swov.nl/index_uk.htm*)

62) Netherlands: (*http://www.swov.nl/rapport/Factsheets/UK/FS_Accompanied%20_driving.pdf)*

63) Netherlands: (*http://www.swov.nl/rapport/Factsheets/UK/FS_Demerit_points.pdf)*

64) Netherlands: Police (*http://www.politie.nl/English/#Download%20brochure*)

65) Netherlands: Veilig Verkeer Nederland - Dutch organization promoting road safety (*http://www.veiligverkeernederland.nl/*)

66) Poland: Ministry of Interior and Administration (*http://www.mswia.gov.pl/portal/en/*)

67) Poland: Police (*http://www.policja.pl/portal/pol/90/4889/Polish_National_Police.html*)

68) Poland: The National Road Safety Council (*http://www.krbrd.gov.pl/*)

69) Portugal: Portuguese Road Prevention (*http://www.prp.pt/inicio.asp*)

70) Portugal: The Instituto de Seguros de Portugal (ISP) (*http://www.isp.pt*)

71) Portugal: The Laboratório Nacional de Engenharia Civil – LNEC (National Laboratory for Civil Engineering) (*http://www.lnec.pt/?set_language=en*)

72) Romania: Government of Romania Ministry of Transports (*http://www.mt.ro/engleza/index_eng.html*)

73) Romania: The Ministry of Administration and Interior (*http://www.mai.gov.ro/engleza/index_r32.htm*)

74) Slovenia: Slovene Road Safety Council (*http://www.vozimo-pametno.si/*)

75) Slovenia: Ministry of Transport (*http://www.mzp.gov.si/en/about_the_ministry/*)

76) Slovenia: Slovenian Police: (*http://www.policija.si/eng/index.php/component/content/article/11/78-traffic-safety*)

77) Slovakia: Ministerstvo dopravy, výstavby a regionálneho rozvoja (*http://www.telecom.gov.sk/index/index.php?lang=en*)

78) Slovakia: The Transport Research Institute (TRI) (*http://www.vud.sk/zameranie/zameranie_en.html*)

79) Slovakia: Slovak Road Administration (*http://www.ssc.sk/en/*)

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81) Finland: The Central Organization of Road Safety Liikenneturva (*http://www.liikenneturva.fi/www/en/regulations/index.php*)

82) Finland: Police (*http://www.poliisi.fi/poliisi/home.nsf/pages/F666038500AD6A4CC2256C370036DAE0?opendocument*)

83) Sweden: VTI, Swedish National Road and Transport Research Institute (*http://www.vti.se/*)

84) Sweden: The Swedish Transport Administration (*http://www.trafikverket.se/Om-Trafikverket/Spraksida/English-Engelska/*)

85) Sweden: SWEROAD (*http://www.sweroad.com/*)

86) Sweden: The Road Traffic Inspectorate (*http://www.vagtrafikinspektionen.se/*)

87) Sweden: The National Society for Road Safety (*http://www.ntf.se/english/default.asp*)

88) Switzerland: Federal Department of the Environment, Transport, Energy and Communications (DETEC) Federal Roads Office (FEDRO) (*http://www.astra.admin.ch/index.html?lang=en*)

89) Switzerland: Swiss Pedestrian Association (*http://www.fussverkehr.ch/fr/english/*)

90) Switzerland: The Swiss Portal - The Traffic Rules Act (TRA) (*http://www.ch.ch/private/00081/00083/index.html?lang=en*)

91) United Kingdom: (*http://www.direct.gov.uk/en/TravelAndTransport/Highwaycode/DG_070304*)

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93) United Kingdom: Road Safety Scotland (*http://www.road-safety.org.uk/walking/*)

94) United Kingdom: Lawontheweb - The UK's legal information Website Table of Driving Offences (*http://www.lawontheweb.co.uk/Road_Traffic_Law/Table_of_Driving_Offences*)

95) United Kingdom:The Royal Society for the Prevention of Accidents RoSPA's (*http://www.rospa.com/roadsafety/default.aspx*)

96) United Kingdom: Transport Safety Research Centre Loughborough University (*http://www.lboro.ac.uk/departments/lds/research/groups/tsrc/index.html*)

97) United Kingdom: Department of Transport Roads and vehicles (*http://www.dft.gov.uk/pgr/roads/*), (*http://www.dft.gov.uk/dvla/medical/ataglance.aspx*)

98) United Kingdom: Vehicle Certification Agency (VCA) (*http://www.vca.gov.uk/vehicletype/technical-services.asp*)

99) United Kingdom: Transport Research Laboratory - TRL (*http://www.trl.co.uk/*)

100) United Kingdom: Police service of Northern Ireland (*http://www.psni.police.uk/*)

3.4 Assembly of user/behaviour data

Information on how road users perceive rules, measures and behaviour in traffic can give additional insight in the public support for certain measures taken or to be taken. The self-reported behaviour gives also some additional insight in road user behaviour and reasons to do so. With respect to the information on road user attitude and behaviour, the SARTRE studies provide a good starting point for this information. The studies span a number of years (1996, 1999, 2003, 2011), is harmonised between European countries, and is updated.

From the SARTRE studies, the following issues were selected because they are relevant for road safety:

- Driver behaviour (self-reported);
- Attitudes towards risk taking.

