

WORKSHOP ON STATISTICS ON THE VOLUME OF ROAD TRAFFIC (VEHICLE X KILOMETRES)

Developing a common framework for the collection of Risk Exposure Data in Europe within the SafetyNet IP The European Road Safety Observatory

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1. Executive Summary

SafetyNet is a project to build the core elements of the European Road Safety Observatory as defined in the EC White Paper¹ on Transport Policy.

This paper is aiming to present the contribution of the Integrated Project SafetyNet project to the statistical information concerning Vehicle - kilometres, comparable at international level, through the development of a common framework for the collection of Risk Exposure Data in Europe.

This paper consist of:

1. A brief overview of SafetyNet, explain how the WP2 “Risk Exposure Data” of this project deals with the national traffic statistics through several indicators in order to make then compatible and comparable as far as possible over the 25 EU Member States.
2. More precisely, SafetyNet being a project running over 4 years (from May 2004 to May 2008), the paper presents the objectives, methodologies and the information related to “vehicle x kilometres” gathered until now by the two tasks currently in progress which are:
 - The task 2.1 “State of the Art”
 - The task 2.2 “Availability, Usability and Comparability”.
3. Finally the time schedule of following WP2 steps of SafetyNet is presented with the expected data and results concerning the “Vehicle x kilometres” over the 25 EU Member States.

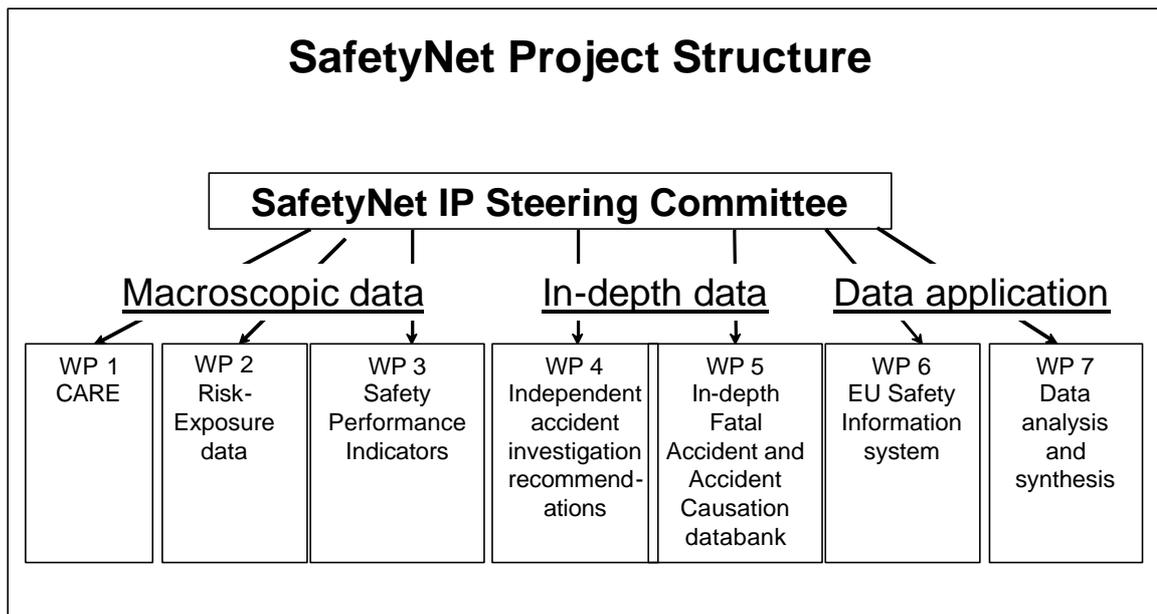
¹ EC White Paper – European Transport Policy for 2010– Time to Decide. EC 2001

2. Overview of the SafetyNet Project

The EU target of a 50% reduction in fatalities by 2010 will only be achieved by the introduction of the most effective countermeasures. It relies on the existence of basic knowledge of crashes and their causation and the availability of road safety data to monitor and assess performance. The EC has expressed the demand for a "Road Safety Observatory" in its 2001 White Paper and other public documents. This Proposal is for an Integrated Project that meets those demands. When complete the data resources developed within SafetyNet will revolutionise the EU approaches to road safety.

