

D.1.11 Enhancement of the CARE accident data

Contract No: TREN-04-FP6TR-S12.395465/506723

Acronym: SafetyNet

Title: Building the European Road Safety Observatory

Integrated Project, Thematic Priority 6.2 “Sustainable Surface Transport”

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Due Date of Deliverable: 31/10/2008

Submission Date: 08/12/2008

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Project Start Date: 1st May 2004

Duration: 4,5 years

Project co-funded by the European Commission within the Sixth Framework Programme (2002 -2006)		
Dissemination Level		
PU	Public	
PP	Restricted to other programme participants (inc. Commission Services)	X
RE	Restricted to group specified by consortium (inc. Commission Services)	
CO	Confidential only for members of the consortium (inc. Commission Services)	



Project co-financed by the European Commission, Directorate-General Transport and Energy

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0. Executive Summary

Work Package 1 of the SafetyNet Integrated Project is dealing with the further **enhancement and exploitation of the CARE system**, the European Community database with disaggregate data. Under that perspective, all SafetyNet WP1 outputs aim at contributing to the further development of the CARE system as a complete and powerful tool for road accident analysis, which will additionally contain a comprehensive set of end-products with compatible statistics, useful for the improvement of road safety in the European Union. Within the SafetyNet life-cycle, the work carried out in the WP1 Tasks was supplementary to the tasks for the development of the CARE system by the European Commission.

On this purpose, a methodology of **five distinct tasks** was adopted. Firstly, the compatibility improvement of data from fifteen EU countries (10 new Member States at the time of the beginning of SafetyNet and additionally Bulgaria, Iceland, Norway, Romania and Switzerland) to CARE was carried out through the development of appropriate transformation rules, to be applied on existing national road accident data. A process similar to the CAREPLUS 1 and 2 methodologies was used, fulfilling thus the priority of the European Commission DG - TREN to have progressively compatible data for more EU countries and form a more complete picture on the road safety level in Europe.

Another task of WP 1 concerned the identification of possible **links between the CARE accident data and the outcomes of other SafetyNet WPs**, as well as of other relevant projects. In particular the possibilities to integrate part of the work carried out in WP2 (Risk and Exposure Data), in WP3 (data on Safety Performance Indicators) and also in WP5 (in-depth accident data) in the CARE framework were examined, offering new possibilities to improve the understanding of the accident population at macroscopic level. When these data become available at EU level, there will be a need to adapt the CARE system to incorporate them. Furthermore, synergies between the work of WP1 and WP7 were identified, allowing for time-series and multilevel analyses of CARE accident data, but also of medical data gathered in the framework of national studies on underreporting in eight EU countries. Finally the establishment of links between the CARE system and the SUNflower +6 methodology was examined.

The **development of a comprehensive set of statistical outputs with comparable statistics**, useful for the support of decisions aiming to the improvement of road safety in the European Union was also an objective of SafetyNet WP1. These statistical outputs concern Annual Statistical Reports and 12 Basic Fact Sheets, as well as a recommendation for a set of Aggregate Data Files, all based on data derived from the EU CARE road accident database. Various types of road accident data users, ranging from road safety analysts to



the wider public, form the target audience to which these statistical outputs are addressed and thus, their content and format was accordingly defined.

Furthermore, the improvement of accident data compatibility throughout Europe was attempted through the establishment of a recommendation for a common framework for road accident data collection, among all EU countries. After the elaboration of this **Common Accident Data Set (CADaS)**, every EU country wishing to update its data collection system will be able to optionally and gradually use this common set. Thus, progressively, more and more common road accident data from the various countries will be available in a uniform format and in this way CARE, the European data base with disaggregate data on road accidents will gradually contain more compatible and comparable data, allowing for more reliable analyses and comparisons across the European countries.

Finally, within WP1 the development of a **method to estimate the numbers of non-fatal casualties in Europe** more accurately was attempted, by addressing the under-reporting issue, as well as the differences of injury classification in the different national systems. This was accomplished through national studies in eight EU countries, attempting to identify the underreporting level for each casualty severity (killed, seriously injured, slightly injured) with a uniform methodology and additionally, by attempting to introduce a new common measurement unit for the identification of the road accident casualties in the European countries: the number of hospitalised persons.

1. Introduction

1.1 Work Package 1 overview

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1.2 List of Work Package 1 Partners

There were 10 partners involved in the SafetyNet Work Package 1 from 10 different EU countries, an affiliated member (INTRAS) that became part of the WP1 partnership in 2006 and additionally the Information Collection Coordinator (ICC).

National Technical University of Athens	Greece	NTUA
Centre d'Etudes Technique de l'Equipement du Sud Ouest	France	CETE - SO
SWOV Institute for Road Safety Research	Netherlands	SWOV
Institut Belge pour la Sécurité Routière	Belgium	IBSR
Centrum Dopravního Vv ýzkumu (Transport Research Centre)	Czech Republic	CDV
Közlekedéstudományi Intézet Rt (Institute for Transport Sciences Ltd)	Hungary	KTI
Kuratorium für Schutz und Sicherheit	Austria	KfV
Road Directorate - Ministry of Transport	Denmark	DRD
TRL Limited (Transport Research Laboratory)	United Kingdom	TRL
Agència de Salut Publica	Spain	ASPB
Research Institute on Traffic and Road Safety - University of Valencia	Spain	INTRAS
Vehicle Safety Research Centre - Loughborough University (ICC)	United Kingdom	VSRC

1.3 List of Deliverables

Within the framework of the different WP1 Tasks 21 Deliverables have been developed during the 4,5 years of SafetyNet, as these are presented in the following Table:

Deliv. No	Deliverable title	Lead contractor
	Work Package 1 – CARE Accident Data	
D1.1	1 st Annual Statistical Report	KfV
D1.2	1 st Annual Basic Fact Sheets	KfV
D1.3	First Progress Report	NTUA
D1.4	Development of Statistical Reports and Analysis Notes - Intermediate Report	KfV
D1.5	Improvement of accident data compatibility throughout Europe - Intermediate Report	NTUA
D1.6	Estimation of the real number of road accident casualties - Intermediate Report	TRL
D1.7	2 nd Annual Statistical Report	KfV
D1.8	2 nd Annual Basic Fact Sheets	KfV
D1.9	3 rd Annual Statistical Report	KfV
D1.10	3 rd Annual Basic Fact Sheets	KfV
D1.11	Enhancement of the CARE accident data	NTUA
D1.12	Harmonising accident data from the EU countries	CETE-SO
D1.13	Linking CARE accident data with other data files	NTUA
D1.14	The Common Accident Data Set (CADaS)	NTUA
D1.15	Estimation of the real number of road accident casualties	TRL
D1.16	4 th Annual Statistical Report	KfV
D1.17	4 th Annual Basic Fact Sheets	KfV
D1.18	Development of EU road accident statistics	KfV
D1.19	EU Aggregate Data Files	KfV
D1.20	5 th Annual Statistical Report	KfV
D1.21	5 th Traffic Safety Basic Fact	KfV

1.4 Work Package 1 meetings

During the SafetyNet project several WP1 coordination and technical meetings took place, facilitating the work progress in the five Tasks and allowing revision of the relevant work programmes and main WP1 milestones. An overview of the main meetings is presented at the following Table.

Meeting No.	Place and date of the meeting	Host partner
	Work Package 1 – CARE Accident Data	
1 st	Vienna - 23 rd July 2004	KfV
2 nd	Crowthorne - 2 nd & 3 rd December 2004	TRL
3 rd	Barcelona - 25 th & 26 th April 2005	ASPB
4 th	Myconos - 17 th June 2005	NTUA
5 th	Köln - 6 th September 2005	IBSR
6 th	Leidschendam - 28 th October 2005	SWOV
7 th	Delft - 10 th March 2006	IBSR
8 th	Athens - 10 th April 2006	NTUA
9 th	Copenhagen - 25 th September 2006	DRD
10 th	Budapest - 22 nd & 23 rd March 2007	KTI
11 th	Vienna - 3 rd & 4 th September 2007	KfV
12 th	Barcelona - 25 th January 2008	ASPB

Some other meetings with the EC CARE administration or at Task level also took place during the 4,5 years of SafetyNet.