3.4.1 User/behaviour data

3.4.1.1 Driver behaviour

(Self-reported) driver behaviour that is typically available from SARTRE contains the following topics:

- Speeding;
- Drink driving;
- Protective system usage;
- Red light (amber) running;
- Overtaking;
- Tailgating;
- Giving way to pedestrians.

Speeding: Information about the self-reported speeding frequency (ordinal 6-point scale) is available for a) motorways, b) main roads between towns and c) country roads.

Drink driving: self-reported frequency of drink driving during last week (driving while over the legal limit) and driving with some alcohol. This information is available on an ordinal 4-point scale.

Protective system usage: Self-reported frequency of seat-belt wearing (ordinal 6 point scale) is available for a) built-up areas, b) country roads, c) main roads between towns, d) motorways.

Amber light running: The self-reported frequency of amber light running (ordinal 6 point scale).

Overtaking: Self-reported frequency of overtaking, in situations where it can just be made (ordinal 6 point scale).

Tailgating: Self-reported frequency of too close following of the vehicle in front.

Giving way to pedestrians: contains the self-estimated frequency (no time constraint) of giving way to a pedestrian.

3.4.1.2 Attitudes towards risk taking

Information on attitudes concerns the following issues:

- Alcohol and drugs;
- Speeding;
- Protective system usage.

Issues on alcohol and drugs contain the following information (all ordinal 5 point scale): a) agreement on freedom for people to decided for themselves how much they can drink and drive and b) agreement on more sever penalties for drink-driving offences. This information is also available by age group and gender.

Attitudes on speeding are about the agreement on more severe penalties for speeding (ordinal 5 point scale). Information is also available by age group and gender.

Protective system usage: information is available (all ordinal 5 point scale) on a) feeling of comfort when not wearing a seat belt and b) attitude towards the need of wearing a safety belt.

3.4.2 Current state and experiences

The information gathered from the SARTRE database can be found in Appendix 7 of this Report. As this data is research outcome, there was no need to let the data be validated by the national experts.

Although SARTRE is quite extensive, more information on road safety attitudes (especially on measures) in European countries may also be found in other national sources for each specific country.

3.5 Assembly of accident cost data

The calculation of road accident costs mainly aims to estimate the advantages presented by the road safety measures aiming to reduce the probability of death or physical injury resulting from a road accident. A comparison of the advantages associated with various actions of road safety, jointly in the study of their costs, can guide the political decision-makers in their choice to introduce, even to classify, various measures. The costing of road accidents can therefore be envisaged as a tool of improvement of decision-making and a means of classifying the politics, the projects, and the research regarding road safety.

Official estimates of road accident costs have been prepared in most of the highly motorized countries of the world for a number of years. These economic valuations can be used in cost–benefit analyses of road investments or for other purposes. The cost estimates should then reflect the social utility of decreasing the number of road traffic injuries (fatal, serious, and slight).

It is often found, in the various studies led on the accidents, differences in term of costs for the victims and costs of accidents, which match up a little this distinction individual / society, with however nuances. The analysis of European cost data shows however that the cost analysis does not follow a universal method and that on the contrary, numerous procedures exist, what makes difficult the comparisons between countries or between studies generally. Within the framework of DaCoTA several existing studies and reports on accident costs calculation were reviewed and a synthesis report has been prepared and is available in Appendix 8, providing also recommendations for the harmonization of the calculation methodology between the countries.

4. ESTABLISHING LINKS WITH EXTERNAL FILES

4.1 General

This task aims to provide links with external data sources. The objective is thus to gather, link and standardise road safety data as well as other sources. This should enhance the exploitation of this information for decision making in a reliable and integrated way. The best way to deliver this type of information is by providing reciprocal web links.

The type of information that is disclosed includes:

- National data files
- International data files
- Research project data
- Stakeholder data

In general, some notes have to be made on this type of data within the scope of the

A short description is provided with each link to give the user an idea about its content. It should be noted though that the reliability of the information can only be assured as far as it concerns the work of the DaCoTA partners and not links to other sources.

As a starting point, the already quite complete link list developed during SafetyNet and still available from *erso.swov.nl* has been updated, using input from the project partners.

4.2 Links within the DaCoTA system

The updated list contains links to:

- National and international databases;
- Governments, institutes and other organisations relevant to road safety;
- Road safety project websites throughout Europe.

The list includes the link to the website, a brief description of the organisation, project or database. Also the country and the type of link are specified and can be used to search.

Some general, worldwide road safety related information is also included in the list.

Links to governmental departments responsible for traffic and transport (e.g. the Austrian Ministry for Traffic, Innovation and Technology) are also part of the list, as well as many active road safety research institutes (i.e. VTI) and organisations such as operation and support institutes (i.e. CROW) or public authorities (i.e. FIA foundation). These links lead to more information about road safety programmes, strategies and measures.

Finally, links to specific road safety projects are included in the pilot system. These projects can be directed at:

- Governments and policy makers (e.g. CAST Campaigns and awareness-raising strategies program)
- Road safety professionals in general (e.g. ROSEBUD)
- Public (e.g. EuroNCAP)

More than 400 links are organised in several user-friendly ways, allowing the users to search for the information/data they need by:
Alphabetic order

Country

Focus (each divided by sub-categories):

- Alcohol/drugs
- Campaign
- Data
- Drivers
- ITS
- Knowledge dissemination
- Law
- Protection

Organisation:

- EU project
- EC level
- European road safety organisations
- Government
- Libraries
- Research
- Special interest group
- Statistics office.