This proposal is for an ambitious and exciting project that will bring together all of the most experienced organisations within the EU to assemble a co-ordinated set of data resources that together will meet the EC needs for policy support.

The project is structured into three broad areas of work as detailed in the diagram below. The Work Packages dealing with macroscopic data are developing new accident data resources and extending existing accident databases that broadly exist at national or EU level. These data resources are typically used to monitor overall accident trends and countermeasure effectiveness and to identify broad priorities for future action. The two Work Packages developing in-depth data resources are dealing with institutional approaches to accident data and developing two completely new databases that will have wide application in identifying detailed



SafetyNet and “Vehicle x kilometres”

Among these 7 WP's the WP2 dealing with Risk Exposure Data (RED) is linked to the “Volume of the Road Traffic” which is one of the Risk Exposure Data included in the SafetyNet work plan. In fact seven RED correlated to the “Volume of Road traffic have been selected in SafetyNet Vehicle x kilometres.

Road Traffic”

Road length

Person x kilometres

Time in traffic

Fuel consumption

Obviously the first one is the more relevant, when it is available, for the Statistics on Road Traffic, the others enable to assess or rebuild the missing indicators.

For this purpose the two first tasks of SafetyNet have been handled.

- Task 2.1 “State of the Art
- Task 2.2 “Availability, Usability and Comparability”.

3. State-of-the-Art survey on Risk Exposure Data

General

In the framework of Task 2.1, a state-of-the-art survey on risk exposure data (RED) was carried out. More specifically, an inventory of the existing studies on RED availability, collection methods and use in the EU Member States was created. A separate survey was dedicated to the investigation of the availability and comparability of RED in the International Data Files (IDF), such as EUROSTAT, ECMT, UNECE, IRTAD and IRF.

In particular, an exhaustive bibliography review was carried out, in order to obtain the overall picture on RED. Moreover, the partners involved in this Task prepared a brief National Report on RED availability and collection methods in their country, in order to provide good examples of common practice. Additionally, a series of visits to the IDF was carried out, in order to interview the managers of the files on the availability and quality of exposure data, as well as the collection and quality control processes, on the basis of an exhaustive questionnaire.

According to the above, a synthesis of the state-of-the-art was carried out. In this paper, the main conclusions concerning vehicle- and person-kilometres are summarized. These results were fully exploited in the elaboration of a questionnaire addressed to the CARE experts group, aiming at gathering the detailed information on exposure indicators (availability, collection methods, national definitions, structures, variables and values) over the Member States.

3.1. Review of methods for collecting vehicle - kilometres in the EU

In several European countries, vehicle- and passenger-kilometres of travel, as well as time spent in traffic are collected through national travel surveys, allowing to obtain information by both person, vehicle and road network characteristics. The main advantage of national travel surveys (compared to other collection methods) is that these surveys have persons as a unit, making it possible to compare groups of persons. Additionally, these surveys are carried out by personal (mostly face-to-face or telephone) interviews on a sample of the entire population (although in some cases an age threshold is in place) and therefore the data obtained are, optimally, only an acceptable approximation of the actual risk exposure. Additionally, a number of possible biases (sampling, non response or measurement errors) may occur and should be treated accordingly where possible. For example, experiences with travel surveys indicate that particular short travels (e.g. by foot or by bicycle) are often not reported, whereas motorized trips are often overestimated.

The international comparability among the produced exposure data is often limited, mainly because of several incompatibilities among the national definitions (road network, vehicle categories etc.) and/or characteristics (different use of various transport modes in different countries e.g. mopeds and motorcycles). Moreover, travel surveys normally have other purposes than to provide exposure data. Consequently, the different definitions between travel surveys and accident databases often create problems when travel surveys are used for road safety analyses purposes.

On the other hand, traffic counts systems, which are also widely used for exposure estimates, are not suitable to distribute exposure according to person characteristics (age/gender groups). In particular, traffic counts may give good estimates of average annual daily traffic (AADT), and its seasonal variation, but there are practical problems involved in calculating vehicle kilometres from AADT.