1.5 Dissemination activities

During the SafetyNet project life-cycle, several activities regarding the dissemination of the knowledge developed within WP1 took place, especially towards the end of the activities in each Task, when the relevant outputs were more concrete and robust. An overview of the main events (Conferences, seminars, etc.) in which work of the WP1 was presented is presented at the following Table:

Enhancement of the CARE accident data

Dates	Type	Type of Audience	Partner responsible/ involved
10-11 May 2006, Prague	SafetyNet Conference	Road Safety community	NTUA
Bi-annually from 2004 to 2008, Brussels	CARE Experts Group Meetings	National Representatives	NTUA
2005, 2006, 2007	IRTAD meetings		KfV
29 September 2005, Greece	Pre-event of the First European Conference on Injury Prevention and Safety Promotion <i>"Towards a Safer Europe: Time for Action"</i>		NTUA
26 - 28 November 2006, Brno	3 rd IRTAD Conference	Road Safety community	NTUA and KfV
	FERSI Conference	Road Safety community	SafetyNet partners
6 June 2007, Arcachon	SafetyNet Plenary	SafetyNet Consortium	NTUA
June 2007, Amsterdam	Common SafetyNet - SUNflower (+6) workshop	Road Safety community	NTUA
June 2007, Valencia	SAU (Urban Accident Analysis Systems) workshop	Road Safety community	NTUA
December 2007, Munich	5 th Conference "Protection of Children in Cars"	Road Safety community	TRL
17-18 April 2008, Rome	Final SafetyNet Conference	Road Safety community	NTUA
April 2008, Ljubljana	Transport Research Arena Conference 2008	Transport and Road Safety community	NTUA
October 2008, Brussels	Final SafetyNet Plenary	SafetyNet Consortium	NTUA

Moreover, scientific papers concerning basic results of the various activities of the SafetyNet project are already published in the proceedings of conferences or are currently prepared to be sent for publication in scientific journals and / or conference proceedings.

More specifically the following papers, based on the WP1 work have been published or have been submitted for publication:

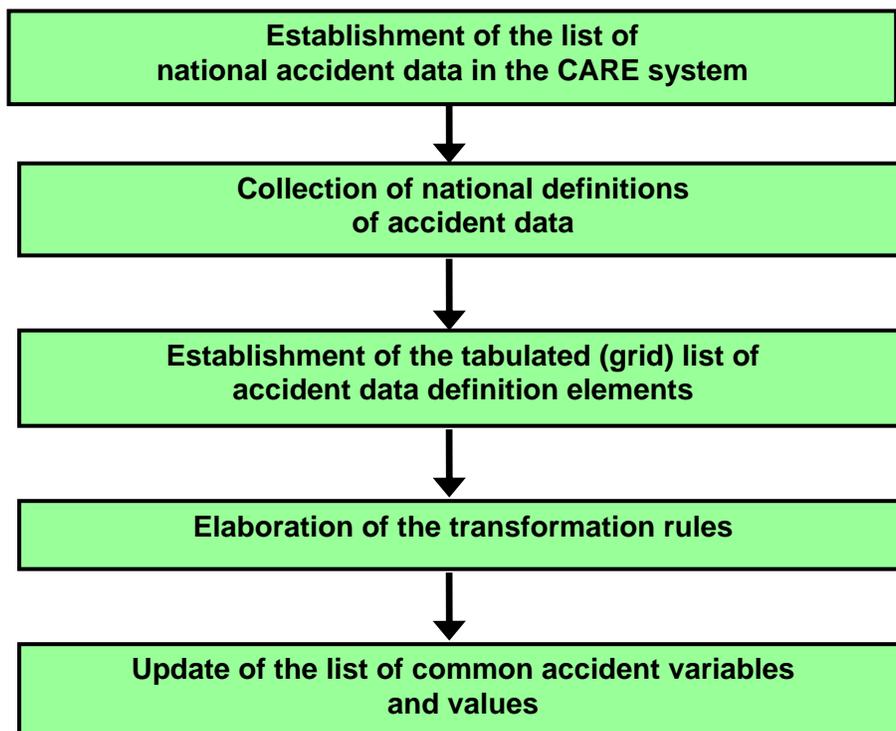
- "Comparative analysis of road safety parameters in the European motorways" (G. Yannis, P. Evgenikos, S. Hoeglinger, N.M. Bos, J. Broughton, B. Lawton). Proceedings of 2nd Transport Research Arena Europe 2008 Conference, Ljubljana, 21-24 April 2008.
- "How safe are children in cars on European roads?" (L. Walters, J. Broughton, B. Lawton, G. Yannis, P. Evgenikos, S. Hoeglinger, N.M. Bos). Proceedings of 5th Conference "Protection of Children in Cars", Munich, 6-7 December 2007.
- "Enhancement and exploitation of the existing European road accident data" (Yannis G., Evgenikos P., Lejeune P., Hoeglinger S., Broughton J.). Proceedings of 3rd IRTAD Conference "Road Traffic Accident Data: Improved Data For Better Safety", Brno, 26-28 Νοέμβριου 2006.
- "A comprehensive set of road safety basic statistics in Europe" (Hoeglinger S., Yannis G., Evgenikos P., Bos N.M., Broughton J.). Proceedings of 3rd IRTAD Conference "Road Traffic Accident Data: Improved Data For Better Safety", Brno, 26-28 Νοέμβριου 2006.
- One paper on the work of SafetyNet WP1 is accepted for publication in the scientific journal "Traffic Injury Prevention" ("Linking Emergency Medical Department and Road Traffic Police casualty data: a tool in assessing the burden of injuries in less resourced countries" E. Petridou, G. Yannis, A. Terzidis, N. Dessypris, E. Germeni, P. Evgenikos, N. Tselenti, A. Chaziris, I. Skalkidis).

Furthermore, the project results are already promoted at the interested parties of the private and public sector in the various EU countries.

2. Compatibility improvement of data from the new Member States

With the accession of the 10 new Member States in the European Union in 2004 (**Estonia, Malta, Cyprus, Latvia, Lithuania, Czech Republic, Slovakia, Slovenia, Hungary and Poland**) there was a need to have the new countries accident data available into the existing CARE system in order to form a more complete picture on the road safety level in the EU. Additionally, accident data from certain states of the European Economic Area (**Norway, Switzerland, Iceland**), but also from **Bulgaria and Romania** were progressively incorporated into CARE, which in this way will be enhanced and extended, allowing the establishment of a broad and compatible accident database, a more comprehensive set of road safety analyses and comparisons among all countries at EU level.

On that purpose, the following **five step methodology** based on the CAREPLUS structure has been developed, in order to appropriately transform the national accident data from the EU countries and make it compatible to the CARE system.



As in the CAREPLUS projects, which were designed to improve the comparability of national road accident statistics, held in the European Union road accident database CARE, this was achieved by restructuring existing national road

accident files within the CARE system, rather than harmonising the collection methods of EU countries. On this purpose, appropriate transformation rules were developed to **transform original national road accident variables into common road accident variables**, which can subsequently be compared among all or most EU countries.

It should be noted that obtaining comparability will leave unchanged differences in the reporting level of accidents, or variations in data quality that already exist between Member States' road accident systems.

Within the framework of SafetyNet Task 1.1 the **basic working principles** of CAREPLUS were used to develop the appropriate transformation rules for the road accident data of the 15 additional EU countries:

- 1) Compatibility with the national road accident data was examined only for the **existing common CARE variables and values**.
- 2) For these common variables and values, the **definitions were collected in both native language and English** and information on their relation to some predefined definition interpretations was collected through the Grids. However, definitions of the non-common national variables and values were also recorded and are included in this Deliverable.
- 3) In some cases, **qualitative information** regarding the collection of some national variables and values was also recorded (frequency of specific data collection, reliability of data collected, etc.), supplemented by more general information on the national road accident data collection system, enabling to identify any particularities that could assist to the appropriate development of the respective transformation rules.
- 4) **Transformation rules** for the common variables and values were established using the same procedure and format as in the CAREPLUS project.
- 5) In certain cases, **recommendations** were made **for additional national variables or values** that could be considered for inclusion into CARE at a next stage. This mostly concerned variables and values that were similar among the national accident databases and were common in most of the examined countries. However, further investigation should also consider whether these are also included in the national databases of the 14 EU countries, data of which is already included into the CARE system.

Initially, a **complete list of the common national accident variables and values** already incorporated in the CARE system and the relevant definitions was established.

At a second stage, the **full description of the national road accident database** of the countries was recorded. More specifically, all the national road accident variables and values, along with the related definitions were collected by all new Member States, as well as Norway, Switzerland, Iceland, Bulgaria and Romania using the following appropriate template.