The complete list of the links in alphabetic order is available in Appendix 9, and also in the DaCoTA System (http://safetyknowsys.swov.nl)

5. ORGANISING META DATA

Using data for policymaking or in scientific research requires sufficient knowledge about the quality of the data source. As the data is instrumental to the outcome of the process, unknown anomalies of the data will yield invalid conclusions. Therefore is it crucial to know the reliability of the data source.

Meta data describe this reliability. We distinguish several properties of the data and the data source that together define the reliability. These properties are described in chapter 2 in a conceptual way. Chapter 3 and 4 describe two applications of this structure of properties: Dutch crash data and Dutch data on distance travelled

5.1 Conceptual description of meta data issues

5.1.1 Scope

The scope of a data collection is the purpose of the registration process.

In traffic safety, we often use databases compiled with a completely different scope e.g. a hospital registration. However, these sources might contain valuable information about traffic accident related injuries or other issues concerning road safety.

5.1.2 Definitions

This put constraints on what is considered to be inside the scope of the data collection e.g. a traffic accident is an accident involving at least one vehicle and happens on a public road.

5.1.3 Intake policy

This defines the lower and upper threshold if applicable to incorporate cases in the database

5.1.4 Practice

The formal definitions and policies might not be completely observed. This can result in underreporting.

5.1.5 Accuracy

Values might be known with certain accuracy or can even be estimates.

Information that is more accurate might be available but the expenses to actually collect it can be too high.

5.1.6 Coding procedure

All information gathered will be coded to enable processing.

By design, this is reducing the data to the classifications allowed by the coding system.

The coding system might narrow down the level of detail or simply does not allow for coding all information available.

5.1.7 Validity

Knowing the constraints, one can establish the validity of the data collection in relationship to the questions one would like to answer.

Below an example of meta data for the road crash database in the Netherlands is presented, indicating the way this structure can be applied on several types of data. Moreover, in Appendix 10 a report relevant to road accident meta-data concerning underreporting is included.

5.2 Road Crash Data

Country: The Netherlands

Source: Bestand geRegistreerde Ongevallen in Nederland, BRON

5.2.1 Scope

Registration of road crashes in the Netherlands.

5.2.2 Definitions

- A crash is considered a road crash when there is at least one vehicle involved, actively participating in traffic on a public road.
- Damage to parked vehicles is not considered a traffic crash.

5.2.3 Intake policy

In the Netherlands, the police register the accidents.

The massive motorization made the police decide not to register property damage only crashes with less than € 1000,- damage.

In 2011, there was a major policy change at the police. Only if there is a severe violation of the law, the crash will be registered. As a consequence the number of registered accidents dropped substantially.

5.2.3.1 Registration rate of killed victims

CBS obtains the data via the obligatory reporting system. In this system the doctor or autopsist sends the “cause of death”-form, together with the death-certificate to the Register of Births, Marriages, and Deaths of the municipality where the death occurred. The “cause of death”-form, which the doctor only fills in for the statistics, is then sent to Statistics Netherlands (CBS).Further, data of court records of unnatural deaths are also used to compare to BRON data. These three sources together form the basis of the actual number of road fatalities in The Netherlands.

The number of killed in BRON having the nationality of the Netherland can be compared with the CBS registration.

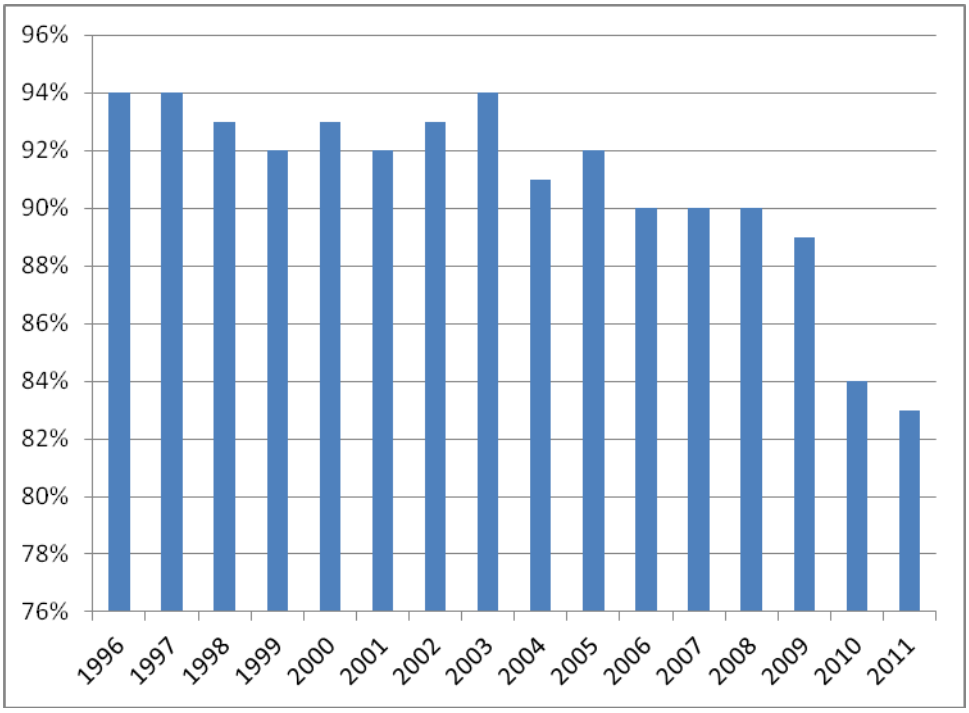

Figure 2: Registration rate of killed victims

5.2.3.2 Registration rate of severe injuries

The hospitals in the Netherland maintain a registration of the reason why somebody is admitted. One of these reasons can be a traffic crash. If BRON data are matched with hospital data, it turns out that many in-patients recorded in BRON are actually not inpatients, and vice versa. Also many inpatients turn out to be slightly injured. Since 2010, a minimum injury of MAIS2 is necessary for casualties to be counted as serious road injury. The number of actual serious road injuries in crashes with motorized vehicles, (recorded either as in-patient or as emergency room treatment) recorded in BRON, is decreasing over the years.