Additionally, this method is also sample-based, and the measurement points may or may not be representative of the national / regional traffic, as in most cases the systems are operational on the principal National and interurban road network (local or urban roads not included). Problems are also encountered in the classification by vehicle type; in some traffic counts systems the level of detail is insufficient, whereas in other cases a bias in the detection of particular vehicle categories (e.g. two-wheelers) is observed.

The two methods discussed above present different advantages and limitations, however they are the main methods that produce vehicle-kilometre estimates. However, because of the difficulties in the implementation and operation of such systems, in most countries the vehicle fleet and driving licenses national registers are also used to calculate exposure. The problem when using such registers to estimate risk is that these are certainly very crude estimates of exposure, giving quite uncertain risk estimates. Quite often, however, (e.g. Netherlands) the registers are optimally used to calculate risk in combination with sample studies (travel or mobility surveys) of average driving distances, resulting to vehicle-kilometre estimates.

Other methods for obtaining vehicle-kilometres, which are used in individual countries, include models for calculating vehicle-kilometres based on fuel sales (e.g. Portugal), odometer readings at regular vehicles inspections (e.g. Denmark) etc.

| | Norway | Greece** | Portugal | Netherlands | France | Hungary | Denmark |
|--------------------------------|--------|----------|----------|-------------|--------|---------|---------|
| National Travel Surveys | | | | | | | |
| Distance travelled | • | | | • | • | | |
| Time spent in travel | | | • | • | • | | |
| -by gender | • | | | • | • | | • |
| - by age | • | | | • | • | | • |
| - by experience | | | | | • | | |
| - by mode* | • | | ••• | ••••• | ••••• | | ••••• |
| - by road type | | | • | • | • | | |
| Traffic counts systems | | | | | | | |
| AADT | • | • | • | • | • | • | |
| Traffic volume | • | • | • | | • | • | • |
| O/D | | • | | | | | |
| - hourly variation | • | • | • | | • | • | • |
| - seasonal variation | | • | • | | • | • | • |
| - vehicle classification* | • | • | ••• | | | ••• | • |

* more bullets indicate a more detailed classification

** up to 1993

Table 1. Overview of main vehicle-kilometre collection methods in European countries

In the above Table 1, the main characteristics (parameter measure, variables and values) of the two main collection methods of vehicle - kilometres in different EU Member States are summarized, as reported in the National Reports. It is obvious that the use and specifications of methods varies significantly among the examined countries. Moreover, the availability, desegregation and comparability of variables and values is also quite diverse. Consequently, National vehicle- and passenger-kilometres estimates, when available, are seldom comparable at EU level.

3.2. Vehicle - kilometres in the International Data Files

These National risk exposure estimates are collected, exploited and published through a number of International Data Files (IDF) in the field of transport and road safety. The main IDF involved in road accidents data and RED in the EU are the following:

- EUROSTAT
- ECMT
- UNECE
- IRTAD
- IRF

These data files are useful and accessible data sources, as a result of several years of important data collection efforts. However, they have different objectives; they collect different data in different forms and structure, and are maintained by organizations with different scopes and policies. In particular, although the main data sources are National authorities, in some cases (IRTAD, IRF) other sources are also used (e.g. research results, other studies at national, regional or local level, private sources etc.), complicating data comparability among IDFs.