COUNTRY :		NATIVE FOLDER NAME :		ENGLISH FOLDER NAME :	
		NATIVE VARIABLE NAME :		ENGLISH VARIABLE NAME :	
VARIABLES		VALUE NAMES and CODES		DEFINITION :	
NATIVE	ENGLISH	NATIVE	ENGLISH		

This information was collected in both native language and in English and in several cases it was accompanied by sketches (i.e. for the accident or collision type variables) and information on the quality and collection methodology of the national variables. Additionally, **technical information on the linkage process of the variables** included in different folders of the national databases was recorded, allowing for better understanding of the database structure and the interrelation of the different variables.

Regarding the working procedure, each Task 1.1 partner was responsible for the compatibility improvement of data for two or in some cases more countries. The entire information collection process was **coordinated by the European Commission** and took place through the **national representatives, members of the CARE Experts Group**. Necessary links were established between the Task 1.1 partners and the national Experts during the CARE Experts Group meetings and especially during the CARE Experts Group meeting in 2004 and 2005, an official request was addressed by the EC to the national Experts to provide a first set of necessary information on their national road accident database, the variables and the values collected at national level and the related definitions. This first set was initially exploited by the Task 1.1 partners, who subsequently were working more closely with representatives of the countries for which they were responsible. In general, all national representatives provided significant assistance to the work of the Task 1.1 partners and only in exceptional cases, some difficulties were temporarily confronted either with the establishment



of contact with the appropriate persons or with delays in the provision of the necessary information.

At the same time, the **tabulated lists (Grids)** of the national accident data definition elements developed within the CAREPLUS projects and already filled-in for the 15 EU countries were also filled-in for each examined country, in close collaboration with the national Experts. In these Grids, the national definition components for the common values of the common CARE variables are summarised and the availability of each component for each Member State is indicated. Grids can be considered as the "building" blocks for developing at a next stage the transformation rules. In the following figure a part of the Grid is presented.

	CARE European road accidents database																
National definition components	A	B	D	DK	E	F	FIN	GB	GR	I	IRL	L	NI	NL	P	S	IS
DATA AVAILABILITY :																	
information collected in country	x	x	x	DK	E	x	x	GB	GR	I	6	x	NI	NL	x	x	IS
exact data value provided to CARE	x	x	x	x	x	x	x	GB	x	x	6	x	NI	x	x	x	x
data value can be derived in CARE	x	x	x	DK	E	x	x		GR	I		1		NL	x	x	IS
value included in another value :																	
car or taxi	A	B	D			F	FIN				2				P	S	
light vehicle												L					
VALUE IN VARIABLE :																	
vehicle type			D		E	F		GB	GR	I	IRL		NI		P		IS
element type	A	B		DK			FIN					L		NL		S	
transport type															P		
DEFINITION COMPONENTS :																	
motor vehicle				DK	E			GB	GR	I	IRL	L	NI	NL			IS
three wheeled vehicle				DK				GB	GR	I	IRL		NI				IS
four wheeled vehicle				DK	E			GB	GR	I	IRL	L	NI	NL			IS
type B driving licence required				DK	E			GB	GR	I	IRL	L	NI	NL			IS
with a trailer				DK	E			GB		I	IRL		NI	NL			IS
without a trailer				DK	E			GB		I	IRL		NI	NL			IS
VEHICLE WEIGHT :																	
light vehicle					E												
gross weight more than 400 kg				DK													
gross weight of less than 3.5 tonnes				DK													
NUMBER OF SEATS :																	
vehicle with no more than 8 passenger seats				DK	E			GB	GR	I	IRL	L	NI	NL			IS

The elaboration of the appropriate transformation rules through the analysis of the national databases (description, content and definitions), as well as the exploitation of the information collected using the Grids was the next step of the methodology.



Common variables and values are derived from the original national variables and values using transformation rules. These **transformation rules** are logic statements, which contain the Boolean operators, for example, "AND" (intersection), "OR" (union) "=" (equal) and "NOT EQUAL". As an example, for the CARE value "Injury Severity Person: Killed" the transformation rule for Poland is the following:

Injury Severity Person: Killed = C [(killed on the spot: yes) OR (killed within 30 days after accident: yes)] OR D [(killed on the spot: yes) OR (killed within 30 days after accident: yes)]

During this process, **interrelation between the CARE database and the national variables and values** was examined, based on the variables and values definitions, as well as on the structure of the national database. On this purpose, specific templates were developed, allowing for a common format of the transformation rules between the countries. The definitions of the national variables and values were analysed and it was examined whether they could identically match with the respective CARE variables and values or a combination of more than one variables and values was necessary. In this latter case, associated variables were formulated.

An **associated variable** is one that is not included in the common variable list, but its values are incorporated in the transformation rules to get common variables and values. As an example, the associated variable "Car or Taxi" has its transformation rules for Poland as follows:

National values: Car = B [(vehicle type: 4 TO 5)] and Taxi = B [(vehicle type: 6)]
 CARE value: Car or Taxi = B [(vehicle type: 4 TO 6)]

The finalisation of the transformation rules was completed through an **iterative process** between the SafetyNet partners and the national Experts from each country, as additional information was often required, clarifications on the variables and values definitions were necessary, as well as verification of the rules at several stages of the work. The final validation of the transformation rules took place by the Member State but also by members of the EC CARE administration.

Finally, additional variables and values from the national databases, which are considered useful and important for road Accident analyses at European and national level are recommended to be included in the existing list of common CARE accident variables and values. In this way the respective Glossary of definitions is updated and enriched, incorporating new road accident elements.

With the finalisation of the transformation rules for the fifteen European countries, these can be applied on the national road accident datafiles that are sent to the EC CARE administration and comparable accident data will be soon available for 29 EU countries (30 countries if data for Germany are also included). Currently there are already data for 6 new countries in the CARE system.

Concerning the experiences attained from the work with these countries, it was evident that all governmental correspondents very well perceived the importance of becoming an active partner of the European CARE road accident database. Moreover, the study of different national database structures, as well as the definitions of the variables, has provided **insight on different ways to analyse an accident** and to identify different perspectives on the possible use of the analysis outcomes.

Additionally, the integration of data for more countries will provide a wider spectrum for future projects in order to:

- Work on further elements of comparisons between the Member States
- Broaden the subsets of comparable countries (by category, by population etc)
- Assess more precisely the different road safety policies in any country.

Part of the work of Task 1.1 was also exploited within the framework of Task 1.4, which deals with the improvement of accident data compatibility throughout Europe. Within the framework of this Task, the information from the Grids filled-in for these fifteen countries was used, and the recorded structures of the national accident data collection systems were analysed, allowing for the identification of the different fill-in systems and the links between the various road accident variables. Special attention was given to the national road accident variables and values that are not currently included in the CARE database, exploring the opportunity to embody the most useful for analysis and the most common ones among the examined countries, into the recommendation for the common data set.

3. Links with in-depth, exposure, SPI and other data files

Within WP1 the identification of possible links between the CARE accident data and the outcomes of other SafetyNet WPs, as well as of other relevant projects was attempted. More specifically, links between the work and the outputs of WP1 with WP2, WP3, WP5 and WP7 were established, as well as links with the outputs of the SUNflower+6 project

Regarding **risk/exposure data** (RED) the work carried out within WP2 aimed at providing comparable RED, in accordance to the existing CARE accident data, in order to enable comparisons and/or use of RED data for producing risk estimates at EU level. All necessary links to the CARE database, concerning its structure, variable and value definitions etc were established and more detailed information included in the CARE database was exploited in order to compare variables, values and definitions as well as propose general transformations to obtain usable sets of RED.

A set of risk exposure data was also exploited together with the existing CARE accident data in order to produce a number of **basic risk indicators**. These indicators were included in the various editions of the Annual Statistical Reports and Traffic Safety Basic Facts. More specifically, population and motorway length data were mainly used in combination with accident data and allowed for the calculation of appropriate indicators across the EU.

With reference to the links of CARE accident data with the **Safety Performance Indicators**, in order to define and establish appropriate SPIs on several road safety issues, among other factors, the CARE data availability and needs were taken into account. In order to conclude to the variables and values used for the SPIs the definitions of the relevant CARE variables and values were thoroughly examined, as well as information on their quality, completeness and availability. As an example, concerning the SPIs on **Protective Systems**, wearing rates of seat belts and helmets were proposed for various road users and vehicle types. Part of the respective disaggregate data on road accident casualties are available on the CARE database. These data could well be used in conjunction with analytical data on protective system use in order to produce interesting statistics.

