TRACE Project. Deliverable 3.5. Summary Report on WP3 ”Types of Factors”

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Summary Report on WP3 "Types of Factors"

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Abstract:

This summary report presents the main results of WP3 "Types of Factors" of the TRACE Project.
The work as performed in the tasks 3.1 (accident related factors), 3.2 (sociological and cultural factors), 3.3 (trip-related factors), and 3.4 (driving-task associated factors) and presented in the Deliverables 3.1 to 3.4 and an additional INTERNAL TRACE Reports (Collection of Sub-Reports) is summarized and discussed.
The objectives of analysing traffic accident causation
- from a factor's point of view while taking traditional views into account
- on different levels
- by using statistic methods for existing databases as provided by the WP3 Partners and
- by using new (developed in WP5 of the TRACE project) methods on new case analysis

in order to gain new knowledge on accident causation was possible to reach.
The scope of the identified key aspects as found by the Partners in their work for the relevance in EU27 is discussed. In accordance, even further, appropriate suggestions for prevention of traffic accidents can be derived.

Keyword list: Types of Factors, Accident Causation, accident related factors, sociological and cultural factors, trip-related factors, driving task associated factors, risk factors, contributing factors

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1 Introduction and Objectives

WP3 of the European Project TRACE is concerned with Types of Factors to analyse the causation of road traffic accidents from a factors' point of view. In contrast, WP5 "Human Factors" provides a method of regarding human functional failures generated by certain scenarios as accident causation process. In the operational WP3 all factors –independent of their origin or role within the accident causation process - are analysed.

The objectives of WP3 were:

1. To detect relevant factors which contribute to road traffic accidents with casualties.

2. To analyse these factors according to a multi-dimensional view of causation factors (Sociological, Infrastructure-related, Vehicle-related, Medical, And Psychological).

3. To analyse the frequency of these factors with regards to accident causation.

4. To understand the major influencing factors in road accidents

WP3 included four tasks. Task 3.1 "Accident related factors" was referring to the first and the third objective. The work was finished in year 1. Tasks 3.2 "Sociological and cultural factors", task 3.3 "trip related factors" and task 3.4 "Driving task associated factors" focussed mainly on the second and fourth objective and started the work in year 1 lasting until the end of the TRACE Project in M30.

The specific challenges and further expectations towards WP3 were:

1. to provide a list of risk factors for WP4 (task 3.1)

2. to develop a model for accident causation based on factors (task 3.1)

3. to define and classify accident related factors to sociological and cultural (task 3.2), trip-related (task 3.3) , and driving task associated factors (task 3.4)

4. to analyse these factors by three different methods in the tasks 3.2, 3.3 and 3.4 by the WP3 partners

5. to use existing databases and aggregated data as provided by the TRACE Partners via WP8 (task 3.1, task 3.3, and task 3.4)

6. to "find new factors" and "innovative results" (all tasks)

7. to translate results to prevention suggestions by taking WP4 and WP6 results into account (tasks 3.3, and 3.4)

8. to give statements on EU27 level towards accident causation (in Deliverable 3.5)

In the following first the Methods used in WP3 (chapter 2) and then the main outcomes from each task (chapter 3) are presented. A general discussion for EU27 relevance, on the conclusions that were drawn in the tasks concerning prevention measures, and on the methods is then presented in chapter 4.

2 Material and Methods

2.1 Definitions used in WP3

For the work in WP3 in task 3.1 first the definitions were developed for being able to avoid misunderstandings when talking about "factors", "risk", and "cause".

Accident-related factors are defined as all imaginable entities that contribute to the accident occurrence. These factors can be material things, but also circumstances, situations, events, manoeuvres, ideas, attitudes, states, and conditions. They contribute to an accident in the sense that if they had not been present, the accident would not have happened.

Usually they are found by investigators and in-depth accident analysis. The idea is to apply a causal contribution to these factors on a single accident level. In accident databases they are collected and by database analysis frequencies on how often the factors are found in the accident samples can be derived.

Risk factors here are defined as all imaginable things that increase the chance for an accident to occur. They are found by statistical analysis on a sample level by estimating risk measures describing the increase in risk for an accident. A causal contribution to accidents is not necessarily given.

Risk estimates for traffic accidents can refer to individual participants, to certain sub-populations of traffic participants, as well as to more specified accident types, and are published most often as relative risks.

The cause for an accident is seen as a combination of co-occurring accident-related/contributing factors.

2.2 Materials used in WP3

2.2.1 Databases by Partners of WP3 and TRACE

Databases provided by the Partners in WP3 and all Partners in TRACE as represented in the WP8 cover in-depth databases and access to national databases. All databases use different criteria for including accidents into their database. Inclusion and Exclusion Criteria range from geographic areas that are covered, over the extent of injury severity and the material damage, to types of vehicles or traffic participants, and are sometimes limited to a certain time when the accidents were collected. All databases use different variables for documenting the characteristics and circumstances for describing the accidents. Further, all databases use different variables for causation analysis. Even if the focus is set on comparable questions (traffic accident causation or injury causation or human functional failure analysis or accident preceding situation analysis) the systematic for documenting causal, precipitating, contributing, risk factors or explanatory elements differs. Even if the name for some factors is comparable often the implied meanings covered or the parameter values differ.

2.2.2 Classification of factors and accident causation model

The idea of a time scale will most often be found in models of accident causation. Also the idea, that accidents are the unwanted outcomes of interactions of the Human with its Environment.

These two ideas serve as the basis for the accident model and the classification of factors suggested by WP3.

One axis distinguishes factors that stem from the components Environment, Vehicle and Human. This is done due to practical reasons of existing classifications. The second axis distinguishes factors that stem from different levels on a time scale from (years to months) via (weeks to hours) to (minutes to seconds). The levels are "background", "trip-related" and "driving task associated". This theoretical classification provided by WP3 is pictured as a three by three table distinguishing 9 different cells.

Factors that stem from the lowest level "driving task associated" are thought to be closest to the accident, thus on the proximal end of the accident causation process. They are directly and causally contributing to the accident occurrence, very specific and detailed, are short-term lasting or dynamic in nature, and refer to the actual conditions of the components.

The background factors are thought to be further away from the actual accidents on a time scale (on the distant end of the accident causation process), are pre-existing and providing the circumstances for traffic and roadway systems in interaction with the participants and might therefore not easily be seen as causally contributing to an actual accident. As well, because they can be conditions leading to other effects besides the influence on traffic accidents they might be regarded more as risk factors.

The in-between trip-related factors can be effects of the background factors (intermediate factors) or independently exist on this level. In any case they are thought to influence the conditions that are then found on the driving task level. Trip-related factors might not directly causally contribute to an accident but are contributing factors for the actual driving task associated factors. They are thought to be constant during a trip, long-term lasting and are more focussing on certain states of the components in contrast to the actual conditions of the components.

2.3 Methods applied in WP3

2.3.1 Literature review for task 3.1

It was aimed at performing a sensitive more than specific search for risk factors for traffic accidents, so to be able to find all possible risk factors discussed in literature. Thus, it was more focus laid on "what" risk factors exist, and not, how high the risk estimates for single factors were.

Risk factors for traffic accident outcomes like the injury severity were not regarded. The literature review already also includes published studies based on databases providing frequencies of factors' occurrences.

2.3.2 Data requests 3A and 3B to WP8

Data request 3A aimed at getting an overview on the data material of the Partners and their modes of coding and classifying variables and factors for accident causation analysis. Frequencies of parameter values of their contributing factors within their data material were requested.

The accident samples requested from the Partners should cover all kinds of accidents in their databases (no restrictions in criteria) and should cover all collected accidents of the year 2004, if this was feasible. In addition the same request was restricted to fatal accidents only, to have one characteristic for improving the comparability of the results.

Data request 3B aimed at screening for certain associations between contributing factors and explanatory variables. Therefore cross tabulations of the selected contributing factors with a selection of explanatory variables with suggested parameter values was requested.

Only Partners being able to provide at least a few of the suggested contributory factors and being able to perform this cross tabulation on a database structure level where only one participant (in one vehicle) for one factor in one accident can be regarded without major effort in database preparation were contacted.

The selected contributing factors were "alcohol", "vigilance", "experience", "vehicle condition", "road layout" from the trip level, and "speed", "attention", "mobile phone use", "sudden health problems" "sudden technical defects" and "dazzling sun" from the driving task associated level.

The selected explanatory variables and the suggested parameter values comprised:

a) person characteristics:

- Gender (male/female)

- Age group (<25/25-44/45-64/>65)
- occupation (worker, employee/student/pensioner/unemployed/other)

b) traffic participation

- Vehicle group (Car, Van <3.5t/truck >3.5t/PTW/pedestrian/bicycle/Other)

c) accident characteristics

- impact type multiple vehicle collision (frontal/side/rear/Other)
- crash type single vehicle (running off the road/hitting object (immobile)/hitting object (mobile -e.g. animal)/rollover)
- manoeuvre (going straight/overtaking/turning/crossing/merging/other)

d) site characteristics

- Location (Rural/Urban)
- Road type (Autobahn, National road/Country road/Other roads)
- Speed limit zone (<50/50-100/>100 km/h)

e) time characteristics

- light conditions (dark/dusk, dawn/day)
- time of day (0-7:59/8-15:59/16-23:59)

2.3.3 *Statistic descriptive methods – all tasks 3.1 to 3.4*

In task 3.1 the results of the data request 3A to WP8 are presented by absolute frequencies of contributing factors as found in the databases provided by the TRACE Partners. In a descriptive way it is pictured thereby how often the factors are applied to the accident samples. The accident samples requested from the Partners should cover all kinds of accidents in their databases (no restrictions in criteria) and should cover all collected accidents of the year 2004, if this was feasible. In addition the same request was restricted to fatal accidents only, to have one characteristic for improving the comparability of the results.

Based on the absolute frequencies also relative frequencies were calculated and given as a percentage. The relation to which the absolute frequencies of the contributing factors were set was on the one hand the sum of all applied factors, to get an idea on how frequently this factor is occurring in the data material of the database. This was presented by providing the Top Ten Factors of each database.

On the other hand the absolute frequencies of the contributing factors were set in relation to the number of accidents they were applied to. This answers in which share of accidents the factor is found. Databases that allow coding of only one factor for one accident show equal figures for both relative frequencies. These results were pictured in lists for a variety of factors that share comparable meanings.

In task 3.2 also only frequencies of social and cultural factors as found in databases provided by the Partners are presented.

In tasks 3.3 and 3.4 descriptive statistic methods are applied in the in-depth analyses for presenting the frequencies of different scenarios worked out.

2.3.4 *Estimation of relevance of factors based on results from data request 3A for D3.5*

The results from the data request 3A as prepared in task 3.1 are further presented in the Deliverable 3.5, and partly in task 3.3. The frequencies calculated as mentioned in the preceding chapter were taken to get an idea on the relevance of the factors within the referring databases according to the represented material. Therefore the relative share of the contributing factors was set in relation to the expected share of the factors. E.g. if a database provides 50 different factors, allows to code one factor per accident and contains 1000 accidents, then every contributing factor should be coded 20 times. As this is not the case, some factors prove to be more relevant within a coding system. Either some overrepresented factors cover a range of different underlying causes, or, this factor is a frequent factor contributing to accidents. By setting the actual frequencies in relation to the expected frequencies (which assumes that all factors are equally relevant and of detail level) relevant factors of a database will be those where the Relative Risk of being coded is higher than the assumed "1". If the overrepresentation is significant or was found just by chance because of the low number of accidents covered in the analysed material is not analysed. These results are provided in the Annexes in D3.3 and D3.5 and serves for reference.