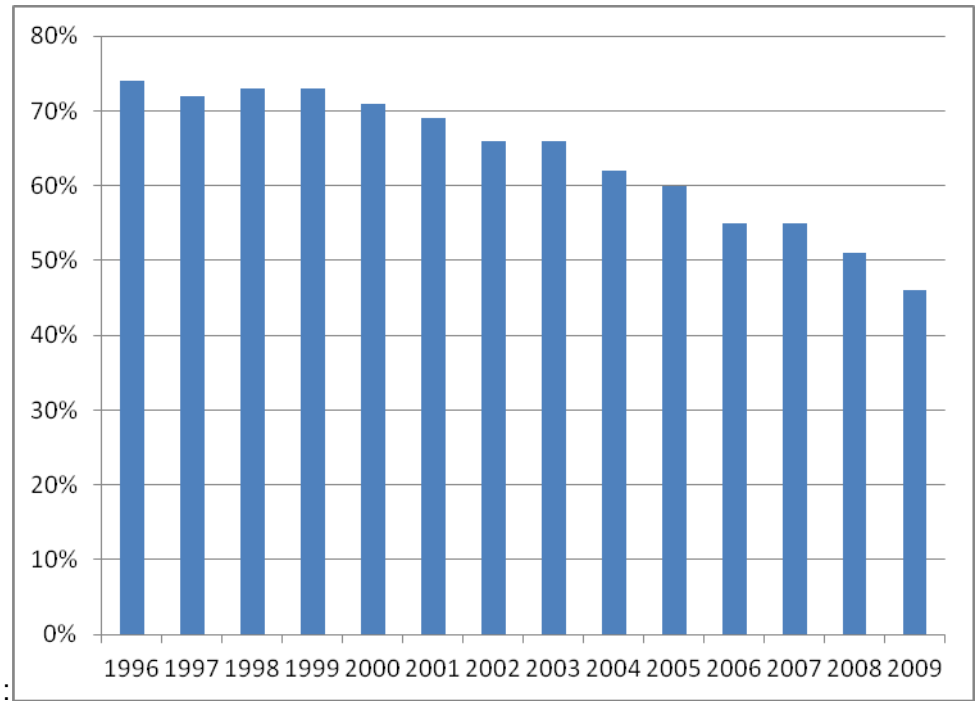

Figure 3: Registration rate severe injuries

5.2.4 Practice

While the intake policy puts constrains on the number of accidents to be registered, there are reasons why the actual number of crashes might be lower than the intake policy allows for.

First of all the police must be notified of an accident. This is not always the case e.g. single vehicle accidents involving damage to e.g. crash barriers are a known example.

Single accidents with bicyclist do comply with the definition of a traffic accident but everybody including the police considers it an ‘accident’ just like when a pedestrian falls.

This makes BRON almost useless as a source for single vehicle accidents involving bicyclist.

In general, the more severe the accidents, the better the registration rate.

5.2.5 Accuracy

5.2.5.1 Injuries

The injuries are coded using a simple scale:

1. Dead on the spot.
2. Dead within 30 days
3. In-patient
4. Emergency treatment
5. Slightly injured

All but the first requires the police to contact the hospital and to verify the severity of the injury.

In practice there is a substantial difference between the injury severity as reported by the police and the one derived from the hospital registration.

5.2.5.2 Speed limit

There are indications that the police have problems to differentiate between 30 km/h and 50 km/h speed limits.

A common error in case of mopeds is to record the speed limit of the moped (30 km/h inside buildup area, 40 km/h outside) instead of the limit of the road.

5.2.6 Coding procedure

The road crash database is maintained by the Ministry of Transport and Environment (I&M) and is based on the report forms filled in by the police and sent to I&M.

Data are registered since 1976. In 2004, there was a major change in the coding procedure.

5.2.6.1 Completeness

In case of missing or incomplete information, the coding office tried to get this information by calling the police. From 2004 on this is no longer the case.

Exception to this rule is severe crashes resulting in death or in-patient hospitalization

5.2.6.2 Location

Part of the registration form is a diagram of the road and the vehicles.

This allows for coding the maneuvers.

I&M decided to stop coding this from 2004 on. Therefore, it is no longer possible to derive information about the (intended) manoeuvers of the vehicles involved.

5.3 Conclusions

Over the years, the registration rate of fatal and severe accidents dropped substantially.

At the present BRON is considered by many not to be a valid source for reliable information about traffic safety in the Netherlands.

By comparing BRON with other resources, one can make an estimate of the real number of victims.

In case of severe injuries the registration rate has dropped to such an amount that the error margin of this comparison becomes too high.

BRON is not a valid source for single vehicle accidents.