Links with WP5 were established within the framework of the recommendation for the Common Accident Data Set (CADaS), in order to identify and define common variables and values to be used at the common part regarding macroscopic data of CADaS and WP5 Glossary for in-depth investigation. This interaction resulted to the formulation of **two consistent and compatible up to a certain extent**



accident data collection systems. Although the aim of each system is different (macroscopic data collection and in-depth data collection), the data elements were developed in a compatible way maximizing the potential for exploiting these data at a European level. Macroscopic data allow for the identification of accident trends and the conduction of accident related studies (i.e. identification of hazardous locations) while in depth data provide better understanding of accidents (accident mechanisms, causation etc). As the implementation of countermeasures and policies is based upon studies that use both macroscopic and in-depth data, the improvement of data availability and compatibility between the two systems further enhances the potential for exploitation of these data at a European scale.

Furthermore, within Task 1.2, WP1 provided new input to WP7 for conducting additional Time Series and Multilevel analyses on selected road safety topics, as the most important source of accident and casualty data for these analyses were coming from the CARE database. Regarding the **identification of geographical dependencies** using CARE data and enforcement data in Greece, the effects of speed infringements and alcohol controls on the accident and fatality number for each Greek county were analysed and the availability of CARE accident data in disaggregate form (by county - NUTS 3 level) proved very useful for the identification of the correlation between enforcement measures and fatality numbers.

Regarding **modeling injury under-reporting** in seven European countries, the information and data on the under-reporting level for non-fatal casualties in several EU countries, carried out within Task 1.5 were exploited. On that purpose national accident data from police reports were brought together with hospital data in each country and on the basis of these results, the analysis presented in WP7 assessed the extent and the variation of the underreporting problem in different countries.

Finally, within the scope of Task 1.2, the possibility to **combine the SafetyNet outputs with the footprint methodology** developed within the framework of the SUNflower(+6) project was explored. A common SafetyNet - SUNflower workshop titled "Setting the stage for the European Road Safety Observatory", took place aiming at addressing the connection between policy questions, knowledge and data. Presentations targeted on specific road safety topics (i.e. "Powered two-wheelers road safety"), in which CARE accident data were combined with other types of data defined within the SUNflower (+6), revealed the indicate how the SUNflower methodology can be applied on road accident data allowing for the formulation of a more complete picture of the road safety level and subsequently facilitating decision making.

4. Development of Statistical reports and Analysis notes

The exploitation of the EC CARE database can also be optimised through the development of a **comprehensive set of statistical outputs with comparable statistics**, useful for the support of decisions aiming to the improvement of road safety in the European Union. These outputs concerned **Annual Statistical Reports** and **Traffic Safety Basic Facts**. Additionally, the recommendation for the development of a set of **Aggregate Road Accident Data Files** has been developed to allow the CARE users to have direct access to useful sub-sets of CARE data. The basis for all these products are road accident data retrieved from the CARE database. Various types of road accident data users, ranging from road safety analysts to the wider public, form the target audience to which these statistical outputs are addressed and thus, their content and format was accordingly defined.

The development and dissemination of the various outputs took place in **three distinct steps**: Initially, the exact set of statistical reports and analysis notes was defined. Then, the identified Annual Statistical Reports, Basic Fact Sheets and Aggregate Data Files were prepared and finally, based on the experience attained through the preparation of these statistical outputs, establishment and promotion of this complete set of analysis techniques took place. This methodology allowed for maximum flexibility and potential with regard to analysis of the information available in the system and thus, opened up a whole set of new possibilities in the field of accident analysis.

In order to define the set of statistical reports and analysis notes, several existing **international databases were evaluated**. Relevant information for each of these databases (Fatality Analysis Reporting System - FARS, Community database on Accidents on the Roads in Europe - CARE, United Nations Economic Commission for Europe - UN/ECE, World Health Organisation - WHO, EUROSTAT, International Road Traffic and Accident Database - IRTAD, European Conference of Ministers of Transport - ECMT) were collected and assessed. FARS (Fatality Analysis Reporting System of NTHSA) in particular is highly comparable with the CARE database as it also uses disaggregate road accident data. Additionally, in order to define the content of the outputs in terms of road accident variables and values used, the needs of the several road accident data stakeholders in seven EU countries (AT, CZ, DK, EL, HU, NL, UK), as recorded in a relevant Grid developed in SafetyNet WP1, as well as the respective information collected by the CARE Experts Group through a questionnaire on the road accident data collection, were also considered.

Following this review, it was decided that Annual Statistical Reports and several Annual Basic Fact Sheets will be produced both in electronic and paper form,



based on disaggregated accident data retrieved from CARE. Additionally, a set of Aggregate Accident Data Files will also be produced, allowing the CARE user to have direct access to useful sub-sets of CARE data. During the 4,5 years of SafetyNet **five editions of Annual Statistical Reports and Annual Basic Fact Sheets** have been developed on an annual basis and were presented to the public in electronic and paper form. The basis for all these products are road accident data retrieved from the CARE database.

These deliverables were enhanced each year by the outputs of other SafetyNet Work Packages, using also the latest available CARE data. There were several links to other Work Packages or Tasks:

- Within Work Package 1, new Member States of the European Union and other countries are gradually added to the CARE database. Data from more countries will bring a broader view of road safety in Europe. In the Basic Fact Sheets 2007 and 2008, up to five new member states were included: Czech Republic, Estonia, Hungary, Malta and Poland and data from more countries will also be available for future editions.
- Work Package 2 is working on Risk Exposure Data (RED), which are necessary to compare between countries. Using available exposure data such as population and length of road network in combination with the CARE accident data, appropriate risk indicators are developed, allowing for more accurate comparisons among countries.

All five editions of the Annual Statistical Report and Basic Fact Sheets were reviewed by the members of the CARE Expert Group and the SafetyNet Steering Committee (SafetyNet internal quality system), before they were submitted to the European Commission.

The recommendation for Aggregate Data Files was another Task output, which will allow **users of road accident data outside the CARE structure to have access to aggregate road accident data** retrieved by the CARE database. This recommendation to the European Commission concerned the structure, the format and the size of these data files that could be useful for road safety analyses.

4.1 Annual Statistical Report

The Annual Statistical Report is a document consisting of a **large number of Tables and Figures** with data retrieved from the CARE database, which are not further analysed or commented. The definitions of the variables used in the Annual Statistical Report are included at the end of the report.

The chapters comprising the Annual Statistical Report, as well as the related Tables and Figures have been selected by looking at the main interests of several potential road accident stakeholders. Task 1.3 partners closely collaborated with the EC-CARE administration, in order to identify which types of data/information are comparable among countries and which are open to misinterpretation. Therefore, detailed Tables and Figures containing accident data and data about injured persons were excluded from these deliverables and only numbers of fatalities and numbers of fatal accidents were used.

Every year, the Annual Statistical Report was compiled with the last available data from the CARE database and in every new edition new Tables or Figures were added, in order to get a more comprehensive picture of the road safety level in Europe. At the beginning of the SafetyNet project the CARE database included 14 EU countries. The latest (fifth) edition of the Annual Statistical Report already includes 19 out of EU 29 countries. Moreover, during the development of the various editions within the last years, more common variables and values defined within the framework of the CAREPLUS 2 project were gradually included and the latest edition consists of more Tables and Figures than the previous editions.

Each edition of the Annual Statistical Report contains road accident **data for the last ten years and more detailed data for the last available year**. Fatality rates for the majority of European member states (EU-25) are only presented in the “Overview” chapter of the Report.

The fifth edition of the Report (Annual Statistical Report 2008) consists of 56 Tables and 28 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 2006
 - People involved
 - Modes of transport
 - Accident characteristics
- Fatal accidents 2006
 - Various periods of time (month, day of week, hour of day)
 - Type of area / road
 - Type of junction
 - Weather conditions

The chapter “Overview – major issues” includes the overall description of the road safety situation in the EU, the development of fatalities in the countries over



time and interesting details about the distribution of fatalities in the EU by gender, area type and mode of transport is provided. Country comparisons about children and senior citizens fatalities are also available in this section.

In order to monitor trends, time series about fatal data from the last 10 years are used in the chapter “Time Series – last 10 years”. Behind general time series (e.g. “Annual number of fatalities by country”) more specific series about mode of transport, age and gender are presented.