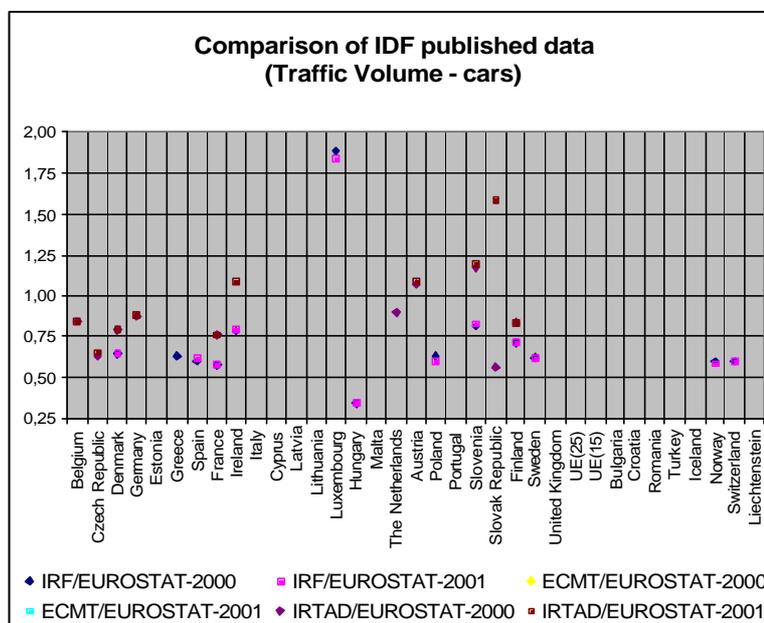


Figure 1. Comparison of published vehicle - kilometre estimates among different IDF (EUROSTAT, ECMT, IRTAD and IRF, 2000 - 2001)

Moreover, the availability of vehicle - kilometres among the data files varies significantly, in terms of both countries and years availability, and variables and values availability. It should be also noted that some of the vehicle - kilometre estimates in the IDF are based on crude National estimates, whereas the actual data source is not known. Additionally, one of the main limitations of the IDF concerns insufficient data quality control, which may be either not carried out at all, or limited to the correction of only obvious mistakes by checking the totals and comparing with other IDF. These issues are illustrated in Figure 1 above, which presents a comparison of 2000 and 2001 data from EUROSTAT and other International Data Files, by means of a ratio, where the denominator is EUROSTAT data and the numerator is the other IDF data. Considerable differences are detected, both among countries and among different IDF, reaching +/- 80% compared to the related EUROSTAT figures.

However, the considerable effort made during the last decades for gathering and exploitation of road safety related data is clearly reflected to these IDF. The fact that there are various IDF at European level is positive for the road accident statistics users, because they can choose from a variety of information. The objectives and scopes of these data files, as well as the quantity and quality of available data contained inside the IDF, differ among the various data providers, making them to function complementarily in most of the cases.

3.4. Conclusions and open issues

In theory, continuous exposure measurements of different road user categories in different modes and different road environments would be required and could provide detailed risk estimates to the degree of desegregation of the respective accidents data. In practice, such measurements are not possible. Consequently, road safety analyses need to compromise to some (approximate) estimates of exposure, which may be more or less accurate and representative of the examined population. The most appropriate and recommended measurements of exposure are vehicle- and passenger-kilometres of travel, as well as time spent in travel, the latter being less widely used in road safety analysis. However, this data cannot be collected in the required level of detail on other than a system-wide basis. In several EU countries, there exist different systems producing national exposure estimates, whereas in other countries no data on vehicle- or passenger kilometres are available.

Summarizing, the availability and quality of risk exposure estimates in the EU Member States varies significantly, and is related both to the exposure measures used and the characteristics of the respective collection methods. In particular, significant efforts are made at national level to improve data availability, desegregation and reliability, however the lack of a common European framework for the collection and exploitation of RED limits significantly the comparability of the detailed national data. On the other hand, the International Data Files containing road safety related data, including vehicle - kilometres, provide useful aggregate information in a systematic way and are currently the only sources allowing international comparisons, however more effort is required to further improve the availability and quality of these data.

It can be deduced that a series of problems, namely poor data availability, insufficient reliability, inappropriate desegregation and limited accessibility are the main limitations to the full exploitation of vehicle - kilometres at European level. Further work and research should also focus on data compatibility and availability, namely through a common framework including common data requirements and definitions and a pan-European data collection system. In particular, this framework should focus on the collection of disaggregate time series of vehicle-kilometres by road user, mode and network characteristics, and should be organized to provide data in a consistent and systematic way.

Certainly, the establishment and operation of such a system would be a complex and time-consuming task, which would also involve a significant effort and cost, both at national and EU level. However, given the importance of an improved vehicle - kilometres and other RED availability and quality, to support and monitor an efficient road safety policy at EU-level, it is necessary to promote its development.

In order to deal with the current needs, the gathering and harmonization of the existing information shall certainly contribute to the improvement of the exploitation potential of the data. In the framework of SafetyNet IP, an exhaustive survey is in progress, in order to fully assess availability, comparability and usability of vehicle - kilometres data at EU level. The methodology adopted, the progress made so far and some first results, as far as vehicle - kilometres are concerned, are presented in the following section.