2.3.5 *Statistic analytic methods and testing in task 3.3 and 3.4*

Use of Explanatory variables: to have objective information without subjective interpretation of a researcher on the Site necessary, just facts, do they characterize circumstances where typical factor related accidents occur?

The method applied was discussed with WP7 and is comparable to the idea presented in D7.3, Chapter 6.3.3 "Comparison of risk factor-specific and reference accident type".

The "Statistical Method" of analysing the selected factors for tasks 3.3 and 3.4 is based on the idea of comparing accidents that are influenced by the factor of interest with those accidents where this factor had not been contributing to the accident. The question is if the accidents differ from each other.

The differences can be described by explanatory variables which comprises road users characteristics and their participation in traffic, crash types, vehicle characteristics, manoeuvres, situations, locations, times, scenarios, and other characteristics describing or being connected to an accident.

At first the databases are prepared to assign a dichotomised variable to each accident indicating, if in this accident a certain contributing factor was contributing to the accident or not.

These accidents are then compared by the help of explanatory variables (e.g. by cross tabulation/contingency tables) to see if not neglectable associations exist between a contributory factor and an explanatory variable. Chi square tests, hosmer lemshow tests, pearson and spearman correlation coefficients, and Mutual Information Content testing were used to test homogeneity hypothesis or find associations between variables and factors. The selection of explanatory variables in the first was either performed by mutual information method as developed by WP8, or by the given limited number of available variables and expert knowledge.

After this screening the explanatory variables that show associations are used for modelling a logistic regression model.

The remaining variables in this logit model for accidents with the contributing factor of interest compared to accidents without this contributing factor, describe a certain pattern that goes along with this type of accident, but not for accidents, where this factor was not contributing.

Depending on the used database different explanatory variables are at hand for the analysts.

For the usage of the 3B data request (requesting cross tabulations of contributing factors with selected explanatory variables comparable to the first steps in tasks 3.3 and 3.4) due to the restriction to aggregated data only Odds Ratios with 95% Confidence intervals are calculated for screening of significant associations.

2.3.6 *Analysis of social factors in task 3.2*

As developed in Work package 5.4, social and cultural factors can be supposed to contribute, on an upstream level, to accident causation in specific cases. According to 5.4 results, “soft” factors, such as culture, social status or membership to specific social groups, have an identifiable influence on individual behaviour. On this background, road accidents can be understood as something that is the product of the interaction of individuals in a given social space. Regarding the specific set of a road accident, Individuals are not neutral (in the sense that they are not only begin to exist when the accident occurs…) they are product of their specific history, they evolved in a specific cultural context and they are acting on behalf of their multiple social roles.

On this premise the aim of task 3.2 was to analyze on the one hand on what level social factors can be identified in existing in-depth databases on accident causation, and on the other hand on which degree it is currently possible to analyze the specific impact of socio-cultural factors on accident causation.

As a basic condition for analyzing the impact of socio-cultural factors on the production of a road accident, corresponding variables must have been formerly integrated in the design of the in-depth analysis database. Therefore, the first step of task 3.2 was to identify existing socio-cultural variables in current accident causation databases. The following questions should hereby orientate the proceedings:

Do the existing accident causation databases contain sufficient information that permit to perform complementary analysis, regarding the implication of social factors in the accident causation process?

Which are the existing variables that do inform about social factor involvement in existing databases?

What is the level of sociological analysis that is possible to perform with the existing data material?

On the bases of the existing data material, what are the conclusions that can be obtained today from such analysis?

To answer these questions task 3.2 proceeded in three different steps:

Four existing European databases (France, Germany, UK and Spain) were examined on behalf of their individual potential to identify existing socio-cultural factor variables.

In a second step, identified socio-cultural variables underwent some frequency analysis (and some correlation analysis on selected variables), to determine their general impact on accident causation.

The third step consisted in a qualitative analysis of four specific cases from the French EDA database. These four case studies are performed on the base of the in-depth interview, which was conducted by the accidentologists with accident drivers.

The results and conclusions of the performed analysis were presented for each of these parts.

Expected results of task 3.2 were to show the potential and the limits of the existing accident causation databases and on this background, to propose elements that can contribute to improve accident causation analysis and public prevention strategies.

2.3.7 In-depth case analysis by using Human Functional Failure Analysis in tasks 3.3 and 3.4

Basis for this is the work as presented by INRETS in WP5. INRETS used their implemented method and database for analysing vigilance (trip level) and attention (driving task level) for this operational WP3..

Previous work on the subject of "human error" in accidents has led to the development of an operational analysis grid. This grid shows the functional failures involved in the various stages of performing the activity (cf. TRACE D5.1): **perception, diagnosis, prognosis, decision and execution** of the action, and on an **overall** level of the individual's psycho-physiological and cognitive abilities. Its use provides a systematic analysis of the role played by the human component in the multi-causal breakdown of situations. Once identified using this model, "accidental errors" are distributed into **prototypical scenarios** (cf. D5.3) explaining the generic contexts of their appearance and the mechanisms that produce them. It has to be underlined that the deliverable D5.3 not only provides a pre-established scenarios list but also the method to build them if thought necessary, following the aggregation process of similar accident patterns. Then, an analysis of the scenarios enables us to observe homogenous sets of situations in which drivers encounter difficulties, to define patterns of explanatory elements for these difficulties and to pinpoint the functional failures that they cause as well as the repercussions that these failures have in the breakdown of the situation.

The VSRC used this method for the first time and applied it to their data on the factors alcohol impairment, road layout (both trip-level) and speed (inappropriate speeding and illegal speeding), (driving task level).

To analyse the type of accidents where the selected contributory factors (alcohol impairment, road layout, and speed) were present, in particular the type of human functional failures that occur in these accidents, an in-depth analysis of a sample of cases involving the contributory factor of interest was undertaken using the in-depth methodologies developed in TRACE Work Package 5, most notably the classification model of human functional failures, the grid of factors and pre-accident driving situations and 'typical failure generating scenarios'. Closely related to the pre-accident driving situation is the 'conflict', which was also identified for each road user in each accident analysed. This can be defined as the initial conflict that the road user was faced with prior to an accident. The conflict describes the first interaction with either another road user or object in the roadway, which can occur either prior to or during the rupture phase. The resulting impact may or may not involve the 'conflicting' road user or object, but the conflict is an integral part of the accident process. If the conflict was not present, the likelihood of the accident occurring may have been different. However, in the same way, in an accident where was no conflict, the presence of a conflict may have changed the likelihood of an accident occurring in the first.

Also, distinctions were made between the road users who were 'primary active' in each accident, and those who were 'secondary active', 'non-active' and 'passive'. In the majority of accidents, there will be one road user who was at the centre of the 'destabilisation of the process', and either intentionally or unintentionally initiated the rupture phase (the point at which things start to go wrong). The remaining road users may have either been 'secondary active' (had a warning of possible danger ahead, but for some reason did not/was unable to avoid), 'non-active' (had no warning of danger ahead, but if had, would have been possible to avoid) or 'passive' (even with warning of danger ahead, it would not have been possible to avoid). See Deliverable D5.1 for further definitions.

It was decided that only a small sample of cases would be analysed using the WP5 methodology, due to the detailed re-coding of cases that was required and further time-consuming in-depth analysis of each individual case that was necessary to try and identify the main 'failures' in each accident and the factors (as defined in WP5) which led to these failures occurring. However, the sample for each factor analysed would be large enough to reveal some interesting results. It was therefore decided that approximately 20 cases would be selected for each causation factor analysed.

The aim was to try and identify some typical failure generating scenarios from each small sample and identify whether these are 'typical' scenarios already identified in TRACE D5.3 or whether new scenarios can be identified.

3 Main Outputs of performed work

3.1 Task 3.1 Accident related factors

In task 3.1 a traffic accident causation model based on factors was developed. It takes results from literature for accident causation into account, further it serves the idea of TRACE to regard accident related factors on hierarchical levels from background factors, via trip-related factors to driving task associated factors indicating at what stage of the accident causation process certain factors are occurring, and it takes current data coding and classification methods into account that separate factors to the origin they stem from, namely the "human", the vehicle, and the environment.

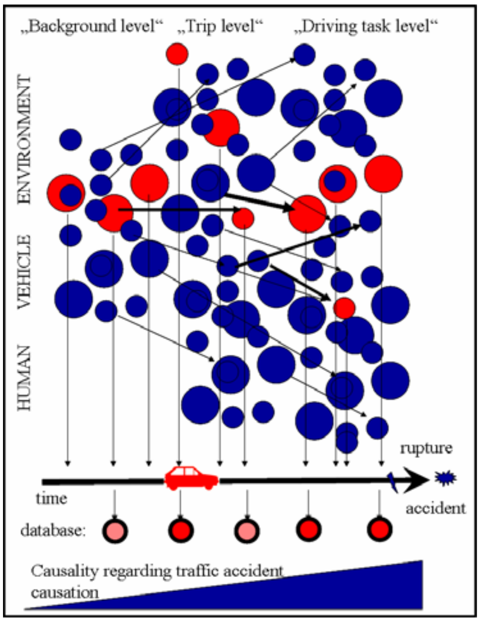

Figure 3-1: traffic accident causation model based on factors (Schick S., 2007)

In this model the ideas of mediating and proximal causes, Cross, 1974, being extended by not limiting them to the human component, the systemic latent failures idea of Reason (1988) and the static and dynamic components idea by Kieliszewski 2005 are reflected.

The model implies the following assumptions and prepositions:

- A causal chain in time of factors leads to an accident.
- A multitude of accident related factors exists
- They are present at particular times on a background level, on a trip level, and finally on a driving task level they might lead to an accident
- They might stem from an environmental “component”, a vehicle component or a human component
- The cause of an accident is always a combination of factors, named accident related factors.
- Each factor by itself is not sufficient to cause an accident.
- Interactions and associations between factors exist
- There are only two (trivial) necessary factors for a road traffic accident, namely the "roadway and traffic system" and the "participation in road traffic".

By this model the classification of accident related factors is two dimensional. One dimension expressing the time (causal chain, accident process) by levels, and the other dimension expressing the origin from where a factor stems from (from a "traditional view") by components. Generalised examples are used in the following figure to visualize the classification of factors.

Levels and Components	Background factors	Trip related factors (task3.3)	Driving task associated factors (task 3.4)
Environment	Modes of Transport, Climate	Road characteristics	Road and light condition
Vehicle	Vehicle fleet, safety standards	Vehicle type and maintenance status	Vehicle condition and performance
Human	Transportation politics, Socio-demographic characteristics (task 3.2)	Physical and mental state	Actual behaviour and performance

Figure 3-2: classification of accident related factors (Schick S., 2007)

Some of these factors are found by accident investigators and are documented in their databases as "contributing factors". In Risk studies also variables can be found, that go along with an increased risk for traffic accidents, whereas usually no "causal contribution" is assumed for these variables (e.g. male gender can be a risk factor, but is usually not regarded as being a causal factor in accident causation).

The most important risk factors for traffic accidents as defined by their implicated risk estimates found in the literature review have to be accepted to be: low socio-economic status, alcohol, drugs, anxiety, fatigue, speeding, cell phone use, high traffic flow and volume, road condition and layout, curves, and junctions.