The next chapter “Fatalities 2006” contains Tables and Figures with data from 2006 or the last available data from each country. This yearly dataset is analysed in several directions in the following pages. The sub-chapters “People involved”, “Mode of transport” and “Accident characteristics” reflect the hierarchical structure of road accidents.

As fatal accidents are currently the only comparable data beside fatalities among EU Member States due different levels of injury underreporting in the countries, in the chapter “Fatal accidents 2006” fatal accidents are analysed for different accident related attributes like time, area type, type of junction and weather conditions. In contradiction to fatalities no correction factors are applied to the number of fatal accidents for countries which do not use the 30 day definition for fatalities.

4.2 Traffic Safety Basic Facts

The Traffic Safety Basic Facts present detailed road accident information for different road safety related areas and road user groups in a simple and comprehensive way, as they contain **Tables and Figures together with some principal analysis and basic comments**.

The development of the Traffic Safety Basic Facts follows some **basic guidelines** to assure their acceptance by the public:

- Only data on **fatalities and fatal accident** are used in the Traffic Safety Basic Facts, as data on other casualty types incorporated into the CARE database is not reliable due to different definitions and levels of underreporting and is also not comparable among different EU member states, due to different definitions used.
- The Traffic Safety Basic Facts should not exceed a length of **approximately 15 pages**, as they should be easy to read and should not include in-depth analysis, as they are addressed to the wide general public and press and not only to people specialised on road safety.
- The most interesting findings are outlined in the **“highlight boxes”**, as this attracts the attention of the readers to focus at these issues and notice the relevant data in Tables and Figures.

- Each Traffic Safety Basic Fact starts with a **time series** of the specific issue where the last decade is examined, as this allows a comparative overview throughout the years and also indicates the trends for the same period.
- In order to develop appropriate accident rates and allow comparison between different EU countries, available **exposure data** (e.g. population, length of road network etc.) from other international databases are combined with accident data from CARE, with Eurostat and IRTAD being the main sources.

During the life cycle of the SafetyNet project the number of Traffic Safety Basic Facts rose from 5 to **12 different Basic Facts**. The following topics were examined in the five different editions:

Topics	1 st edition (BFS 2004)	2 nd edition (BFS 2005)	3 rd edition (BFS 2006)	4 th edition (BFS 2007)	5 th edition (BFS 2008)
Main Figures					
Children (Aged < 16)					
Young People (Aged 16 – 24)					
The Elderly (Aged > 64)					
Pedestrians					
Bicycles					
Motorcycle/Moped					
Car Occupants					
Heavy Good Vehicles & Buses					
Motorways					
Junctions					
Urban Areas					

Each edition of the Basic Facts was revised and updated, including more recent data, more variables and values for more countries. The Traffic Safety Basic Facts 2008 include the data for **five additional EU countries**: Czech Republic, Estonia, Hungary, Malta and Poland.

As an overview of the latest edition of the Traffic Safety Basic Facts 2008 in terms of content, the Basic Fact regarding “**Main Figures**” presents the reduction of EU road fatalities since 2001 and shows the gap between the actual result and the target of halving the number of deaths on the roads by 2010. After an overview of fatalities in Europe by country on the level of EU-25 the "Main Figures" Basic Fact presents the evolution of fatalities over the last decade and also the change in fatality rate in each of the EU-25 countries. Also a geographical representation of fatality rates is presented. Fatality data are spilt by age and gender, type of road, mode of transport and road user type as well as by seasonality, day of week and time of day.



Children form a road user group at relatively high risk. In the "**Children**" Basic Facts introductory information is presented using general Tables and Figures on the number of child fatalities and comparisons with rates per million children, million population and total fatalities. Additional information on age and gender of children fatalities is also presented. Fatality data are split by vehicle group, mode of transport and further on by type of road. Through this detailed breakdown, information is available for example on pedestrian or pedal cycle accidents. The Basic Fact provides detailed and varied information on child road users, with data on road types (also rural and urban roads), the distribution of drivers, passengers and pedestrians and information on frequencies for time of the day, day of week and also seasonality.

The "**Car Occupants**" Basic Fact deals with drivers as well as passengers of cars and taxis. Data on car occupants are split between drivers and passengers in many chapters. In the introductory part, the number of fatalities per country and year is mentioned as well as rates; fatality rates per million of population and in proportion to national totals. More detailed analyses have been made considering age and gender, road types and time. The time related tables include fatalities by time of day, day of week and month.

The "**Pedestrian**" Basic Fact begins with general information on fatalities per country and year, which is further presented in details, in relation to million people and total fatalities. It includes data on pedestrian fatalities in relation to age and gender and information by day of week and seasonality. The relation with age is particularly interesting for pedestrians, as children and elderly people form a considerable proportion of fatalities and also the light conditions are taken into account.

The "**Motorcycles and Mopeds**" Basic Fact presents the number of fatalities among riders of motorcycles and mopeds, using also respective data from car and pedestrian fatalities for comparison. It contains general data on fatalities of motorcycle and moped riders, i.e. fatality rates by million inhabitants and the national fatality totals. Data on fatalities is presented in the form of overviews for different modes of transport. The distribution of rider fatalities by age and gender is presented for motorcycles and mopeds. An important note concerns the separation between riders and passengers, as well as a chapter on seasonal distribution, which is a very important variable for motorcycles and mopeds accidents analyses. Additionally, there is information on distribution by road networks (motorways and area type), rural and urban area and junction types.

In the "**Motorways**" Basic Fact the fatalities on motorways per country are presented as absolute numbers and as rates per million inhabitants. In order to enable comparisons, fatalities on motorways were also described at the rate of existing kilometres of motorways in the several countries. Important information is the distribution of fatalities on motorways by the total number of road accident

fatalities and the comparison with the number of fatalities on other roads. Tables on fatalities by collision type, vehicle group and fatalities by age and gender, modal split and lightning conditions complement this information.

Road users aged 16 - 24 are pooled to form the category "**Young People**" and data such as fatalities per country and in proportion to fatality totals are the starting point of the respective Basic Fact. Tables and Figures by age and gender complement the overview. Data on the mode of transport is included and the split by person group (drivers, passengers and pedestrians) provides additional insights. Information on fatalities by type of road, time of day, day of week and seasonality round out the data presented for this road user group.

"**Elderly people**" defined as people aged 65+ are the topic of another Basic Fact and in some cases this group is compared with middle-aged people (45 - 64), for example when comparing fatalities by country or by road type. The chapters of this Basic Fact are similar to the ones of the "Young People"; there is information on fatalities by country, fatalities in proportion to fatality totals and the above mentioned comparison to middle-aged people. Fatality rates are also available according to age and gender, the different road user types and road types. Information on distribution by time of day, day of week and seasonality has been presented in the same way as in the other Basic Facts.

Regarding the "**Bicycles**" Basic Fact the number of bicycle fatalities is presented in absolute numbers and also as fatality rates by country. It also describes the percentages of bicycle fatalities in the total number of road accident fatalities. The "Bicycle" Basic Fact also comprehends an analysis regarding bicycle fatalities by age and gender, as especially for children and elderly the bicycle as mode of transport increases their mobility. Bicycle fatalities are also described by road network in terms of area type and in a special way in terms of junctions. Tables and figures on day of week and month of year complement this information.

The "**Heavy Good Vehicles & Buses**" Basic Fact deals with fatalities of goods vehicles of over 3.5 tons maximum permissible gross vehicle weight. Road traffic accidents involving heavy good vehicles (HGVs) tend to be more severe than other accidents because of the great size and mass of these vehicles. In general the fatalities are described for the several EU-countries in absolute numbers broken down by HGVs and buses or coaches. This Basic Fact also compares the fatality rates (fatalities per million inhabitants) and the proportion of fatalities in accidents involving HGVs and buses or coaches. The time related tables and figures include information about time of day and day of week and seasonality. The accidents involving HGVs and buses or coaches are furthermore described by type of road, age and gender and nationality of vehicles to describe the proportion of fatalities in accidents involving foreign vehicles.

The “**Junctions**” Basic Fact presents the fatalities at junctions per country in absolute numbers and as rates per million inhabitants. Additionally, the distribution of fatalities at junctions by the total number of road accident fatalities is described. Information about the area type (inside or outside urban area) and on mode of transport, person class and gender and lightning conditions is provided.