4. Availability, Usability and Comparability

4.1. Objective

The main objective of task 2.2 is getting knowledge of the gathering methods, definitions and comparability of RED over the 25 EU Member States plus Norway and Suisse. The most important deliverable of this task is a common RED framework that is applicable to the CARE database over the Member States. This framework should consist of lists of the common risk exposure variables and values including transformation rules to compare national data at the European level.

4.2. Methodology

A two-step approach is used for gathering this data.

The first step is to provide a first classification of the Member States who will be able to provide usable and comparable RED. A RED questionnaire was sent out in May to all the 27 countries involved, consisting of 9 parts each representing a common RED indicator. Each questionnaire part contained both broad questions on the availability of the data, and some more detailed questions on the methodology that was used. To stimulate Member States to respond the Information Collection Coordinator (ICC) provided general feedback to every country for each indicator with some preliminary results on the questions. Above this, personal feedback is sent by the ICC to the National Correspondents to provide information on the responses that have been delivered already and the responses that still have to be returned. Based on the results of the questionnaire a first classification can be made on the usability of each indicator. This first classification is provided by the partners by analysing the data on availability, compatibility and usability. More details on the first classification can be found in the paragraph on the results.

The second step continues from the first classification and contains a more detailed approach to gather information. Using the first classification, some indicators will not be involved in the detailed study, since their usability is already limited. The detailed questions will only be asked for the usable indicators in those countries that are able to provide the data.

These questions will be asked by means of interviews that will be provided in February and continue from the information already gathered by the questionnaire.

The outcomes will provide the task group the necessary information on the gathering methods, definitions and comparability of RED over the 27 countries, to propose a common framework with transformation rules, and suggestions for state-of-the-art gathering methods to countries that don't gather RED indicators. The start of this task will be around June next year.

4.3. Results

Seventeen countries have responded on the questionnaire on vehicle kilometres. From the responses the availability, compatibility and usability can be analysed.

4.3.1. Availability

Available data is defined in SafetyNet WP2 as "relevant data on country level that is ready for usage".

For analysis purposes the availability of the data is divided in 4 categories:

- Data is fully available (relevant data is available on country level);
- Data is partly available (data is available but not complete for all subsets, but it can be corrected using transformation rules);
- Data is not available (data is not available);
- Data availability is unknown (there was no response on the availability).



Fig 2 Data availability

The preliminary results are the following: in 3 countries data is fully available, 12 in countries data is partially available and in 5 countries data was not available. Data is partly available in a lot of countries because the data is not collected for all transport types: in most cases bicycles, mopeds and/or trams are missing.

4.3.2. Compatibility

The concept of compatibility has to be analysed with regard to the potential future use of the RED in the European context.

That means that the compatibility will be assessed in accordance with three different areas, from the more global to the more detailed:

1. Compatibility with EUROSTAT definitions;
2. Compatibility with CARE variables;
3. Compatibility between countries.

Compatibility with EUROSTAT definition

The EUROSTAT definition is as follows:

“‘Vehicle kilometres’ of a country is defined as the total number of kilometres travelled within the borders of the country by road vehicles, where ‘road vehicle’ is a “vehicle running on wheels and intended for use on roads”

This definition includes bicycles and trams, and as we have seen in the availability most countries do not collect data for these types of vehicles.

Concerning the compatibility we take only take the collected data into account and analyse if it is compatible with the definition or that aggregation or desegregation is needed to provide the data according to the EUROSTAT definitions.

Table 1 shows the preliminary results on compatibility with EUROSTAT’s definition from the replies to the questionnaire.

| <u>Country</u> | Compatible with EUROSTAT definition? | <u>Country</u> | Compatible with EUROSTAT definition? |
|----------------|---|------------------|---|
| Belgium | Yes | Luxembourg | N.A. |
| Czech rep | Yes | Hungary | Yes |
| Denmark | Yes | Malta | N.A. |
| Germany | Yes | Norway | Yes |
| Estonia | Yes | Northern-Ireland | Not known |
| Greece | N. A. | Netherlands | Not known |
| Spain | Not known | Austria | Yes |
| France | Not known | Poland | Not known |
| Ireland | Not known | Portugal | Yes |
| Italy | Not known | Slovenia | Not known |
| Cyprus | N.A. | Slovakia | Yes |
| Latvia | Not known | Finland | Yes |
| Lithuania | N.A. | Sweden | Not known |
| | | UK | Yes |

Table 1 EU+ countries with data on vehicle kilometres and degree of compatibility with EUROSTAT definition. N.A. = Not available.