The most important contributing factors for traffic accidents as found by their representation in the databases of the TRACE Partners have to be accepted to be: alcohol, speeding, distraction and inattention, followed by careless and risky driving, automatic driving, road overfamiliarity, view obstructions, road condition and layout and by inexperience and insufficient safety distance.

Frequencies indicate that the vehicle in terms of maintenance or mechanical failures only seldom contributes to accidents. Also, the Environmental influences on the accident causation are not regarded enough by the existing data collection methods that mix factors from different levels with interactions of components. Still the Human "factors" are mainly regarded in traffic accident causation analysis.

Combining the findings for accident related factors by risk increase and frequency of contribution to accidents the conclusion can be drawn that the most relevant factors for accident causation are:

alcohol, speed, inattention and distraction, fatigue and road condition and layout.

3.2 Task 3.2 Social factors

3.2.1 Reminder

Why should a focus and analyses of social and cultural factors inside the accident causation process, bring any new information?

Road accidents are today very much seen as individual problems (human failure), fact that surely occurs for a great number of cases. Nevertheless, a part of accident cases do imply factors that can be qualified as being social and cultural, and those factors do not occur on the individual level, but are produced by society on a structural level – which means , they are latent, pre-existent and triggered by the accident. For example, in the context of child safety, the misuse of CRS is an important issue: there are many cases where a child, who was killed or severely injured in a road accident, could have been saved if properly installed, in an adequate CRS. The proper use of the CRS and the selection of an adequate CRS is in the parents responsibility – but, what are their knowledge on child safety needs, what are their criteria for choosing the right seat, etc.? All this are social, cultural or socio-economic factors that are prior to the immediate situation of the road accident and they co-determine the outcome of it.

Another example could be drink driving: the driver who has an accident while under the influence of alcohol did consume it prior to the accident. What are the reasons for it? What do we know about social context that tends to encourage drink driving? When we better understand the reasons why someone decides to drive under the influence of alcohol (maybe with passengers), we have better possibilities to do more efficient prevention work.

3.2.2 Leading Questions

Task 3.2 inside Work package 3 "which factors" is about the identification of social and cultural factors in existing European accident databases. By applying an analysis methodology that was introduced in the methodological oriented Work package 5 on "Human Factors", task 3.2 proceeds according to the following leading questions:

- Do the existing accident causation databases contain sufficient information that permit to perform analysis regarding the implication of social factors in the accident causation process?
- Which are those variables that do inform about social factor involvement in existing databases?
- On what level it is possible to perform sociological analysis with the existing data material.
- On the bases of the existing data material, what are the conclusions that can today be obtained from such analysis?

3.2.3 Proceeding

To perform an analysis regarding the existence as of social and cultural factors in existing European accident databases, four databases were examined: the German database GIDAS (BaSt), Spanish DIANA database (CIDAUT), OTS from Great Britain (VSCR) and EDA for France (LAB). Regarding the operability of the once identified variables, frequency analyses were performed for EDA and GIDAS variables. To compare the identified variables with the trends inside the greater European space, European databases (CARE and UNECE database) were examined on behalf of the prevalence of the identified social and cultural variables. Finally, four individual case studies were performed, on the base of interviews with accident drivers.

3.2.4 Results

1. The overview of four European databases EDA, GIDAS, DIANA and OTS shows the very limited possibilities to access background information on behalf of socio-cultural content for a more substantial analysis on social and cultural factors inside the accident causation process. More precisely, today, regarding the four compared databases, the existing, common topics of socio-cultural interest, are **"age", "gender", and "alcohol consumption"/ "drink driving".**

2. The frequency analyses of the selected variables with socio-cultural background, which were performed with data from the EDA and the GIDAS databases, few results were obtained. Given the current database situation, a specific social sciences approach does not give any new information. On the selected topics, the following conclusions can be drawn:

- The most important part of accident drivers are young men, coming from the age group of 18-25 years. This result confirms a well known trend which was treated in the bibliographic overview of TRACE 5.4. The reasons for this result are commonly seen in a lack of driving experience and sensation-seeking behavior.
- Alcohol consumption concerns mainly the same demographic group of young male drivers.

One specific conclusions regarding the EDA (France) database was:

- Persons with a higher education degree appear less represented among the accident drivers (but there are 28% of accident drivers that are not specified regarding their educational background).

On the other hand, the GIDAS database (Germany) showed that:

- The analysis of the professional occupation background did not bring any results.
- Regarding passenger information, the 18-25 are also identified as the most important group that transported their boy- or girlfriends, or other friends and acquitances, when the accident occurred.

As a general conclusion, the current data situation does not appear sufficiently complete to perform an in-depth analysis on socio-cultural factors in the GIDAS and EDA databases.

3. A brief review of the public accident statistics for the European Community shows that socio-cultural accident causation factors do also appear as being limited on Age, Gender and Drink Driving, which corresponds to the conclusions of the review of the four databases, cited priory.

- In comparison to the analysis of the EDA and GIDAS databases, the European data show not only the higher exposure of young drivers, but do also put in evidence the higher road accident risk for elderly drivers.
- According to the results published in the CARE database[1], the European trends regarding the socio-demographic variables Age and Gender do confirm the general trend regarding a specific exposure of young male drivers in road accidents. Also, significantly much more men are killed in road accidents than women.
- The population of elderly drivers appear as strongly exposed according to the CARE database. UNECE [2] accident statistics confirm the trend of proportional higher exposure of young drivers' and elderly drivers to road accident. Regarding the socio-cultural factor of 'Drink Driving', UNECE data show the importance of this variable in accident causation.
- It appears that for some countries, the rate of Drink Driving related accidents is much higher than for others, for example, comparing Germany and Great Britain (2002) to Italy (2002). In general, the much lower number for Italy in comparison to Germany and Great Britain is an indicator for a culturally different attitude towards alcohol consumption and its integration in a given cultural framework. Besides this cultural background, it also reveals a very different attitude on the social acceptability of Drink Driving in a specific country.

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[1] Cf. http://ec.europa.eu/transport/roadsafety/road_safety_observatory/care_reports_en.htm

[2] http://www.unece.org/trans/main/wp6/pdfdocs/RAS_2004.pdf

Drink Driving is maybe one of the most interesting socio-cultural factors that today is systematically investigated in accident causation statistics, but it does not appear, if these data are sufficiently exploited, regarding their socio-cultural content.

4. The four individual case studies illustrate different aspects regarding the interference of social and cultural factors in accident causation. Especially case 1 (alcohol and social exclusion factors) and 3 (relation to the rule) do complete the understanding of the accident by indicating the relevance of the socio cultural factors to the accident causation process. The cases 2 and 4, which show interesting examples for "human failure" as accident causation factors [3] are completed by additional socio-cultural information.

- The "human failure analysis" would certainly contribute to understand fully the accident causation process – for these two specific cases the analysis of social and cultural factors can be considered as complementary. However, the situation regarding case 3 and more specifically case 1 is quite different: in both cases the socio-cultural factors are the key factors for the complete analysis and understanding of what has happened.
- The four cases, selected by random choice, are very typical accident causation scenarios, where common people meet common, every-day traffic situations. The fact that in each of these average scenarios, one or several social factors can be decrypted and be situated in the social spheres analysis scheme shows the relevance of an regular integration of socio-cultural factor analysis in accident causation research.
- An important point is the source of information: the in-depth interview is the only procedure that allows the collecting of socio-cultural background information, it is today the only instrument where such qualitative data can be investigated.
- The four cases illustrate clearly that some accident causation factors are socially constructed; sometimes their origins lay very much in the past so that one can consider that the road accident is in fact the result of a long-term social construction with a multitude of actors involved and a social structure that facilitates such accidents to happen.

3.2.5 Conclusions / Recommendations

The present study shows that the existing European databases are incomplete on behalf of a sociologic perspective

- As a general recommendation regarding the European databases, the diverse age groups for younger as well as for elderly drivers should be reorganized and put in an explanatory framework. The explanatory framework hereby should refer to sociological / social psychological background information on mobility patterns, life styles or socio-cultural information (cf. TRACE report 5.4) that could contribute to a more systemic view on accident causation factors and so help to improve road safety policies.
- Regarding the topic Drink Driving, the European databases reviewed show that this social phenomenon is an important one regarding its relationship to accident causation, which is an argument for further in-depth investigation. Especially research on cultural differences among European countries regarding their "habits" of alcohol consumption culture and, even more important, their diverse degree of social acceptability of Drink Driving should be further investigated.
- The "social dimension" of road safety that is illustrated by the case studies, presents - from a social scientist's perspective - a much-underestimated dimension in accident causation analysis. A more important investigation of the social and cultural accident causation factors

[3] Van Elslande, P., Fouquet, K., (2007a). Analyzing 'human functional failures' in road accidents. Final report. Deliverable D5.1, WP5 "Human factors". TRACE European project.

can give in some scenarios useful information that could help especially for prevention strategies.

- A typical "young driver" accident causation scenario wherein inexperience and in-adapted driving behavior are the key factors (cf. case 2), do illustrate an acknowledged problem[4], but the phenomenon still risks to be repeated at the scale of the "old" and new European countries (EU 22). A constructed analysis framework for social and cultural factors in accident causation can contribute to improve prevention strategies and road safety management for those new European countries.

The problem is, some of the research that could prove useful for road safety will take time, the data collection procedures have to be adapted, the accident investigators have to be trained to collect those "soft" data. In addition, in-depth accident research would profit by a more interdisciplinary approach and more flexibility regarding the evolution of its investigation tools. The "human factor" in accident causation is still the most important one, but to understand it to its full extent, more complex human and social sciences approaches have to be applied and more longitudinal studies on risk groups and on the origins of risk attitudes and behaviour should be encouraged.

3.3 Task 3.3 Trip-related factors

The analyses performed for task 3.3 were aimed at achieving more knowledge on certain types of accidents, namely, accidents that are caused by selected trip-related factors. The following contributing factors on a trip level were chosen:

- alcohol
- vigilance
- experience
- vehicle condition
- road condition and layout.

The expected results should give an idea how the accidents can be characterised and on the other hand on how to prevent these accidents. Prevention measures can always be on an educational and regulatory (control and law enforcement) level including target groups as defined by social characteristics e.g. (see also D3.2), on a vehicle level (active and passive safety features, see also Deliverables D6.1 (Barrios et al., 2007) and D4.1.5 (Van Elslande et al., 2008) of the TRACE Project) and on an environmental (infrastructure and traffic) level.

By analysing explanatory variables as circumstances for the selected contributing factors more focussed prevention efforts can be recommended.

The circumstances of accidents as described by explanatory variables comprise time (e.g. advice when to intensify prevention efforts), place (e.g. sites for controls in general, sites for infrastructural improvement), situations/manoeuvres/scenarios (which active safety device could be apt) and target groups (drivers and vehicles).

Depending on the results only limited but reliable suggestions can be given for most of the analysed factors. The active safety systems suggested are taken from the list as presented and evaluated by the Deliverables D6.1 and D4.1.5 of the TRACE Project.