The “**Urban Areas**” Basic Fact initially presents an overview of the total number of urban road fatalities by country, the proportion of the total number of fatalities and the ratio of urban road fatalities per million inhabitants by country. More detailed information regarding age and gender and traffic involvement (driver, passenger, pedestrian) are also included. The time variables show the distribution of urban road fatalities by day of week and by months.

4.3 Aggregate Data Files

Apart from the five editions of Annual Statistical Reports and Annual Basic Fact Sheets, the recommendation for the development of a set of **Aggregate Road Accident Data Files** was planned within Task 1.3 allowing a broader group of road accident data users to have direct access to useful sub-sets of CARE data. At present, access to the CARE accident database of the European Commission is limited to only **three officially nominated organizations or bodies** in each EU Member State, usually being National Governmental Authorities, Universities or Research Institutes. These organisations are appointed by the High Level Group on Road Safety and queries on the database are performed using a secured network connection. Additionally, some pre-defined static reports based on data derived from CARE are available on the CARE website. Aggregate Data Files will allow users of accident data, **currently outside the CARE structure**, to have access to aggregated road accident data retrieved by the CARE database.

The development of these Data Files is based on certain **criteria**. In order to avoid misleading interpretations, the variables included have to be selected very carefully, taking into consideration both data availability and completeness throughout the years. Additionally, specificities regarding the variables definitions in some countries should also be taken into account when comparing data for different countries.

Considering all the constraints but also the various needs for road safety analyses, a **recommendation on the structure, the format and the size of these data files** was formed, in such way that they will be useful to all potential road accident data users. A first set of 6 - 8 Aggregate Data Files is proposed to be initially prepared, divided into five main categories, according to the type of the variables that these files comprise: those referring to the person, those referring to vehicle, those referring to road environment, those referring to

accident and those referring to more general circumstances. More specifically, the following Data Files are proposed, named according to the basic information they provide: Road user, Driving license, Vehicle type, Vehicle manoeuvre, Road environment, Junction type, Accident/collision type, Region/seasonality. Each of these Data Files consists of 5 - 6 variables, besides the variables Country, Year and the Measurement Unit (fatalities or fatal accidents).

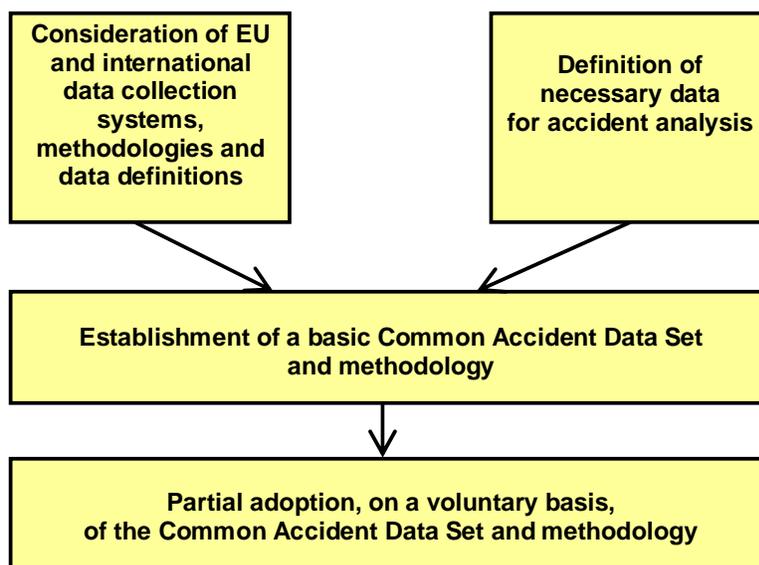
The collaboration of the SafetyNet partners with the **members of the CARE Experts Group** under the coordination of the EC has been very important for the initial development, the continuous improvement and in particular the finalisation of the content, structure and the overall enhancement of the various Task outputs. The national representatives of this group are experts who know exactly which types of data are important and whether national accident data published in the several reports are correct or misleading. Their feedback and suggestions on the various editions of the statistical documents during the SafetyNet life-cycle proved very accurate, as they allowed for the identification of more road safety topics, but also of new approaches for using the existing information.

5. Improvement of accident data compatibility throughout Europe

Existing European road accident data are not always comparable among the various countries, mainly due to the **different national accident data collection systems**. Data variables and values are currently collected under different definitions in the EU countries, the various accident data collection forms have different structures and the relevant data fill-in systems cannot be compared. Both accident data quality and availability are affected and consequently, data analyses and comparisons among the various EU countries are not always reliable, even for some of the common CARE variables and values.

Within SafetyNet WP1 the **improvement of accident data compatibility throughout Europe** was attempted. As harmonisation of accident data at national level (apart from the EC level) could be very beneficial for road accident analysis, using more common variables and values across the European countries, a Common Accident Data Set (CADaS) and methodology were established, to be used by any EU country that wishes to update their national road accident collection system.

A two-stage approach was adopted to achieve this, as it can be seen at the following diagram. On one hand, the data required for road accident analysis in several EU countries was identified and on the other hand, the current potential of the national data collection systems was recorded. The basic common accident data collection set and methodology were derived through an iterative process that took into account both data availability and usefulness, with the participation of experts and Governmental representatives.



In order to establish a basic accident data collection set and methodology, **information concerning the existing national collection systems**, as well as the identification of the needs for road accident data are required. Within this framework, a questionnaire to collect information about the national accident collection forms, methodologies and data definitions in all EU countries was prepared. This questionnaire was initially developed by the Task 1.4 leader and subsequently all questions were thoroughly examined by all Task 1.4 partners, who contributed significantly to its further improvement. In the next phase, the recording and examination of national road accident data took place. Data elements, as well as the respective definitions used in each national system, were gathered and analysed in order to identify good practices in general, but also detailed variables and values for accident analysis. The results were exploited in the formulation of a recommendation for a Common Accident Data Set.

Moreover, the **identification of the needs for road accident data** was considered important for the establishment of a concrete proposal. On that purpose, the needs of the main stakeholders from several EU countries were recorded. According to the specific circumstances in each country and the specific needs of each stakeholder, different needs were expected to be recorded, thus this activity took place at both national and local level. The main interest groups were Public Services (Police, Hospitals etc), Central Governmental Authorities (Transport, Health), Local Governmental Authorities, Research Institutes and Industry (including transport associations). **An appropriate Grid was developed** to establish a list of various stakeholders by country and then identify their needs for accident data. By filling-in this Grid for several stakeholders, the maximum needs were defined for each country and these were further compared, in order to identify the minimum/common needs for

all countries examined. Exceptional needs recorded, such as those of cyclists in the Netherlands could also be considered, but not for all countries. This Grid was distributed to all and was filled-in for the countries of the Task 1.4 partners (Greece, United Kingdom, Austria, Netherlands, Denmark, Hungary and Czech Republic).

After thorough co-examination of all information collected through the various activities of Task 1.4, the formulation of a complete recommendation for a **Common Accident Data Set (CADaS)** was carried out. This iterative process considered both data availability and usefulness, but also the currently used CARE variables and values and the experience of other international data files (US - MMUCC, WHO).

The recommendation for a **Common Accident Data Set consists of a minimum set of standardised data elements**, which will allow for comparable road accident data to be available in Europe. In this way, more variables and values with a common definition will be added to those currently included in the CARE database, maximising thus the potential of CARE and allowing for more detailed and reliable analyses at European level. CADaS is structured in a simple way, without levels of hierarchy, constituting in fact the record layout of the data set to be transferred to the EU. CADaS refers to the set of data to be voluntarily transmitted by each country to the EU, which should be derived from the national road accident data collection system. Moreover, the variables and values of CADaS may be considered as recommendations for national police road accident data collection reports.

CADaS consists of **73 variables and 471 values**. The selection of these variables and values resulted from the balanced co-consideration of some **basic criteria**, taking into account that variables and values must be comprehensive, concise and useful for road accident analysis at EU level, the level of detail of the variables and values should correspond to all data useful for macroscopic data analysis and that each country should have the possibility to choose alternative level of detail of the various variables and values. Data which are impossible or very difficult to be collected are not retained in the CADaS, however, the future perspective of using certain variables and values was also taken into account, even though those data are not currently collected by most of the countries. Existing CARE variables and values are of first priority within CADaS and additionally, CADaS variables and values refer to casualty road accidents.

The CADaS variables are divided into **four basic categories**: **Accident** related variables, **Road** related variables, **Traffic unit** related variables and **Person** related variables. Several variables include two distinct types of values, referring to different level of detail: Detailed values, concerning information at the highest level of detail and alternative values, concerning information at a more aggregate level of detail, when more detailed values are not available.