Not all information as compiled by the police is available in the database. Noticebly information about the maneuvers is no longer coded.

5.4 References

Road crash registration (BRON) - SWOV

Causes of Death - CBS

National Medical Registration (LMR) - Prismant

Serious road injuries in the years 2009 and 2010 M. Reurings & N. Bos. SWOV, Leidschendam

6. ESTABLISHING OUTPUT INTERFACES

6.1 General

This WP3 Task concerns the establishment of the necessary output interfaces in order to provide the necessary data in the necessary format. More precisely, basic statistical outputs (Statistical Reports, Basic Fact Sheets) already developed using CARE accident data were prepared to be further used and disseminated together with the other DaCoTA results in ERSO by WP4 - Decision Support. However, these statistical outputs were gradually enhanced with additional non-CARE data that were gathered and included in the DaCoTA system (in-depth accident data, exposure data) and additionally, more Fact Sheets on new road safety related topics were developed.

6.2 Annual Statistical Report s

During the DaCoTA WP3, three editions of the Annual Statistical Report were developed (see DaCoTA Deliverables D3.1 - D3.5 and D3.9). The older Annual Statistical Report 2008 was used as the basis, but more recent road accident data from the CARE database, for more countries, were used in each edition. The last edition of the Annual Statistical Report 2012 provides the basic characteristics of road accidents in 26 member states of the European Union and Switzerland for the period 2001-2010, on the basis of data collected and processed in the CARE database, the Community Road Accident Database with disaggregate data. The period 2001-2010 has been used in order to maximize the sample of data. However, data for some countries and corresponding years were not yet available in the CARE database at the date of drafting the report.

Special attention should be given to the following points that concern the content of the Annual Statistical Report:

- Analysis and comparisons of the numbers of accidents and injuries are not always possible, as different definitions exist in each EU Member State.
- Fatality data are compatible between countries and use common definitions as a result of the CAREPLUS 1 and CAREPLUS 2 project. Corrective factors have been applied to comply with the international definition of people killed within 30 days after an accident. (*http://ec.europa.eu/transport/roadsafety/road_safety_observatory/doc/care_glossary.pdf*).
- On fatal accidents data, no corrective factors have been applied to comply with the international definition of persons killed within 30 days.
- Minor differences in totals are due to rounding-off differences of data.
- “Unknown” values are not displayed in tables, but totals include the unknowns.
- The EU totals for all people killed are not necessarily the sum of each subdivision of these persons, given that there are no data available for all subdivisions and all countries. Corresponding percentages refer to the available data.
- Partial or complete reproduction of these statistics is permitted if the source is mentioned and accompanied with the remarks included in the Statistical Report.
- The basic characteristics of fatal road accidents in the EU member states have been selected as those which might be useful for road accident analysis and where data

are available for all or most of the EU countries. More precisely, the basic characteristics of fatal road accidents refer to:

Person class (driver, passenger, pedestrian)

Person killed (age groups and/or gender)

Area type (inside or outside urban area)

Motorway (yes or no)

Junction type (crossroad, level crossing, not at a junction, roundabout, T or Y junction)

Weather conditions (dry, fog or mist, rain, snow/sleet/hail, strong wind)

Modes of transport – vehicle group (agricultural tractor, bus or coach [>8 seats], car or taxi, heavy goods vehicles, lorry under 3,5 tons, pedal cycle, moped, motorcycle, other)

Month (January to December)

Day of the week (Monday to Sunday)

Hour (0-24)

The last, 2012 edition of the Annual Statistical Report consists in total of 52 Tables and 26 Figures with the most interesting combination of CARE road accident data on the following major topics:

Overview – major issues

- EU-25 – Developments (also includes data other than CARE)
- Interesting Details

Time Series – last 10 years

- General time series
- Time series related to mode of transport
- Time series related to person age and gender

Fatalities 2010

- People involved
- Modes of transport
- Accident characteristics
- Various periods of time (month, day of week, hour of day)
- Type of area / road
- Type of junction
- Weather conditions

All three editions of the Annual Statistical Report are available in the DaCoTA System (http://dacotapilot.swov.nl/Statistics/Annual-statistical-reports.html).

6.3 Basic Fact Sheets

6.3.1 General

The CARE database brings together the disaggregate details of road accidents and casualties across Europe. It is based on the national accident databases maintained by all EU member states, taking account of the differences between national systems for recording accidents. It is thus a vital resource in monitoring the level of road safety across Europe, and for formulating approaches for reducing the harm caused throughout Europe by road accidents.

Access to the CARE database is permitted only to a restricted range of users, so it is important to develop a comprehensive range of publications based on these data that are accessible to the general public. This process was begun in the SafetyNet project that was carried out between 2004 and 2008 as part of the European Commission's Sixth Framework Programme. The concept of the Basic Fact Sheet (BFS) was developed, and by 2008 a set of twelve BFS's was being prepared annually by researchers at five institutes and published via the SafetyNet and the EC website. The 'Main figures' Fact Sheet provided an overview of the accident data. The other Fact Sheets presented a range of statistics derived from analyses of the CARE database relating to a specific group of accidents or casualties, such as pedestrian casualties or accidents occurring on motorways. All Fact Sheets gave details of trends over ten years, with more detailed analyses of data from the most recent year. Only data relating to fatal accidents or casualties were analysed because of inconsistencies between national reporting of non-fatal accidents and casualties.