Compatibility with CARE

The RED will be collected in order to assess the risk levels for a subset of accident indicators. For this purpose, the national RED should be compatible with the subset of relevant accident common variables recorded in the CARE database for the risk levels assessment.

Therefore, this comparability requires:

- Firstly, to select the relevant common accident CARE variables allowing the risk levels assessment for which we have linked RED
- Secondly, to verify the compatibility of the national RED to the common accident CARE variables.

By means of a table, the compatibility with CARE variables will be estimated, namely we are looking for the level of details for the CARE variables, which could be equivalent to the RED's. In fact, it would be needless to work on a upper level of details than the RED's.

This estimation will be done in a later phase of the project. Therefore, no results can be presented yet.

4.3.3. Compatibility between countries

For each national RED, the compatibility between countries themselves will be verified in terms of:

- the RED definition
- the features of the collection:
 - The units
 - The geographical area
 - The frequency of the update
 - The methods of registration (sampling, survey, Storage)

This comparison will be made in a later stadium of the project. Therefor, no results can be shown.

4.3.4. Usability

Usable data is defined in SafetyNet WP2 as data that is at least partly available *and* partly compatible. Countries that are able to provide usable data can be found in the green and yellow cells of table xx.

The criteria by which countries are placed in the table is their answer to the questionnaire. Denmark and United Kingdom are the only countries that have data on vehicle kilometres considered to be fully compatible with the EUROSTAT definition. The reason for this is that these are the only two countries that have vehicle kilometres also for bicycles.

Those countries that have not answered the questionnaire are placed in the “not known/not known” category. We expect that many of these countries in fact do have data on vehicle kilometres.

| | Compatible ¹ | partly compatible | not compatible | not known |
|------------------|---|-------------------|--|--|
| available | Denmark Norway United Kingdom | | | |
| partly available | Belgium Czech Republic Estonia Finland Hungary Portugal Germany Slovakia | | | |
| not available | | | Greece Lithuania Luxembourg Malta Cyprus | |
| not known | | | | Spain France Ireland Italy Latvia Northern-Ireland Netherlands Poland Slovenia Sweden |

4.3.5. Conclusion

Data on vehicle kilometres are available or partly available in many countries, and compatible with the EUROSTAT definition. The reason why they are not fully available is that bicycles, mopeds and trams are normally not included. The usability of vehicle kilometres as a RED indicator is thus high.

5. Expected results concerning the Vehicle x kilometres

The above results are the first steps of the SafetyNet WP2 tasks, which are aiming at a better knowledge of Risk Exposure Data gathering and use over the 25 EU Member States.

Traffic Volumes (vehicles x kilometres) being obviously one the more relevant Risk Exposure Data, the following steps of the project intend to go deeper in the detail of the knowledge concerning the different components of this variable.

For this purpose

- A complementary survey with the EU Member States will be performed in order to collect the missing information to date including an assistance to the failing countries.
- In parallel a common framework will be built-up including transformation rules if necessary mainly focused on the comparability of the Risk exposure Data (RED including vehicles x kilometres) over the EU Member States. This framework should enable the Commission to collect the RED and use them within the future European Road Safety Observatory
- Before this final goal SafetyNet WP2 will intend to test this common framework by the way of a pilot study which will consist in collecting in accordance with the “Common Framework” the Risk Exposure Data (including vehicle x kilometres) from a panel of three or four countries. These data will be checked and analysed and used. For this purpose a data processing will be undertaken with the CARE accident database and the RED (including the vehicle x kilometres) in order to calculate comparable level of risk over these panel of three or four countries.
- Finally a Risk Exposure Data (including vehicle x kilometres) collection could be organized within the European Road Safety Observatory framework in accordance with the methodologies and results proposed by the SafetyNet project.

These tasks are planned to be performed in 2006 and 2007 and of the SafetyNet IP will be ended in the middle of 2008.

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