The number of variable and values contained in the CADaS are presented at the following Table:

Variable category	Code	Number of Variables			Number of Values		
		High (H) importance	Lower (L) importance	Total	Detailed values	Alternative values (A)	Total
Accident	A	7	5	12	86	13	98
Road	R	11	15	26	106	13	119
Traffic Unit	U	7	10	17	137	15	152
Person	P	11	7	18	91	10	102
Total		36	37	73	420	51	471

For each of the variables included in the **CADaS**, the following information is presented:

Variable Label: The label of the proposed variable, consisting from the category identifier (A, R, U or P), the numbering and the name of the variable. The importance of the variable for road safety analysis is also added: (H) for variables of high importance and (L) for variables of lower importance.

Variable definition and scope: A brief description of the variable is provided, followed by the importance and usefulness of the variable, explaining the rational lying behind its selection.

List of values: The attribute values to each variable are listed.

Value labels: Each value is identified by the code of the variable, followed by a number which corresponds to each value and its name. The (A) code is added next to the variable category code for the alternative value, when is the case.

Value definitions: The definition of each value of the variable is provided, indicating also any particularities of the value and any relevant assumptions regarding its collection.

Data Format: The way in which each variable has to be provided. Data formats concern:

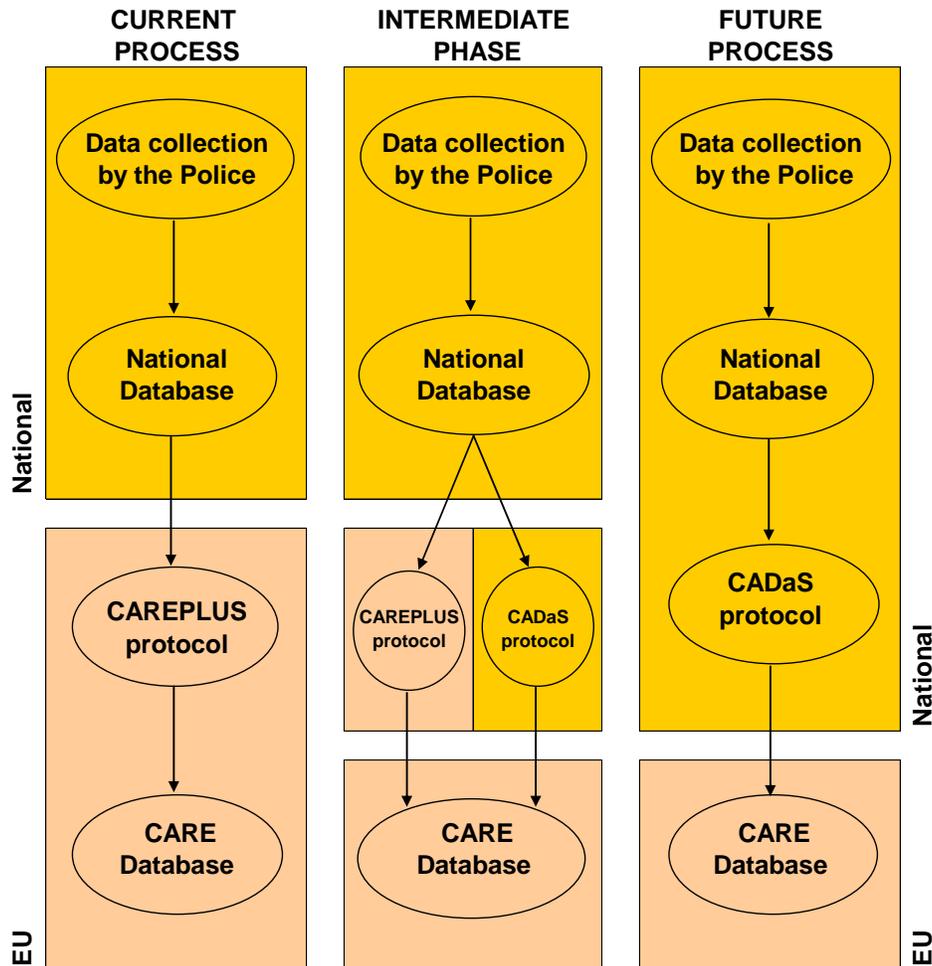
- the possibility to attribute one or more values to a variable,
- the format of the value (code, number, text).

The adoption of the CADaS recommendation by the European countries is a very important step towards the success of this Task. One of the CADaS advantages is that it can be **adopted gradually by EU countries**, without presupposing any changes in a country's national data collection system; however, any part of it (variables, values, definitions and data formats) can be implemented within an



existing national collection system, increasing thus the compatibility of the national road accident data with the respective CARE data. If one country decides to start using the CADaS protocol, it can transform its national data into the CADaS data by using appropriate transformation rules and eventually transmit the transformed data to the EC. Consequently, the level of adoption of the CADaS can vary according to any national needs and/or particularities and can be performed during any time in the future.

In the following Figure, the **current, intermediate and future** (based on the CADaS adoption) **processes** of the national road accident data files are presented. Using both (current and future) approaches ensures compatibility of the accident data among EU countries and the main difference of these two approaches is related to the degree of involvement of the country in the process.



Taking into account that many Member States may partially adopt CADaS, an intermediate phase is also necessary, during which, countries may use a part of the CADaS in order to transform specific variables and values at national level

and transmit the rest of the data in the current format in order to be transformed using the CAREPLUS protocol. According to the proposed future process, transformation of the national accident data (based on the CADaS protocol) will be performed at the national level and the derived CADaS variables and values will be transmitted to the EC, where they will be included in a more automatic way into the CARE database. This process will allow for more common variables and values but also for higher quality, given that the **national authorities better perceive any particularities related to national data collection**, and subsequently can better identify the interrelation between the collected and the CADaS variables.

The output of CADaS consists of a **Reference Guide** with several **Appendices**, as well as a **Data List**, in which the proposed variables and the related values are also presented with indicative levels of hierarchy, in case some countries wish to use a similar structure at the national collection system.

6. Estimation of the real number of road accident casualties

The objective of Task 1.5 of the SafetyNet IP has been to estimate the actual numbers of road accident casualties in Europe from the CARE database by addressing two issues:

- the under-reporting in national accident databases and
- the differences between countries of the definitions used to classify injury severity.

Currently, the only comparable measurement units available in CARE are the numbers of fatal accidents and of people killed, where the degree of under-reporting is acceptably small in most EU Member States and there is a common definition. The same is not true, however, of non-fatal accidents and of casualties who are not killed. As a result, at present **the numbers of non-fatal accidents and of people seriously and slightly injured cannot be compared** in different Member States. In addition, the definition of injury severity differs among member states, so that a casualty which would be recorded in one country might not be recorded in another. Equally, a casualty which might be recorded as 'seriously' injured in one country might be recorded as 'slightly' injured in another.

As a result of this lack of comparability, **international comparisons of road safety focus entirely on fatal accidents and fatalities**, which form only a small minority of the totals. It is highly desirable to extend these comparisons to include the full range of injury severities. In order to overcome the inconsistencies in the reporting of non-fatal casualties, this Task has:

1. estimated the under-reporting level for non-fatal casualties by developing a uniform methodology and applying it in several EU countries,
2. estimated the number of serious casualties per country according to a new common measurement unit.

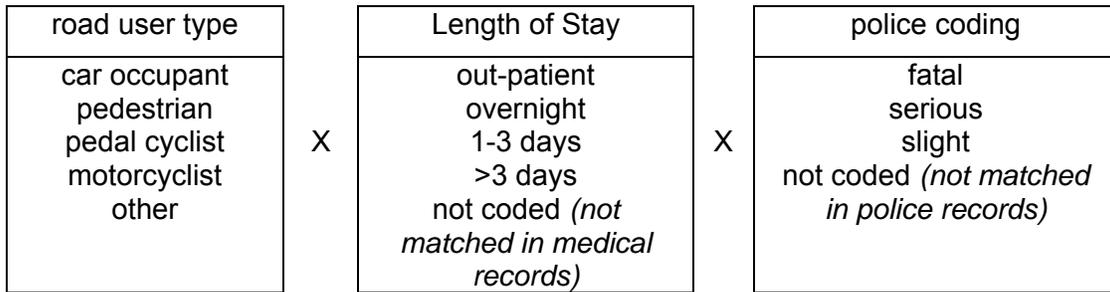
Within the framework of Task 1.5, the work began by agreeing a **common methodology** that would be applied by all partners in Task 1.5 for their studies. Studies were carried out in 8 countries according to this methodology, and the report contains detailed descriptions of the individual studies. In each study, files of police and hospital records were assembled for the road accidents that occurred in a common area. These files were compared to identify matching records, i.e. those casualties who were present in both files. For these matching records, certain medical details were added to the police records: length of stay in hospital and injury severity (specifically the Maximum Abbreviated Injury Score (MAIS), an internationally accepted summary measure of injury severity).