One of the tasks of DaCoTA Work Package 3 has been to continue to develop this area of work. Within the framework of DaCoTA three new editions were developed. The edition of the twelve (12) Basic Fact Sheets 2008 was used as the basis, but more recent road accident data from the CARE database, for more countries, were used and also new content was gradually added. For the 2010 and 2011 editions five (5) new Fact Sheets have been developed, whereas in the 2012 edition another Basic Fact Sheet on Causation was included. The set of eighteen Fact Sheets that were prepared in 2012 is listed below in Table 2. One part of the development has comprised adding details of accident causation to Fact Sheets where appropriate, based on in-depth accident data collected during the SafetyNet project, health indicators by the EU Injury Database, but also maps on specific road safety topics derived from the CARE system.

Table 2: Titles of current Basic Fact Sheets

	Basic Fact Sheet	Health indicators section	Causation section
Update and expansion of existing BFS	Main figures	Yes	No
	Children (aged<15)	Yes	No
	Young people (aged 18-24)	No	Yes
	The Elderly (aged>64)	Yes	Yes
	Pedestrians	No	Yes
	Cyclists	Yes	Yes
	Motorcycles & mopeds	No	Yes
	Car occupants	Yes	Yes
	Heavy Goods Vehicles and Buses	No	Yes
	Motorways	No	No
	Junctions	No	Yes
	Urban areas	No	No
New BFS	Youngsters (age 15-17)	Yes	No
	Roads outside urban areas	No	No
	Seasonality	No	No
	Single vehicle accidents	No	Yes
	Gender	Yes	Yes
	Accident Causation	No	-

A central aim of road safety analysis is to measure and compare the risk of having an accident, so measures of exposure to risk are indispensible for providing the context for the accident and casualty data. Risk indicators are generally calculated as the ratios between accident or casualty counts and an appropriate exposure measure. Various indices exist that quantify more or less satisfactorily the exposure to risk of those travelling by road in a country, so they are related more or less directly to the number and type of road accident casualties in that country.

These indices are typically divided into three groups: those relating to the people using the roads and their behaviour, those relating to the vehicles being used, and those relating to the road infrastructure. The range and detail of indices that are collected varies between countries. One of the tasks of DaCoTA Work Package 3 is to bring together the available files of exposure data to broaden the range of analyses of CARE data that can be conveniently be made. Where possible, these exposure data have been used to enhance the Fact Sheets.

Moreover, the combination of road accident data with data on road accidents derived from the health sector can provide a better insight on the severity of the road accidents, but also on the identification of the appropriate measures to mitigate the impact of the road accidents. On this purpose, a first attempt to make an assembly of health data was made in order to identify any indicators that could be incorporated into the DaCoTA system. On that purpose, information on medical environment from EUROSTAT and also the IDB (Injury Database) was exploited. Initially, based on the available limited data, some health indicators were defined, with a similar structure to the Risk Exposure Data. More specifically, the following indicators are defined:

- Heath personnel by the type of personnel
- Hospital facilities
- Main causes of deaths

Some of these health indicators were included in selected Basic Fact Sheets giving them significant added value.

Finally, some basic causation data and information that can provide a top level overview of the topic being examined is included in some of the Basic Fact Sheets, exploiting the only resource that has harmonised information regarding causation, across a number of European countries, the in-depth SafetyNet Accident Causation Database (Methodology: SafetyNet Deliverable D5.5, Analysis: SafetyNet Deliverable D5.8). Data from 6 countries was collected in the SafetyNet project following a common methodology and, importantly, a detailed process for recording causation called the SafetyNet Accident Causation System (SNACS). This resource includes 1.006 cases split between Germany, Italy, The Netherlands, Finland, Sweden and the UK. It was therefore decided to use this resource to supplement Fact Sheets of the 2011 edition with causation data. To reflect the nature of the BFS, each causation section was limited to two pages. The level of detail in the database is high and this conciseness limited the amount of analysis possible in each fact sheet. Interesting points emerged for each topic, though, and the work indicates the future investigations that would be possible using the database.

For the 2012 edition a separate Basic Fact Sheet on Causation was developed.

All three editions with the related Basic Fact Sheets are available in the DaCoTA System (http://dacotapilot.swov.nl/Statistics/Basic-fact-sheets.html).

6.3.2 Practical details

After the allocation of the Fact Sheets to the Task 3.6 partners, active preparation of the first edition began in October 2010. For each edition, the CARE database was "frozen", i.e. no changes were made to the database during the period of the queries to ensure that the Fact Sheets would have a consistent statistical basis. The database was "frozen" for two months, and all data needed to compile the Fact Sheets were extracted during that period. The following Table 3 summarises the availability of CARE data at the time of the third edition of 2012.