[4] For example, SARTRE 3, "Les conducteurs européens et le risqué routier"; Vol 1, rapport sur les principaux résultats, INRETS, 03/2005;

3.3.1 Alcohol

In the combination – high risk and high frequency – alcohol is regarded as a relevant and important accident related factor by increasing the risk and contributing to the occurrence of accidents which had been shown by task 3.1. Already on a legal level (depending on country) below 0.5% the crash risk was found to be 3 times increased. Depending on the database alcohol was found in 4% up to 19% of accidents in the national databases and in 0% up to 13.7% in in-depth databases of those countries.

To prevent accidents caused by alcohol some general suggestions are well-known e.g. Alcolock systems to prevent drunk driving in the first. In D4.1.5 a response efficiency of 98.5% was estimated for this feature. Another general prevention recommendation is to conduct more controls for drunk driving by the Police. The results of task 3.3 show, that controls would be especially effective in certain circumstances. The circumstances comprise time (advice when to intensify controls), place (sites for controls in general), and target groups (drivers and vehicles). Educational effort by e.g information campaigns to change behaviour and reduce the habit of drunk driving can be focussed on certain target groups, in which the social norm accepts drunk driving (see D3.2).

The analysis of the factor alcohol by BASt (GIDAS database, Germany) showed that typical accident circumstances and person characteristics were overrepresented in alcohol related accidents involving passenger cars compared to the accidents where alcohol was not involved. The typical alcohol related accidents seem to occur on weekends at night hours. The driver is typically male and the purpose of the trip is "leisure". These include the stereotypical alcohol related accidents which occur when young people during the weekend drive home after alcohol consumption at a discotheque or party.

From this analysis it can be concluded, that in Germany alcohol related vehicle accidents would be best prevented by controls on weekends, sites for controls should be before "leaving the road accidents" can occur (recommendable is within city limits or close to discotheques etc. and the target group for controls should focus on males. From the vehicle side active safety features preventing running off the road would be beneficial to prevent alcohol related accidents, especially Intelligent Speed Adaption (ISA) on a mandatory level, but maybe also Lane Keeping Assistance and Electronic Stability Program (ESP) are suspected to be of benefit here. Prevention campaigns could focus on male unemployed persons. In Germany 8.3% of the accidents show the contributing factor alcohol, although this factor is usually not coded as a primary causative factor. Comparable suggestions can be given for the Czech Republic, France, Italy, and the UK.

The analysis of the factor alcohol by TUG (ZEDATU database, Austria) showed the following: Out of the selection of analysed explanatory variables six variables are connected to the contributing factor "alcohol" forming a pattern to distinguish these accidents from those where alcohol didn't contribute. These are identified as vehicle group (vehicles/vans), engine power (higher motorization), time of week (weekend), road type (other road), time of day (16 to 23:59), and lighting condition (daylight). "Lighting conditions" can be seen as the most significant factor.

The TUG analysis shows, that in Austria fatal alcohol related vehicle/van/PTW and truck accidents of males would be most effectively prevented by controls during the early evening hours (after 4 pm during daylight). The most effective sites would be not country roads or motorways but other roads. Controls could effectively focus on cars/vans. A specific target group could not be worked out, except that males should be addressed by educational efforts. Further, no specific manoeuvres or situations were found thus no recommendation on active or passive safety features in vehicles can be recommended to prevent alcohol related fatal accidents from this analysis point of view. 11.9% of the fatal accidents in Austria are contributed by alcohol, showing the importance of prevention action. Comparable suggestions might especially apply to the Czech Republic and Italy.

The analysis of the OTS database by VSRC (UK) showed that alcohol related accidents happen to occur more often on minor, urban, single carriageway roads with low speed limits (30mph/48kph) especially in bends, leading to single car collisions or car vs. pedestrian collisions with frontal impacts where no manoeuvre was undertaken; with the traffic participants being involved being more often car drivers or pedestrians; male drivers at night during light density traffic conditions, when compared to other accidents.

The in-depth results revealed that there was not one typical failure generating scenario for the road users who were alcohol impaired in the accidents. However, from the accidents analysed, it was found that alcohol impairment can affect a driver's or pedestrian's ability to correctly judge the road ahead and also make the correct decisions while driving/attempting to cross the road. Alcohol impairment was also found on occasions to be the overriding factor in the accident (i.e. if the road user was not impaired by alcohol, there would have been no functional failure and the accident would not have occurred). Typical failure generating scenarios were also identified for many of the non primary active road users in the accidents, who are the road users who did not cause the initial 'disturbance', but for some reason did not or were unable to avoid to resulting impact. For the non primary active road users the scenarios mainly related to a failure to detect the primary active road user, who was either in plain view or out of view.

From this analysis we learn that alcohol controls for preventing traffic accidents in the UK would be most effective if focussing on minor urban roads, in particular during more quiet times during darkness. As alcohol related accidents are more frequent in low speed limit zones, in bends and are more often single car accidents without specific manoeuvre also the suspicion arises that unadapted speed might have additionally contributed. Again ISA on a mandatory level, Lane Keeping Assistance, and ESP might have prevented these accidents. Further, the combination of "single car accidents" and "car vs. pedestrian accidents" with "frontal impacts" might give rise to the suggestion that Brake Assist, Active Cruise Control (ACC), and Collision Avoidance could be of benefit. Also here comparable suggestions might be transferable partly to Germany, to France, the Czech Republic and Italy.

In addition the in-depth case analysis by the VSRC shows that alcohol related accidents often also concern drunken pedestrians. In-depth analysis of fatal pedestrian accidents for WP1 task 1.4 also showed for Germany that alcohol plays a major role here. So further suggestions for prevention is necessary, like e.g. better road safety education for pedestrians when out at night and alcohol impaired or better separation of traffic for different road users. Further, from the vehicle side Pedestrian detection & avoidance systems like SAVE-U (Vulnerable Road Users Protection) or even also Night Vision could help to reduce these kinds of accidents. From the OTS analysis for task 3.1 it is known that in 7.8% of the accidents alcohol was contributing.

3.3.2 Vigilance

Vigilance is influenced by alcohol, so the analysis of vigilance itself as contributory factor is of importance in regard to preventive measures. Most often vigilance is viewed in terms of low vigilance and especially fatigue, although an alteration in "normal vigilance" can also comprise a state of hyperexcitation, which also reduces the driving capability. As shown in D3.1, "Fatigue" as a risk factor is found in literature to increase the risk for accidents of about 2 to 5 times; the frequency of "Fatigue" as contributing factor in databases available to the TRACE Partners lies between 0.1% and 15% of accidents.

Regarding cross tabulation results from the analysis performed by CIDAUT (DIANA database, Spain), vigilance as a contributing factor is associated with intersection, active safety system, time of accident, road type, luminosity and speed limit. The results are in accordance with the conclusions found in literature review for accidents where vigilance is contributory.

From the CIDAUT analysis of the factor vigilance it has to be concluded that vigilance related accidents are predominantly a problem on monotonous roads like highways without intersections during the light condition of dawn. Not specifically connected with these accidents are certain driver types like professional drivers, or to truck and bus drivers only. Also, no specific age, gender, employment type or nationality is more frequently involved in vigilance related accidents than in other types of accidents. Active safety systems that were already installed in the vehicles were not able to prevent especially vigilance related accidents, but seemingly other types of accidents. Proposed measures refer to educational campaigns to promote safety habits related to trips, such as the time for travelling, the necessary rests, an adequate judgement of their own state considering drowsiness and the subsequent decisions. For prevention by information/education like campaigns especially highways might be a site most effective, as no specific target group could be established by person characteristics. Also from an infrastructural prevention approach highways might bear the highest benefit if monotony could be reduced by geometry and layout and lighting improved. Here also speed limit changes provided by variable message signs of traffic management systems (that usually only coordinate traffic flow) might be helpful. From active safety measures in vehicles of course Drowsy Driver Detection systems can be recommended, but also Lane Keeping Assistant and Night Vision and Advanced Adaptive Front Light System might be beneficial. Best transfer of these results is possibly applying to the UK.

The "WP5-method" as applied by INRETS (EDA database, France) reveals that for vigilance related accidents some typical scenarios can be established. Vigilance related accidents are occurring due to drowsiness, faintness, states of reduced vigilance and alcohol intake, psychotropic drugs and narcotics. Usually these accidents occur because of the human functional failure encountered is classified as an "overall failure". For this failure twelve prototypical scenarios could be elaborated of which 5 relate to the alteration in abilities (29.2%), 6 scenarios that relate to the loss of psycho-physiological abilities (28.5%), and one scenario related to the failure of overwhelmed processing abilities (5.3%). In addition some vigilance related accidents occur due to failures in diagnosis (underestimating a passing road difficulty with 5.5%), decision (deliberately disobeying a safety rule with 7.6%) or execution of a task (poor control of an external disturbance with 4.7%) that are represented in another 4 prototypical scenarios. For these scenarios different prevention measures might apply.

The in-depth analysis of vigilance related accidents by INRETS shows that alcohol is of important influence for those kinds of accidents. So, there is no wondering that for preventing vigilance related accidents Alcolock Key can be recommended as well. Further, the analysis reveals that prevention of vigilance related accidents is not limited to active systems like Driver Drowsiness Detection. The different scenarios found give hints that features like ISA, ESP, and Lane Changing Assistance might also be apt for preventing vigilance related accidents. Target groups for educational campaigns should clearly separate one group of younger drivers with alcohol involvement in a festive context, a second group of around 40 year olds with chronic alcohol consumption problems, and elderly people with cognitive slowdown and fatigue. As in about 20% of the accidents of the database low vigilance shows up as an explanatory element, the importance of prevention efforts is clear. Only the statistic data from Italy give an indication for possible transfer of these suggestions.

3.3.3 Experience

The analysis on the factor "experience" was tried by CIDAUT. As cross tabulation results show no association between Experience and any environmental characteristic, no conclusion about this factor in accident level can be drawn. The explanatory variables in the DIANA database more associated to experience related accidents are the variable age group (18 to 25 year olds), driver type (private driver) and employment (student driver). Furthermore, experience related accidents don't show up primarily in certain traffic situations, on specific types of roads, in certain vehicles or all other explanatory variables. In addition experience related accidents are not typical for one gender only.

Unfortunately here no new suggestions could be extracted. Experience is obviously a factor for young drivers. Intensifying of driving licence driving lessons and some graduated driver licensing programs are thought to be beneficial in general, but not specifically for this type of accidents only. As experience is contributing in around 4% of the accidents in Spain, and between 1.3% and 6.6% of the national databases available to the TRACE Partners (see D3.1) and also in 12% of in-depth analysed Truck Accidents more research would be necessary where to put effort in preventing experience related accidents.

3.3.4 Vehicle Condition

The cross tabulation results calculated by CIDAUT show an association between vehicle condition and vehicle power on one hand, and on the other hand between vehicle condition and day of week. In accident level, the presence of "day of week" variable suggests the necessity of a periodical schedule for reviews (related to periodical trips), whose frequency could be made more precise using in-depth analyses of vehicle condition factor. Nevertheless, more investigation in this way is required.

The analysis indicates that controls as well as maybe more regular mandatory checks would be efficient if focussing on commercial trucks. Interesting is the fact that a certain day of the week was found to be overrepresented for accidents where the vehicle condition contributed. Assuming regular voluntary checks this might indicate that either distance travelled or time since check need to be reduced for frequency of more regular checks.

Accidents where the vehicle condition contributed have been analysed by BASt for Germany. The analysis showed that the street type "motorways" was significantly overrepresented in accidents related to vehicle condition. The reason could be that only at high velocities a vehicle defect resulting from maintenance problems leads to a severe accident. At low velocities the driver can keep control of his vehicle. This is confirmed by the finding that urban roads are significantly underrepresented in the group of vehicle condition related accidents.