Two matrices presented in the following Figures were subsequently prepared to

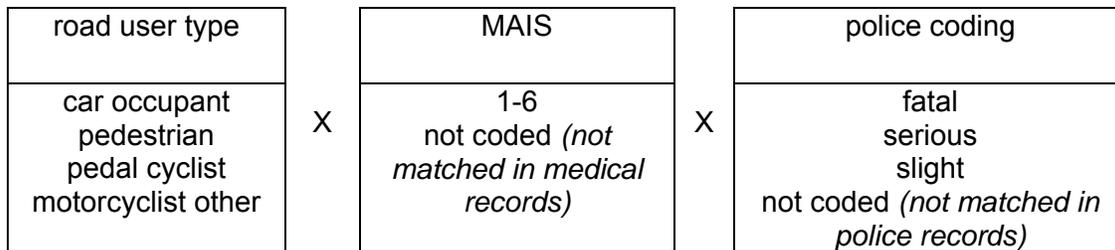


summarise the outcome of each study, one based on injury severity and the other on length of stay. These matrices were brought together for analysis, and conversion factors for each study were estimated in a consistent way. These factors allow the actual number of serious casualties in each country to be estimated consistently from police accident statistics.

Matrix 1



Matrix 2



The **new common measurement unit** for counting serious casualties could be based on either injury severity or length of stay. It is concluded that the most robust definition internationally is of a **non-fatal casualty with MAIS \geq 3 (inclusive)**. Initial comparisons have been made of casualty data adjusted by the conversion factors estimated by the national studies.

The **coverage of the studies** varied widely, influenced to some extent by whether hospital data had to be collected directly (as in the Czech Republic and Hungary) or were already available from files that had been compiled by national or regional authorities. The size of the datasets varies widely, depending on the size of the study area and the period included. The studies are summarised below.

Country	Study area	Period
Austria	National	2001
Czech Republic	Local (Kromeriz)	2003 - 2005
France	Regional (Département of the Rhône)	1996 - 2003
Greece	Regional (Corfu)	1996 - 2003
Hungary	Local (part of Budapest)	Aug 2004 - Jan 2006
The Netherlands	National	1997 - 2003
Spain	Regional (Castilla y Leon)	July - Dec 2005
United Kingdom	Regional (Scotland)	1997 - 2005

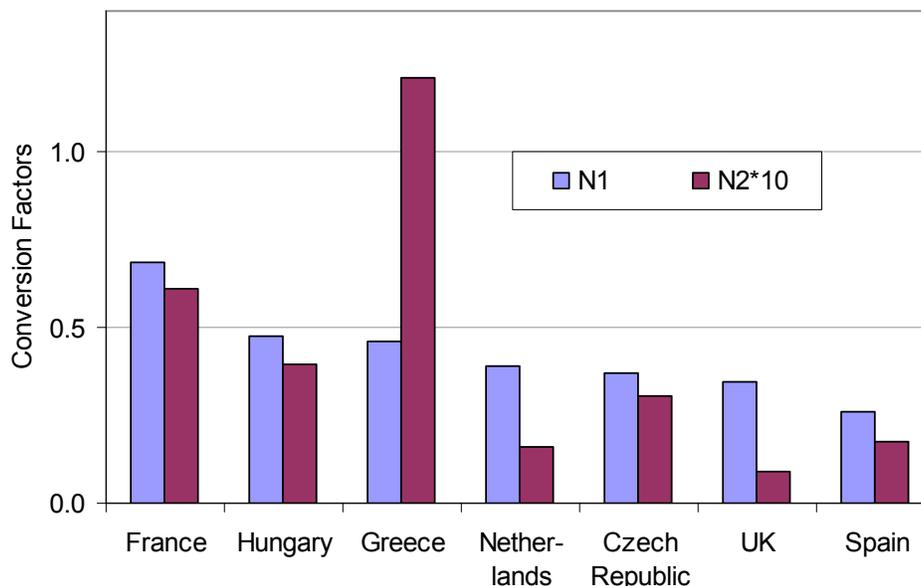
Ideally, these studies would have covered complete countries and so been truly national. Only 2 studies were really representative at a national level, consequently the question arises in the remaining 6 countries of whether conversion factors estimated from sub-national studies can be generalised to the national data. The answer must vary from country to country, but in general the larger the study area the more likely the conversion factors are to be nationally representative.

The new common measurement unit is a non-fatal casualty with MAIS \geq 3. Most of these are recorded by the police as seriously injured, but the studies show that the police record some as slightly injured. Consequently, according to this definition the number of casualties C in a particular country is estimated as:

$$C = N1 * \text{police reported serious casualties} + N2 * \text{police reported slight casualties}$$

where N1 and N2 vary from country to country. The overall factors from 7 studies are shown below (they could not be estimated in Austria because of data limitations). N2 is considerably smaller than N1 and hence is multiplied by 10 in this figure.

Conversion Factors for MAIS \geq 3, all road users



It was originally envisaged that the conversion factors would be generalised to other countries, in order to increase the utility of the CARE database. However, the results have led to the conclusion that this would not provide reliable results. The only satisfactory approach would be to carry out comparable studies in as many countries as possible.

The results from the Dutch and UK studies have also shown that the conversion factors can change through time as police accident reporting practices evolve. Thus, studies need to be repeated regularly to update the factors.

In summary, the research that has been carried out in the course of SafetyNet Task 1.5 represents a **significant step forward** and allows for the first time the number of severely injured casualties to be compared meaningfully between countries. The goals of the research were ambitious, but the practical problems that were encountered have meant that some could not be achieved fully. The lessons that have been learnt will allow this type of study to be carried out more effectively in future.

The central problem of this type of study is of obtaining **access to anonymised medical records**. Access to these records for research purposes is often problematical. Modern linkage techniques such as those used in this study, however, make these data increasingly valuable. Ways need to be found to persuade the custodians of these data to allow them to be used for purposes that support the broader aims and welfare of society.

7. Conclusions

Currently available road accident data, existing in the EC CARE database provide a useful basis for road safety monitoring and analysis at national but mainly at European level. However, **further enhancement and exploitation** of these data is necessary, making the CARE a complete and powerful tool for road accident analysis, useful for the improvement of road safety in the European Union.

With the completion of SafetyNet **all objectives of WP1 was met**, as it successfully dealt with a number of challenges that CARE database faces at present, through the application of a five-task methodology. Progressive incorporation of road accident data from 15 more European countries (most of which were new Member States at the beginning of the project) was made possible by the implementation of the CAREPLUS methodology, allowed thus for a complete road safety monitoring at EU level and also enabled comparisons between countries.

More precisely, the **improvement of road accident data compatibility** throughout Europe can now be achieved, through the recommendation for a Common Accident Data Set, produced within SafetyNet WP1. In this way, harmonisation of accident data at both national and EU level could be achieved and progressively, additional comparable road accident data from all EU countries will be available, allowing for more detailed, complete and reliable analyses.

Identification of the real number of serious road accident casualties is possible by addressing the underreporting issue, through the establishment of appropriate underreporting coefficients on serious and slight injuries, by the use of a common methodology. Moreover, the possibility to use a new common measurement unit, the "Seriously Injured Casualty", was examined, enabling the collection of comparable road accident data among the various countries.

The exploitation of the CARE database was also optimised through the development of a **comprehensive set of statistical outputs** with comparable statistics, useful for the support of decision makers, aiming to the improvement of road safety in the European Union. These statistical outputs concerned Annual Statistical Reports and Traffic Safety Basic Facts, as well as Aggregate Data Files derived from the EC CARE road accident database.

The adopted **integrated approach** allows the European road safety Community not only to fully exploit the current important CARE road accident data potential but also develop the basis for further enhanced road accident CARE database and subsequently produce reliable conclusions and backup important road safety decisions at EU, national and local level.