Table 3: Availability of CARE data for Fact Sheets

		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2009
Belgium	BE	X	X	X	X	X	X	X	X	X	X	X	X
Bulgaria	BG	-	-	-	-	-	-	-	-	-	-	-	-
Czech Republic	CZ	X	X	X	X	X	X	X	X	X	X	X	X
Denmark	DK	X	X	X	X	X	X	X	X	X	X	X	X
Germany	DE	-	X	X	X	X	X	X	X	X	X	X	X
Estonia	EE	-	-	-	-	-	-	X	X	X	X	X	-
Ireland	IE	X	X	X	X	X	X	X	X	X	X	X	X
Greece	GR	X	X	X	X	X	X	X	X	X	X	X	X
Spain	ES	X	X	X	X	X	X	X	X	X	X	X	X
France	FR	X	X	X	X	X	X	X	X	X	X	X	X
Italy	IT	X	X	X	X	X	X	X	X	X	X	X	X
Cyprus	CY	-	-	-	-	-	X	-	-	-	-	-	-
Latvia	LV	-	-	-	-	-	-	-	X	X	X	X	X
Lithuania	LT	-	-	-	-	-	-	-	-	-	-	-	-
Luxembourg	LU	X	X	X	X	X	X	X	X	X	X	X	X
Hungary	HU	-	-	-	-	X	X	X	X	X	X	X	X
Malta	MT	-	-	-	-	-	-	X	X	X	X	X	X
Netherlands	NL	X	X	X	X	X	X	X	X	X	X	X	X
Austria	AT	X	X	X	X	X	X	X	X	X	X	X	X
Poland	PL	-	-	X	X	X	X	X	X	X	X	X	X
Portugal	PT	X	X	X	X	X	X	X	X	X	X	X	X
Romania	RO	X	X	X	X	X	X	X	X	X	X	X	X
Slovenia	SI	-	X	X	X	X	X	X	X	X	X	X	X
Slovakia	SK	-	-	-	-	-	-	X	X	X	X	X	X
Finland	FI	X	X	X	X	X	X	X	X	X	X	X	X
Sweden	SE	X	X	X	X	X	X	X	X	X	X	X	-
United Kingdom	UK	X	X	X	X	X	X	X	X	X	X	X	X
Switzerland	CH	-	-	-	-	-	X	-	-	-	X	X	X
Iceland	IS				X	X	X	X	X	X	X	X	X

X = CARE contains data for this country and year Source: CARE Database / EC

- = CARE does not contain data for this country and year

The availability of CARE data, as summarised in the Table above, had various consequences for the coverage and content of the Fact Sheets of 2012. There were CARE data for 2011 for a significant minority of countries, but not enough to choose 2011 as the terminal year for the analyses; instead, the decade 2001-2010 was chosen to be the period covered. There was good availability of data for 2010, which simplified the analyses that focus on the latest year of data. Several countries were missing data for 1 or 2 years at the beginning of the decade, so it was decided to estimate these missing data as the first reported number: this allowed 10-year time series to be based on the widest range of countries possible. Note that some details were not recorded for certain countries, or not recorded well, which meant that specific analyses had to exclude these countries. For example, hour of accident is not known in the German data, so Germany must be omitted from analyses relating to time of day.

In principle, the CARE database can contain data from European countries outside the EU. Data for Switzerland and Iceland is missing for some years, however, when possible, Fact Sheets were extended to include non-EU countries.

A standard template, similar to the approach adopted in SafetyNet, was developed by one of the partners (KfV) in order to ensure that all Fact Sheets shared a common format.

The seventeen Basic Fact Sheets that have been prepared in 2010 are available in Deliverable D3.2 – Basic Fact Sheets 2010 of the DaCoTA project.

6.4 Design Principals for the Basic Fact Sheets and Annual Statistical Reports

During the preparation of the Basic Fact Sheets (BFS) and the Annual Statistical Reports (ASR) different partners were in charge for separate BFS or sections of the ASR and individually worked on these documents, so the final drafts showed a certain variety of styles. It was subsequently agreed that a more uniform style was desirable for future versions.

On that purpose, a short document was prepared by one of the partners (TRL) setting out guidelines that are to be followed when a Basic Fact Sheet is drafted or redrafted in the future. Some of these issues also arise with the Annual Statistical Report. The guidelines are based as far as possible on scientific principles. In order to achieve consistency, however, it has been necessary to make rather arbitrary choices in some cases. All principals are available in Appendix 11.

7. CONCLUSIONS

Even though some European countries present a remarkable road safety level, being among the countries with the best road safety performance at global level, there are several constraints that do not allow for accurate road safety analyses at a European level. The lack of specific data and of related details (accidents, injuries, exposure, performance indicators, etc.), the data compatibility and comparability issues among the European countries and the low reliability of data in several cases are the most common problems that need to be confronted. Additionally, the absence of standard methodologies for data/information collection and analysis is observed, and through existing analyses correlations between various parameters are identified but not the causation of the accidents, thus analyses are not solution oriented. On that purpose, **the necessity for systematic collection of road safety data and knowledge through a comprehensive tool is now more urgent than ever**.

The expected outcome of DaCoTA WP3 was the establishment of a **solid but easily accessible, integrated road safety system** that will allow for road safety policy and decision making at all levels, to use a complete set of aggregate road safety related data (road accident data, risk exposure data, safety performance indicators, in-depth data, health indicators/data) and information (programmes, measures, legislation, social cost, behaviours/attitudes, regulations), supplemented by methodologies, analyses and benchmarking tools.

A **three-step methodology** was adopted for the development of this road safety data and knowledge tool:

As a first step existing road safety **data and information was gathered** from various national and international sources, initially directly from the sources and at a second phase through national Experts of the CARE/RSPI Experts Groups.

Road safety data gathered concerned: Road accident data from CARE, Risk-exposure data from EUROSTAT, IRTAD and national sources, data on Safety Performance Indicators, Health data/indicators from EUROSTAT and EU Injury database and In-depth accident data/indicators from the Fatal Accident Database and the Accident Causation Database.