Prevention measures in Germany seemingly don't have to focus on more regular checks for older cars. Obviously the existing mandatory checks are sufficient in this view, as a specific age group of the vehicle was not overrepresented in these types of accidents. A target group for campaigns picturing the need for regular technical checks, especially for the tyre condition, might be unemployed drivers, where the probable lack of financial capacities might be the reason for not keeping the vehicle maintained. In general, which is also mentioned in the efficiency analysis in D4.1.5, the educational advertising has to picture the dangers stemming from bad vehicle conditions and tyre conditions, respectively. Regular traffic checks by the Police might possibly be intensified for also checking the maintenance status of the vehicle, and not only focus on drunken driving/license/safety equipment. The site for controls with this focus might be before the entering of highways and other roads with higher speed limits.

For both analyses it can be stated that from the vehicle side of course tyre pressure monitoring and warning systems can help to prevent accidents where the tyre condition was contributing. In up to 8% of the accidents analysed by the TRACE Partners (see D3.1) a bad tyre condition was contributing.

A transfer to the other countries as represented by the WP8 request is not possible.

3.3.5 Road Condition and Layout

The investigation of the trip related factor of the environment component "road condition" by BASt showed that urban locations are highly underrepresented in the group of accidents related to road condition. Thus improvement of road condition should be focused on rural areas. Furthermore, the type of accident "driving accident" was overrepresented in the group of accidents where road condition was contributing. Driving accidents are normally single vehicle accidents, which result from unadapted behaviour of the driver with regard to the circumstances of the accident scene. In the case of road layout related accidents this means that the driver failed to adapt the speed to the bad road condition.

For the analysis of accidents where the road condition contributed by BASt the following prevention measures can be recommended. Improvement of road maintenance efforts should focus especially on rural sites without traffic regulation. As "road condition" implies a variety of different variables (road layout, maintenance of infrastructure etc.) no specific recommendation for vehicle active safety systems can be derived. It would not be effective to focus on educational information to certain target groups (like informing about the difficulties and influences of road condition contributing to accidents e.g. during driving lessons) as no specific age/gender/driver group is especially affected by road condition as an accident factor. A possible solution to improve this situation and reduce the number of accidents related to road condition could be driver education or more warning signs, if appropriate, advising the driver of upcoming bad road conditions. Also driver assistance systems to warn the driver of bad road conditions could be beneficial for this type of accidents. As the databases of the TRACE Partners (see D3.1) have shown that bad road conditions contributed to up to 24% of the accidents, the need for improvement of road layout and road maintenance is given. Partly the pattern might be possible to transfer to Czech Republic, Italy and the UK.

For cases where road layout was a contributory factor, the statistical overview by VSRC revealed that road layout was more likely to be causative on quiet, high-speed, minor, rural, single carriageway roads with low density traffic at night, not at an intersection, involving a single car with a young driver who was not undertaking a manoeuvre, but going ahead on a bend with a degraded road surface (defects or contaminants).

The in-depth results revealed that the most frequent typical failure generating scenarios for the primary road user involved either taking an intentional risk (failure in decision making) when negotiating a bend or not correctly evaluating a bend (failure in diagnosing situation). For the non primary active road user the scenarios were mainly related to their pre-defined expectations of the primary active road user's manoeuvres (or lack of) who was in plain view.

This analysis reveals a target group of young drivers (<25years) for information campaigns on the danger of bends/steep hills and narrow roads. Sites for more signage and information would be most efficient for warnings and speed limit reductions in approaching of bends on minor, rural roads. As decision-making failures and diagnosis failures are most frequently found in accidents related to the road layout, also Driver Assistance Systems in vehicles can be effective. Especially Brake Assist, Collision avoidance, Collision Warning, ESP, ISA but also ACC, Night Vision, and Lane Keeping Assistance might be beneficial. As up to 12% of the accidents analysed by the TRACE Partners for task 3.1 show bends and view obstruction as contributing factor, the need for improvement is given, for the infrastructure and the roads' maintenance as well as the vehicles' and drivers' interaction possibilities with the difficulties met. The findings of the in-depth VSRC analysis might only be partly possible to transfer to the Czech Republic and Italy

3.3.6 Remarks to the output of the work performed for task 3.3

For the interpretation the data materials on which the analyses are performed have to be taken into account. For differing results between partners when analysing the same contributing factor, multiple explanations can be given. There may be real existing differences in the circumstances of accidents where certain trip-related factors contributed which might be due to differences of the countries the databases stem from including different laws, law enforcement habits, vehicle fleet, geography, and other explanations. Another explanation is coding instructions of variables, definition of factors, and sample criteria. E.g., obviously fatal accidents differ from "all kinds" of accidents, and accidents with "all kinds" of traffic participants to vehicle accidents only. Especially on the trip level the factors covered might be too general, covering a mixture of depending driving-task related factors. This can e.g. be seen by the multiple scenarios that are connected to vigilance related accidents.

On a trip level the factors not only comprise multiple scenarios, also, interrelations between multiple factors are to be expected. E.g. evidence for alcohol, vigilance, speed and bends as showing up as combinations are found in task 3.3, even if trying to separate the factors for analysing accidents.

This also leads to the question if by all the suggested countermeasures, accidents with certain trip related factors can be prevented at all. They might happen in cases like in alcohol induced hypovigilance situations, where e.g. alcohol could be eliminated (by alcolock key e.g.) but, nevertheless due to fatigue, risk taking and speeding or unadapted speed in curves a big share of those accidents might happen still.

The idea to analyse factors on a trip level was expected to lead to answers if certain trip related factors are typically occurring in certain objective accident circumstances as defined by person, vehicle, site, time and situation characteristics. If special characteristics were obtainable then special prevention measures would apply. This could only be confirmed partly.

Often the information of interest is either not available in the database, especially background factors like socio demographic information to focus on certain risk populations for prevention efforts, but also vehicle information like equipment is often not collected in the databases.

On the other hand it has to be accepted that accidents that are caused by certain trip-related factors are very often not that different from other accidents that are caused by other factors.

This is of course due to the trip level which is too far away from the actual accident, but also due to the variety of other contributing factors necessary and maybe by combining then more typically describing a typical accident pattern.

3.4 Task 3.4 Driving task associated factors

The aim of the analysis performed in TRACE Task 3.4 was to gain a better understanding of the characteristics of accidents that are caused by driving task-associated factors, that is, factors which are 'directly and causally contributing to the accident occurrence, very specific and detailed, are short-term lasting or dynamic in nature, and refer to the actual conditions of the components' (TRACE D3.1).

From the numerous driving task-related factors identified in Task 3.1 of TRACE, the following factors were chosen for analysis:

- Attention
- Sudden health problems
- Speed (including 'inappropriate speeding' and 'illegal speeding')
- Sudden technical defects
- Dazzling sunshine

The results of the analysis undertaken by each partner within WP3 identified the main characteristics of accidents where each of these factors were contributory and also gave suggestions for ways to prevent these sorts of accidents from occurring. The type of methods of prevention varied from education methods, regulatory methods (e.g. control and law enforcement), vehicle-related methods (active and passive safety features, see also D6.1 and D4.1.5) to road infrastructure and traffic-related methods.

By analysing the explanatory variables as circumstances for the above contributing factors, more effective prevention efforts can be recommended.

The circumstances of accidents as described by explanatory variables comprise time (e.g. advice when to intensify prevention efforts), place (e.g. sites for controls in general, sites for infrastructural improvement), situations/manoeuvres/scenarios (which active safety device could be apt) and target groups (drivers and vehicles).

Depending on the results only limited but reliable recommendations can be given for most of the analysed factors. However, the most detailed results (due to data availability and frequency) were given for the driving task-related factors 'attention' and 'speed'.

3.4.1 Attention

The driving task-related factor 'attention' was studied by CIDAUT using Spanish data and the results implied that monotonous situations (i.e. not at an intersection) were more likely to lead to poor attention in the driver. Also, drivers were more likely to be undertaking an illegal manoeuvre when attention was low. As the data does not specify whether this illegal manoeuvre was intentional or not, it could be a possibility that the illegal manoeuvre was a direct result of the lack of attention. For example a driver is not paying attention to the road and overshoots a junction or crosses into the opposing carriageway or even turns the wrong way up a one-way road.

In addition, drivers who had active safety systems in their vehicles were more likely to be inattentive when involved in an accident. This implies that an active safety system in a vehicle leads to a greater likelihood of a driver being less attentive, which is possible if the driver believes they don't have to concentrate as much on the aspect of the driving that the active safety system undertakes. This is a behavioural adaptation issue. This may also be another reason why illegal manoeuvres are more likely with inattentive drivers, because they believe they can take more risks because the active safety system will help them control their vehicle. Alternatively, it should be considered that active safety systems will be fitted mostly in new and recent vehicle models which may be driven by people who have a different, possibly lower risk taking propensity to the drivers of older vehicles. These suggestions regarding active safety systems are therefore speculative and because of the lack of detail regarding the type of active safety systems involved in these accidents, this result should be considered with caution, as it is highly likely that the benefits of the presence of active safety systems outweigh these possible side effects, bearing in mind this analysis only included 66 cases.

It was also possible, using the results of the TRACE WP5 analysis of the factor 'attention' by INRETS, to identify the typical failures experienced by road users in accidents where attention problems were experienced. In over half of the accidents studied, attention-related problems were found to contribute to the accident. Overall, perception (detection) failures were found to be most vulnerable to problems with attention, being either directly or indirectly causative, where 'focalised acquisition of information' was the most frequent failure in detection. Unlike vigilance problem (see D3.3), failures when attention is a contributory factor occur in combination with other explanatory elements (attention-related and non-attention-related). Of the three types of attention analysed, inattention was found to be the most contributory and was mainly found to affect the information acquisition (detection) stage and the road difficulty diagnosis stage. 'Competition for attention' mainly resulted in perception (detection) failures involving the focalised acquisition of information and 'distraction' mainly resulted in perception (detection) failures or failures when taking action, in both cases where the driver has taken their eyes of the road due to the distraction, resulting in the driver becoming aware of an impending 'situation' too late to be able to avoid it.

When supplementing this information with the aggregated data related to 'attention' accidents supplied from across 5 European countries, the type of road users, vehicles, locations, accident/impact types and the time of day varied across the data sources. The main reason for this is probably due to the varying nature of 'attention' itself, as found in the analysis of French data using the TRACE WP5 methodology. Therefore, it is important to ensure that when investigating accidents where attention was thought to be a cause, that the variations found in this analysis are investigated separately, and that when trying to decide on potential solutions to the problems of attention, that all types are considered.