Road safety knowledge gathered concerned: Road safety programmes in 30 European countries, 655 road safety measures identified for 34 different sub-categories (grouped in 4 main categories), with an exhaustive description and related information, 54 different traffic rules into 4 main groups (drivers, pedestrians, vehicles, emergency phone number), issues related to behaviour (self-reported) on Speeding, Drink driving, Protective systems usage, Overtaking, Driving through amber light, Giving way to pedestrians, Tailgating and attitudes towards risk taking regarding Alcohol and drugs, Speeding, Protective system usage. Finally, a review of road accident cost data and calculation methodologies.

Additionally, 263 data and knowledge elements necessary for specific road safety analyses by other DaCoTA WPs were gathered through the **DaCoTA Master Tables**.

As a second step, **key road safety analyses and syntheses** were developed on the basis of the data/information gathered. **18 Basic Fact Sheets** with disaggregated road accident data for a decade on selected road safety topics, with worth-noticing comments outlined in the “highlight boxes” were prepared in three editions (2010, 2011 and 2012). These editions were significantly enhanced with maps from the CARE/CADaS database, with Tables and Figures with in-depth accident/causation data for 6-7 countries, as well as with health indicators from the EU Injury database.

Three editions of the **Annual Statistical Report** were also delivered (2010, 2011 and 2012) with 52 Tables and 26 Figures with the most interesting combination of selected road accident data related to: Person class, Person killed, Area type, Motorway, Junction type, Weather conditions, Modes of transport, Month, Day of the week, Hour of day, from 27 European countries for a decade. Both these outputs were developed according to specific design principals.

In order to facilitate road safety level comparisons between countries, **Country Overviews** were developed in DaCoTA WP4 for each country, in which all layers of the Road Safety Pyramid are covered, related to: Structure & Culture, Programs & measures, Road Safety Performance, Indicators, Road Safety Outcomes, Social Cost. There is also a synthesis section where the safety position of the country is recorded, the scope of the main problem is noted and any recent progress and any remarkable road safety policy issues are presented.

Additionally, the data and information gathered allowed for the preparation of the **Road Safety Management Profile** for each European country within the framework of DaCoTA WP1. 'Snapshot' of the country's road safety management system are included, based also on coded answers to questionnaire and comments of governmental and independent Experts, interviewed in the first quarter of 2012. An overview of road safety management good practice elements is presented, structures, processes & outputs are described according to the policy-making cycle and various Notes & Observations are recorded regarding policy orientation, medium-level intersectoral coordination, stakeholders' consultation, funding, monitoring and reporting, relations between national/regional level and knowledge production & use.

Moreover, data and information gathered was exploited by DaCoTA WP4 for the estimation of road traffic fatalities based on time-series analysis, as it is important to know in what direction the annual casualties are developing, and how fast this development is expected to go. In the **Country Forecast Fact Sheets** the road traffic fatalities, the traffic volume and the fatality risks are forecasted to 2020 and also forecasts according to mobility scenarios are carried out for all 30 European countries, with exposure as most important explaining variable. Forecasts of the road safety situation in every country include a description of the method adopted to produce these forecasts.

Finally, syntheses on key road safety issues were prepared in the form of **22 webtexts**, containing high quality information on important road safety topics. The information is scientifically founded, easy to read and ready to use and for each of the subject treated, the information consists of an overview of the magnitude of the problem, prevalence and countermeasures. The subjects are broadly related to: Age groups, Road users, Hazardous behavior, Post crash, Road safety measures and Policy issues. All these web texts were initially developed in SafetyNet and updated in DaCoTA, under supervision of an editorial group (SafetyNet) and editorial board (DaCoTA), both consisting of renowned, highly esteemed road safety experts, who were responsible for producing the information about a specific road safety subject. Both editions of the webtexts (SafetyNet and DaCoTA) are included in the DaCoTA pilot System.

At the last, third step, an **Integrated Road Safety Knowledge System** was developed as a comprehensive and integrated road safety information system with aggregate data and information consolidating, organising and making available existing data and information, necessary for the support of road safety decision making in Europe (see Figure 4).

Figure 4: Integrated Road Safety Knowledge System

This **DaCoTA system** is operational since mid 2012 (http://safetyknowsys.swov.nl) and consists of five main components (safety issues, countries, statistics, methods, links) and is described in detail in Deliverable D3.7 “Data Warehouse Design - Final Report”.

The proposed DaCoTA pilot system can serve as example for the further enhancement of the **European Road Safety Observatory** (ERSO), as new structures and features were tested during the development procedure and new data, knowledge and analyses outputs have been assembled and have become available for incorporation into the existing ERSO. Next steps for the improvement of this road safety data and knowledge tool concern carrying out more surveys for collection of exposure data, development of additional performance indicators and detailed recording of driver behavior. These should be supplemented by more large scale experiments on in-depth accident investigation, naturalistic driving and driving simulator, more research and analyses, enabling the identification of more solutions to real life problems, thus leading to a more rigid European Road Safety Observatory.

APPENDICES

Appendix 1: Master Tables

Appendix 2: Performance Indicators

Appendix 3: Health Indicators

Appendix 4: Safety Programmes

Appendix 5: Safety Measures

Appendix 6: Traffic Rules

Appendix 7: Behaviour/Attitudes

Appendix 8: Accident Cost

Appendix 9: Links

Appendix 10: Meta data

Appendix 11: Design Principals