Because attention is strongly related to the human in the system, the most effective solutions to reduce problems in attention when driving must be aimed at the driver. Drivers need to be supported and where possible educated to increase their awareness of and minimise risks from the dangers of driving while not fully being attentive on the task in hand and to be aware of the ways in which low attention of the driving task can manifest itself (e.g. when the driver has a lot on their mind or when they are distracted by another task/person/object not directly related to the driving). Competition for attention is not a problem of a low attention on the driving task, but more a problem with the complexity of the multiple tasks that the driver is sometimes faced with when on the road. Competition for attention could be between two aspects related to the vehicle (e.g. looking at the dashboard lights while trying to demist the windscreen), the external environment (e.g. trying to look for directions while also trying to follow the curve of the road) or a combination of both. Where there is a risk of one driving task taking over the attention of another part of a driving task, systems which take over one of these tasks for the driver would alleviate the problem for the driver so they can concentrate on the other. In both the in-vehicle and external environment, competition for attention can also be reduced by improved design of both the vehicle and the highway itself (making roads and vehicles more supportive and 'self-explanatory'), to reduce the chances of competition for attention occurring in the first place. In addition, consideration should also be given to the increased introduction of eSafety and information systems into vehicles, which could carry potential for competition for attention and distraction, depending on whether or not it is related to the driving process.

3.4.2 Speed

Speed was investigated in total by 3 TRACE WP3 partners: CIDAUT (Spain) and LMU (TUG – Austria), using the logistic regression analysis to investigate accidents involving speed as a cause in general and by the VSRC (UK), giving a statistical overview but mainly using the TRACE WP5 methodology to investigate inappropriate speeding and illegal speeding separately. Road users will travel at high speeds both intentionally and unintentionally. The intentional reasons could include because the road user is in a hurry to reach their destination or they enjoy driving fast (ERSO, 2007) and it can unintentionally happen because of either the design of the road or the vehicle. The analysis undertaken by the TRACE WP3 partners investigated these issues further.

Motorcycles less than 6 years old and curves (bends) were found to have the greatest link in accidents involving speed as a causation factor in the Spanish data. It is not surprising that speed accidents involving newer vehicles were found to be more likely than in accidents where speed was not involved, in particular motorcycle accidents, as advances in technologies have led to higher performance vehicles, which means that vehicles are capable of travelling at greater speeds, even if it is against the law. These reasons are often due to the road user feeling more 'comfortable' at the wheel of their vehicle, so they feel like they are travelling slower than the really are. Also, if a road user is already travelling at a high speed (whether illegal or inappropriate), the added factor of negotiating a bend in the road is only going to increase the risk of the road user losing control. It is often the presence of the curve itself which makes the speed the road user is travelling at suddenly become too fast. The design of roads could also make a driver feel like they are driving slower than they are (i.e. speed inciting), which leads them to approach a curve too fast.

In the logistic regression analysis undertaken using Austria data (TUG), the characteristics most likely to be involved in an accident where speed was contributory were male drivers under the age of 45, with darkness conditions and cars/vans associated to a lesser degree. Here, different types of characteristics were associated with speeding, and more related to the road user themselves and the environmental conditions. However, slightly conflicting results were found with the type of vehicle. Whereas in the Spanish (CIDAUT) research, motorcycles were more involved in speeding accidents, in this research, it is cars and vans.

In the aggregated data analysis of 7 European data sources from 5 European countries, the results appeared to complement the results of the individual analyses. There was found to be a general split between either motorcycles or cars/vans having the most significant link with speeding accidents, which were the two main types of vehicles found in the individual analyses. Male drivers of all ages under 45 were most prevalent, while smaller (i.e. not major) roads were most involved, which involved bends, and occurred during darkness.

The main aim of the analysis of UK OTS data undertaken by the VSRC was to compare accidents involving inappropriate speeding with those involving illegal speeding using an overall statistical analysis of data and also an analysis of a sample of cases using the TRACE WP5 methodology. In the statistical overview, many of the typical characteristics found in the logistic regression analysis undertaken using Austrian and Spanish data were found for both types of speeding (e.g. male drivers (although <25), cars, bends, darkness). In addition, differences were found between two types of speeding, these being that environmental conditions and high speed roads were more prevalent in inappropriate speeding accidents, whereas low speed roads were more prevalent in illegal speeding accidents. This implies that driving over the speed limit is more likely to occur on roads with lower speed limits and it appears to be 'easier' for road users to go over the speed limit when it is low, especially if it is unintentional (i.e. not looking at the speedometer). However, on high speed roads, road users are more likely to lose control because of environmental conditions, before even reaching the speed limit, which explains the inappropriate speeding.

The WP5 methodology analysis showed that inappropriate speeding occurs most often in accident scenarios involving a detection (perception) failure, especially in a situation where an encounter was not expected. For example, a typical scenario might involve a road user who was travelling close to the speed limit when the vehicle in front starts to brake because they are turning into a private driveway. The road user does not initially detect the vehicle braking because they weren't expecting a vehicle to brake suddenly at this point in the road, so by the time they start to brake, it is too late to avoid a collision. As can be seen from this example, inappropriate speeding appears to more often occur in situations where the road user is not expecting to encounter a 'conflict', therefore when a conflict does occur, they do not detect it (because they are not searching for it) until it is too late to avoid.

Illegal speeding was more often involved in accidents scenarios where the road user failed to diagnose a situation correctly. In these scenarios, the road user often failed to diagnose the situation correctly, often the road layout (e.g. bend) ahead. Therefore, as opposed to road users who are speeding inappropriately, road users who are illegally speeding have detected a potential conflict but fail to correctly judge this conflict, so are unable to safely deal with it (mainly due to the excessive speed) once they do encounter it.

Interestingly, differences were also found between road users in inappropriate and illegal speeding accidents who were not the speeding drivers (i.e. the 'non primary active road users). Those who encounter a road user who is speeding inappropriately fail to predict the actions of this road user (i.e. assume the other road user will take regulatory action), while those who encounter a road user illegally speeding failed to detect the speeding road user until it was too late too avoid (i.e. was not expecting a 'conflict' so didn't search for one).

The overall view of a 'typical' speeding accident was one involving a male motorcycle rider or car/van driver under the age of 45, with a relatively new vehicle, travelling on a bend (curve) of a non-major road at night. When travelling too fast for conditions the road user, who was travelling on high speed roads in degraded conditions, often failed to detect an unexpected potential conflict, while those travelling above the speed limit failed to correctly evaluate a potential conflict while travelling on low speed roads.

To reduce the risk of an accident occurring in these types of conditions, education of drivers about the dangers of both illegal and inappropriate speeding would again be the simplest but not always the most effective preventative measure, mainly due to many drivers' unchanging attitude towards speeding. A considerable challenge is therefore to achieve a change in the driving culture so that speeding is no longer considered to be acceptable. Such a change in culture has been shown to be possible with regard to alcohol in some countries and the challenge is now to make a similar change for speeding. Elements of a wider policy on cultural change might include police patrols of 'high risk' locations (i.e. where speeding appears to occur the most) and stricter penalties would help to deter those who consistently illegally speed. For road users who want to avoid unintentional speeding, in-vehicle systems could be used to warn drivers or even take control when their speed is either over the legal limit or unsafe for the external conditions, as well roadside signage advising on appropriate speeds. Technology which helps to keep control of the vehicle in 'accidental' inappropriate speeding on bends and poor road conditions. However, in order to prevent drivers who intentionally drive fast, more obtrusive measures would have to be applied, such as speed limiters, in particular on roads where illegal speeding is more frequent (i.e. on urban roads with low speed limits). Collision avoidance devices would help other road users to avoid errant speeding vehicles, whether it be inappropriate or illegal. As with attention, although these active safety devices can help in reducing the likelihood of a collision or loss of control, consideration should also be given to the potential of systems inspiring greater driver confidence, which in itself may encourage greater speed.

3.4.3 Sudden health problems

The driving task-related factor sudden health problems was investigated using German GIDAS data by the TRACE partner BASt. Using the 119 accidents that were identified with sudden health problems as a contributory factor, it was found that there was more likely to be older road users (>65 years old) who had pre-existing health problems, who were originally travelling at a velocity of greater than 60kph on motorways, which resulted in their vehicle running off the road. Most of these characteristics are directly linked to the sudden health problem itself and probably increase the risk of the sudden health problem occurring in the first place (i.e. older drivers who have a pre-existing medical condition) Run-off the road accidents are inevitable because the road user would not be able to keep any control over their vehicle once their sudden health problem had taken effect and even if the road user was physically able to try and control their vehicle during the sudden health problem, the likelihood of being able to keep control would be reduced on high speed roads such as motorways.

Additional to these characteristics, the aggregated data analysis using data from 3 European countries provided by 3 TRACE partners also found that accidents where sudden health related problems were a cause involved bicycles, 'going ahead' manoeuvres, which led to impacting an immobile object, and occurred during daylight. It is not clear while accidents involving bicycles were found to be more prevalent in sudden health-related accidents. One suggestion could be that as drivers get too old to drive, they travel by bicycle as an alternative. However, no other clear reasons could be given, apart from that possibly there are two typical scenarios involving sudden health problems. One involving an older driver on a major road who is unable to control their vehicle at the high speed when their conditions starts to deteriorate, so the vehicle runs off the road. The second involves an older cyclist in an urban location who suffers from a sudden health and they also are unable to control their cycle and therefore run off the road.

Two main prevention measures were identified for sudden health problems in accidents. Regular health checks for drivers above the age of 65 would help to identify potential health risks while driving before they occur, while in-vehicle systems which would assist a driver to stop in the event of losing control due to a health problem.

3.4.4 Mobile phone use

Analysis of mobile phone use as a driving task-related factor was also undertaken by the TRACE partner BASt using German GIDAS data. Using the 72 accidents where mobile phone use was contributory factor, a bivariate analysis was undertaken, but from this, the only accident characteristics which were found to correlate highly with mobile phone use were related directly to the mobile phone use itself (e.g. driver profession, purpose of journey). Therefore, because of this, and because of the low number of accidents in the aggregated data from other European countries, mobile phone use was not considered further in this study. However, due to the nature of mobile phone use, in that it is a form of distraction, many of the findings of the analysis of accidents where attention was a factor could also be associated with mobile phone use as well.

3.4.5 Sudden technical defects

Sudden technical defects as a driving task-related factor was another factor analysed by BASt using German GIDAS data. Using 31 accidents which has sudden technical defects as a contributory factor, the logistic regression analysis undertaken showed that presence of sudden technical defects were more likely to occur in accidents on motorways when the defect was a tyre defect, where the vehicle ended up leaving the road. In addition, the bivariate analysis of aggregated data of 3 data sources from 3 European countries additionally revealed that males, drivers of HGVs, between the ages of 25 and 44, those who were travelling straight but ended up running off the road during daylight hours were overrepresented.

It is interesting to note that the main result of the sudden technical defect was a faulty tyre, which in many cases will be a maintenance issue that is trip related rather than task-related. This is one good example of where one trip related factor can lead to another factor which is more related to one part of the driving task rather than the trip as a whole. Behind many driving task-related factors, there will be a more deep-rooted causal factor either at the trip level or even further back at the societal level.

As a sudden technical defect is a maintenance issue, this would be the most effective way of reducing these sudden defects while driving. Regular inspections of vehicles, in particular company goods vehicles when on long journeys involving high speed roads, including tyre maintenance, should be essential and even enforced (if not already) to ensure vehicles are fully roadworthy before starting the journey. Where sudden defects occur which are not maintenance-related (e.g. tyre blowout due to sharp object), driver assistance systems which aid the driver in keeping control of their vehicle in such a situation would also help. It should, however, be borne in mind that accident investigations for research are inherently more likely to record externally visible vehicle defects, such as tyre or lighting problems, rather than internal defects such as faults with brake or steering, due to time and resource limitations. It is therefore possible that results shown here may underestimate such problems.

3.4.6 Dazzling sun

Analysis of dazzling sun as a driving task-related factor was undertaken by BASt using German GIDAS data (41 cases) and found that dazzling sun was overrepresented in accidents at intersections, where the road user's sight was obstructed and where the opponent road user was a vulnerable road user. Additional results from the bivariate analysis of aggregated European data of 3 countries from 4 TRACE partners where dazzling sun was most prevalent included the road user being female, older than 45 years, in a car or small goods vehicle, impacting a mobile object, going straight and on urban roads during twilight or daylight.

As this analysis shows, dazzle from sun can result in drivers not being able to see road users who at best are not always easy to detect, these being pedestrians, cyclist and motorcyclists. This is mainly an issue when drivers are crossing an intersection, whether they have right of way or not, and are further impaired by poor visibility caused by roadside objects or vehicles blocking the view.

As it is difficult to stop glare from sun in the first place, indirect countermeasures to the problem of dazzling sun would possibly be the most simple method of reducing the risk. Countermeasures such as improved road design, in particular at junctions with poor visibility issues, and also in-vehicle detection systems which can detect pedestrians and other vulnerable road users in the vicinity of the vehicle, would help to reduce the chance of an impact in the event of dazzle by sun. Technologies to reduce the effect of dazzle on windscreens would also be of benefit. Further research might usefully investigate if dazzle from the sun is a common problem at specific road locations with a view to making recommendations for road safety audit procedures and guidelines for infrastructural modifications at high risk sites.

3.4.7 Conclusion of the work performed for task 3.4

Many of the findings given in this study will often be related to the exposure of the road user to these situations. Another aim of this study was to try and locate exposure information relevant to the results found in the in-depth analysis of driving task-related factors so that an attempt could be made to evaluate the risk of the different situations identified. For example, as many of the driving task-related accidents occurred on specific types of roads (e.g. speed accidents on rural roads), relevant information was sought. However, no directly relevant exposure information could be located which could be compared with the accident data to permit risk calculations to be made.

Overall, when driving task-related factors are a cause in an accident, it appears that road users are caught by surprise by the sudden change in events and are unable to deal with the situation in hand. In most of the situations analysed, it appears to be the driving task-related factor itself that is the main factor that leads to the deterioration in the situation. In other words, without these driving task-related factors, it is possible that the accident would not have occurred. This is the nature of driving task-related factors, as they have an immediate effect on the road user. In order to prevent many of the driving task-related factors from occurring in the first place, other factors further back in the chain of events (i.e. trip and social/cultural) would need to be dealt with. Therefore, by preventing factors at a trip or social/cultural level, it might be possible to also prevent the factors at a driving task level.

4 Discussion and Outcome

4.1 Contributing factors in traffic accidents in Europe

WP3 was expected also to give estimations and suggestions on a EU27 level for the relevance of the findings. As with a factors' point of view in-depth data are required in the first the expectiations were low to reach this aim, however, in task 3.2 a successful comparison is presented for discussion of the found sociological impact, and by tasks 3.3 and 3.4 a comparison of results seemed to be feasible to a certain degree. The same comparison (task results compared to bivariate results from TRACE Partners countries) is not possible for other European countries without the same bivariate analyses. Therefore a variety of ideas were discussed in WP3 how to fulfil this goal:

1. Especially for Alcohol and Speeding a lot of information on the European level is available. In the Annex (AnnexIII) some corresponding tables for these two factors are cited.

From BASt analysis on alcohol we find a pattern including young males and unemployed as sociodemographic variables, to check if the alcohol rate in other countries is also connected to unemployment rate and share of young males the available figures from the EU accident statistics on alcohol rate, young males and unemployement rate would have to be compared. But, these figures are lacking and from pure national/sociodemographic data no reliable results are expected (this is why we do in-depth analysis). If the pattern holds for all countries can thus not be reliable estimated. The idea to calculate a random effects model is discussed:

Idea: something like: $N_{ij} \sim \sum (\sum ß_i{*}x_i + \varepsilon_I)_+ \; \rho_{ij}$

A random ρ_{ij} for each of the countries j= country

Necessary input from national statistics for example alcohol:

Country	Number of alcohol accidents in country	% young males in accident material	% unemployed in accident material
Country 1	Available from national statistics but not reliable	Not available	Not available
Country 2	Available from national statistics but not reliable	Not available	Not available
Country 3	Available from national statistics but not reliable	Not available	Not available

So even if the figures were available there would be no use to calculate anything of further information content. And – for alcohol we know the official figures.

It would be interesting to estimate national figures for factors that are not covered in the official statistics (like vigilance), but, - the explanatory variables necessary for this assumption are not available either (only for TRACE partners – some hints from second data request 3B are used for discussion in task 3.3 and 3.4).

And – first thing would be to check if the pattern and scenarios hold for the whole of Europe, then it could be possible to calculate estimates for Europe.

The results from the second data request 3B were used to discuss the in-depth results of 3.3 and 3.4, the simple cross tabs gave a hint towards the question if the results of the analysis of the WP3 Partners (pattern and scenarios) are likely to be found in other TRACE Partners datamaterial as well

The idea to focus on alcohol (for trip level) and speed (driving task level) in Europe (law enforcement, different countries, different laws and limits, comparison for the scope of the problem, etc.) was discussed in WP3, but as already a study exists (see ANNEX III) and the results found by WP3 database and case analysis (as was the objective for TRACE) are findings that should be extended and not a new study on this topic (Annex III) should be started this idea was given up. Even 3.2 was not able to give answers on the cultural differences, in TRACE every Partner was to use his/her own database, and just by comparing aggregated data no influences by country characteristics can be taken into account. Further, the sociological and cultural influences are just not covered in the accident data.

2. The presented frequencies of task 3.1 will have to stay on a descriptive level, as we know that the results are derived from different countries, databases, sample criteria, classification criteria for variables, and are therefore not able to provide ONE frequency for Europe, also this is not rational due to assumed differences for the countries in the EU.

To provide at least some risk measure making the database results comparable the relative coding representation was calculated and is presented in Annex I. But, only the question "what is the most frequently coded/found factor is represented in the according accident database?" can be answered by this, not the question of frequency or implied risk for the accidents occurrence.

For the EU27 consequences of the results different methods, ideas and suggestions were taken into account, discussed and checked if relevant and valid conclusions were possible by these ideas on the one hand, and it was checked if the necessary information (background, data) for performing the different ideas was existing and accessible. Statistic experts from WP7 provided ideas as well as gave their expertise on what is not valid or possible. For the factors point of view, for the methods applied in WP3 and also taking account the results of the in-depth data request of WP8 it is only possible to discuss and compare the results, but no figures for neither single countries of the EU not represented in TRACE nor overall figures for the EU27 by any kind of extrapolation can be performed.

From the UNECE data (see Annex II) it is known, that the highest share of accidents caused by alcohol (more than 10%) are the following (from 25% down to 10%): Estonia, Luxembourg, Denmark, Lithuania, Finland, Latvia, Hungary, Slovenia, Slovakia, Poland, Czech Republic. The Czech Republic is the only country represented in the TRACE consortium. WP3 showed, that the Czech national data reveal a share of 19% of accidents being caused by alcohol. (all estimates refer to 2004).

Besides the cultural background, it also reveals a very different attitude on the social acceptability of Drink Driving in a specific country.

Drink Driving is maybe one of the most interesting socio-cultural factors that today is systematically investigated in accident causation statistics, but it does not appear, if these data are not sufficiently exploited, regarding their socio-cultural content.

Regarding the topic Drink Driving, the European databases reviewed show that this social phenomenon is an important one regarding its relationship to accident causation, which is an argument for further in-depth investigation. Especially research on cultural differences among European countries regarding their “habits” of alcohol consumption culture and, even more important, their diverse degree of social acceptability of Drink Driving should be further investigated. On this background, the common European space is a very interesting field for comparative research on this matter, especially regarding the analysis of best practices on how to integrate an given “alcohol consumption culture” and work on the fact that Drink Driving should be socially unacceptable.

From the UNECE data (see Annex II) it is further known that the highest number of accidents caused by alcohol (more than 2000 accidents) are the following (from 24000 down to 2000): Germany, United Kingdom, Poland, Hungary, Austria, Czech Republic, Netherlands. These countries are represented in TRACE (except Poland and Hungary).

So the WP3 results of tasks 3.3 of these countries for the factor alcohol are applying to the highest number of accidents caused by alcohol in the EU that can be prevented.

Already in D 3.1 the frequencies of certain factors as contributing to accidents in the databases available to the TRACE Partners gave a good overview on the relevance of certain factors. This led to the selection on what to focus on in the further analyses.

It is assumed that by focussing on Alcohol, Speed, Distraction and Inattention, Road Condition and Layout by any prevention measures as found by the task 3.3 and 3.4 results the highest share of accidents in the EU can be prevented.

In Annex I of D3.5 the relevance of factors in the available databases as being coded in accident causation analysis (state of the art in 2004) is presented as a reference for the countries.

To understand these accidents better also background factors (e.g. social factors as shown in 3.2) and the underlying mechanism for the Human functional failures (as found in task 3.3 and 3.4) have to be added.

4.2 Prevention measures to be suggested due to WP3 results

It is obvious that for preventing traffic accidents one has to go back in time from the actual accident to the driving task level, further back to the trip and finally to the background level. To prevent some accident related factors in the first also only a step back in time is useful. But, for accidents caused by a certain factor (of level X) it is not necessary to only go back in time for preventing this factor, but, the consequences of this factor are such a kind of typical, that prevention also on a level closer to the accident seems possible.

This could be confirmed by using the statistic analyses in WP3. From the WP5 method applied further information on accidents of a certain contributing factors is derived. The Human functional failures, and the scenarios found, characterize the typical circumstances of typical accidents as well, but, not only by a "facts" directed objective statistic approach, but by already implying the objective needs that would have helped a driver/traffic participant to not getting involved in an accident. With this approach suggestions for the development of active safety systems are possible by explaining which needs those should cover/and which functions they should provide or take over. And in this WP also the suggestions for the selection of Vehicle Safety Systems as provided by WP6 and WP4 were possible to be applied on the analysed cases to give additional prevention suggestions in this WP.

From the accident causation model it might have been assumed, that by preventing all underlying factors on a background level then all accidents could be prevented because the consequent factors on the trip and driving task level will vanish as well. This is of course not the case, as already pointed out in the model: some factors might exist or newly develop in time, without necessarily stemming from any preceding factor.

The analysis for 3.2 showed that already on a random choice of cases, a lot of sociological and cultural factors are found, that influence the following acts, behaviours, vehicles involved in the accident etc. But, of course it is not possible to explain every accident in sociological terms. And this is not wanted from a prevention point of view which in nowadays societies tries of course to protect the individuals but also tries to give responsibility back to the individual. It is however, necessary to know the underlying reasons for some factors found on a trip or even driving task level. Sociological and cultural factors are just one component of the background factors, although strong interactions between those factors and environmental and vehicle related factors on a background level can be expected (see D3.1 for more details).

4.3 Methods used in WP3

It has been possible, using the two main types of analysis in tasks 3.3 and 3.4, to identify not only the most 'typical' characteristics of accidents where trip related or driving task-related factors are involved (using the statistical logistic regression analysis), but also to identify the main reasons for what went wrong in the accidents where these factors and their associated characteristics, are present (using the TRACE Work Package 5 methodology analysis). As opposed to providing conflicting views about these accidents, the findings produced using both methods have been complementary, and where both methods have been used to investigate the same factor, an even more detailed view of the accident process was produced. Unfortunately, due to the lengthy Work Package 5 methodology recoding process when used for retrospectively study of accident files, only four factors were analysed using both methods. However, for future accident analysis, the use of both methods to obtain a detailed picture of accident situations involving either driving task-related factors or trip related factors is recommended. If databases provided background factors, this recommendation would apply to these factors as well.

This statistic method (comparable to a case – control study with an induced exposure idea) could be used also for other types of accidents (comparing not factor associated accidents but road user related accidents, or situation related accidents, or any other types of accidents whichever classification/separation/characterization is chosen – as factor is here defined as anything contributing to accidents one would prefer separating e.g. loss of control accidents to other, or turning accidents to others, or rural to urban, motorway to country road…) . This method will always be able to show up characteristics of certain types of accidents in comparison to other types of accidents.

Improvement has to be undertaken in the selection of explanatory variables and by taking all contributing factors applied to one accident into account. The analyses in WP3 were limited to a kind of pilot study, to be on a most objective level. As already these showed some good results especially by using the Mutual Information Content method in addition, this next step can be recommended for future analyses.

If more sociological factors were documented in databases and a harmonized coding and classification sytem was used in Europe (like developed in SAFETYNET) then the statistic method used in tasks 3.3 and 3.4 might be able to take all explanatory variables and all contributing factors into account simultaneously, to derive even more detailed pattern and more specific prevention measures.

The attempt of analysing accidents by a view point of contributing factors on a trip level reveals some general insights: on the one hand the trip level is too general for modern analysis, thus, sometimes only well-known results can be gained. Too general means that the factors on this level are the consequence of underlying background factors and in addition are themselves the reason for different subsequent factors that will be found on the driving task level. Factors from a trip level comprise a variety of different scenarios which are defined as combinations of certain road user, site, time, and place characteristics involved in situations, manoeuvres and in this combination leading to typical failures. General recommendations can thus be derived by analysing trip related factors, but, as they comprise a variety of implied aspects, no conclusions on the actual relevance of the factor itself, or the impact of the suggested preventive measures, can be drawn.

As can be seen from the results of analysis many of the driving task-related factors are a direct result of factors at a trip level. The link found between factors at a driving level and other levels being investigated in WP3 (trip, Social/cultural) shows that it could be of future interest to take each specific driving task factor (e.g. speed) and analyse its effects throughout all 3 levels investigated in this Work Package. However, in order to do this, more work would need to be undertaken to harmonise the type data collected at the scene, as it would be difficult to undertake this using retrospective data.

But, as can be seen by the existing coding structures of the databases available to the TRACE Partners, for those factors, which are still collected and documented on many different levels, that show high representations in the databases, still results can be gained. For factors of lower representation in the databases also the analysis within the task 3.3 cannot show evidence for any typical accident pattern connected to this factor (e.g. experience that is showing a low frequency in comparison to other factors, and the analysis was not able to give satisfying results), whereas the analyses for 3.4 (e.g. sudden health problems, sudden technical defects and dazzling sunshine) were able to show pattern despite the low representation of these factors in the databases. This means on the one hand, that the closer the factors are found on a driving task level the more specific conclusions about the circumstances of the accidents can be drawn. On the other hand, that when multiple implications and meanings are combined for forming one trip-related factor and a certain pattern is detected, a lot of impact can still be expected by preventive measures.

The method used in task 3.3 and 3.4 to compare the results to other countries is the optimum feasible and valid way. By comparing bivariate associations to pattern found in the regression model on a descriptive level it was possible to find hints and tendencies that the results might be transferable. But, as showed in the analyses, some of the bivariate associations vanish if adjusting to other factors and because of existing interactions. Thus also the bivariate associations found in other countries might not be stable and the transfer will not prove to be true in reality. Only the same kind of analysis applied to other countries will show if the same pattern are found. But, as already mentioned, this will only be useful if harmonization of databases is reached.

5 Concluding remarks and Outlook

Harmonisation of data across data sources across Europe, using for example the Work Package 5 methodology, would help make a more Europe-wide view of the causes of accidents at a driving task level more achievable. In the analyses of WP3, much variation was found in the type of data collected between the existing data sources, including definitions of specific factors and also the level to which they are recorded in accident databases. This made it difficult to be able to harmonise results found in the reports and fully represent the European situation, although this was successfully managed to some degree, despite the limitations outlined. It has been shown that analysing accident causation at a 'harmonised' level, especially when only aggregated data is available, can be a significant challenge. The harmonisation of accident causation data across Europe, such as the work being undertaken in other European projects (e.g. SafetyNet), will enable accident causation analysis to be taken to another level and allow for an even more detailed analysis of the accident causation issues across Europe as a whole.

This study has shown the benefits of using a unique human factors methodology such as the one used in this study, which was developed in TRACE Work Package 5. It has also highlighted further the need for a common accident causation methodology such as this, which could be developed further and usefully be taken forward into further projects across Europe. However, one limitation has been that it is difficult to use on existing accident data, but would be an extremely useful and innovative method to use when analysing new cases.

A further issue concerning sociological factors is, some of the research that could prove useful for road safety will take time, the data collection procedures have to be adapted, the accident investigators have to be trained to collect those "soft" data. In addition, in-depth accident research would profit by a more interdisciplinary approach and more flexibility regarding the evolution of its investigation tools. The "human factor" in accident causation is still the most important one, but to understand it to its full extent, more complex human and social sciences approaches have to be applied and more longitudinal studies on risk groups and on the origins of risk attitudes and behaviour should be encouraged.

The concept of regarding accident causation from a factors point of view by separating background factors, trip-related factors and driving task related factors can still be considered for the future and WP3 has been an interesting 'pilot' of the concept. This concept needs to be considered initially at an investigation process to be able to have enough information to investigate all three levels.

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The Trace Partners have access to national and in-depth databases. The results presented in the report are based on the work performed by the according organisations keeping the databases.

No guarantee can be given on the correctness of the interpretations of the results. The conclusions drawn might not reflect the views of the organisations and partners, respectively.

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STATS 19: National Accident Data for Great Britain are collected by police forces and collated by the UK Department for Transport. The data are made available to the Vehicle Safety Research Centre, Ergonomics and Safety Research Institute, at Loughborough University by the UK Department for Transport. The Department for Transport and those who carried out the original collection of the data bear no responsibility for the further analysis or interpretation of it.

In the early 1990s, the LAB (Laboratoire d'Accidentologie de Biomécanique et de comportement humain PSA Peugeot Citroën – Renault) pooled resources with the state-funded INRETS (Institut National de REcherche sur les Transports et leur Sécurité) in a common active safety research program – VSR (Véhicule et Sécurité Routière). 4 teams of investigators were called out to injury accident scenes by the emergency services to collect real-time crash data (approximately 60 accidents per team per annum). In 1999, at the end of this joint program, the two partners chose different but complementary directions. The LAB began to evaluate the effectiveness of new safety systems, whereas the INRETS continued developing its driver failure model. The LAB has since adopted this model and included it in the ongoing in depth accident investigation program.

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Annex I within database relevance of factors of TRACE Partners

A) by country

country	database	Contributory factor reported in accident	relative overrepresentation in database (all accidents)	key words
Czech Republic	**Czech_national**	**visibility**	**13,61**	**visibilty and view obstruction**
Czech Republic	**Czech_national**	**state of road surface**	**11,97**	**road surface condition**
Czech Republic	**Czech_national**	**state of road surface (except dry polluted, other)**	**11,38**	**road surface condition**
Czech Republic	**Czech_national**	**condition of driver**	**8,8**	**health status**
Czech Republic	**Czech_national**	**wet**	**8,72**	**road surface condition**
Czech Republic	**Czech_national**	**under influence of alcohol**	**6,94**	**alcohol**
Czech Republic	**Czech_national**	**weather conditions**	**6,44**	**weather condition**
Czech Republic	Czech_national	external influencing of driver	4,56	attention
Czech Republic	Czech_national	at night, with public lighting - undeteriorated due to weather conditions	4,09	visibilty and view obstruction
Czech Republic	Czech_national	at night, without public lighting - undeteriorated due to weather conditions	3,73	visibilty and view obstruction
Czech Republic	Czech_national	influenced by action of other road traffic participant	2,78	
Czech Republic	Czech_national	by day - deteriorated due to weather conditions (fog, snowfall, rainfall etc.)	2,7	weather condition
Czech Republic	Czech_national	wiew conditions	2,63	visibilty and view obstruction
Czech Republic	Czech_national	rainfall	2,3	weather condition
Czech Republic	Czech_national	rainfall beginning, slight rainfall	1,75	weather condition

country	database	Contributory factor reported in accident	relative overrepresentation in database (all accidents)	key words
France (North)	**LAB_in-depth**	**Inappropriate reaction (panic, exaggerated movements…)**	**6,82**	
France (North)	**LAB_in-depth**	**Excessive speed**	**5,77**	**exceeding speed limit**
France (North)	**LAB_in-depth**	**Alcohol impairment**	**5,4**	**alcohol**
France (North)	**LAB_in-depth**	**Wet road surface**	**5,31**	**road surface condition**
France (North)	**LAB_in-depth**	**Poor experience**	**2,59**	**experience**
France (North)	LAB_in-depth	Surroundings obscured by infrastructure or roadside element or road geometry	2,55	visibilty and view obstruction
France (North)	LAB_in-depth	Roadside shoulders not driveable (step, bank, trees…)	2,05	road layout
France (North)	LAB_in-depth	Poor road surface	1,67	road surface condition
France (North)	LAB_in-depth	Inappropriate speed (related to weather, road surface, infrastructure…)	1,59	inappropriate speed
France (North)	LAB_in-depth	Mood (stress, preoccupation, anger…)	1,55	attention
France (South)	**INRETS_in-depth**	**- Automatic driving: low attention level due to high experience of the trip (or its monotony)**	**7,05**	**attention**
France (South)	**INRETS_in-depth**	**- Rigid attachment to the right of way status**	**5,29**	
France (South)	**INRETS_in-depth**	**- Atypical manoeuvres from other users**	**5,29**	
France (South)	**INRETS_in-depth**	**- Temporal inconvenience for visibility (sun, other vehicle)**	**3,53**	**visibilty and view obstruction**
France (South)	**INRETS_in-depth**	**- Visibility limited by infrastructure (road equipment, vegetation and buildings)**	**2,82**	**visibilty and view obstruction**
France (South)	**INRETS_in-depth**	**- Automatic driving: low attention level due to high experience of the manoeuvre**	**2,47**	**attention**
France (South)	INRETS_in-depth	- Choose of a too high vehicle speed for the situation	2,47	inappropriate speed
France (South)	INRETS_in-depth	- Trivialization of the situation (potentially dangerous but treated as 'pain-killer')	2,12	Careless
France (South)	INRETS_in-depth	- Low level of attention (in its psychological sense: affectation of attentional resources to driving task)	1,76	attention
France (South)	INRETS_in-depth	- Risky driving (ludic, test of performance, transgression, etc.)	1,76	Careless
France (South)	INRETS_in-depth	- Difficult site (low radius in bend, rupture)	1,76	road layout

country	database	Contributory factor reported in accident	relative overrepresentation in database (all accidents)	key words
Germany	OGPAS	13 in other cases	13,1	
Germany	OGPAS	49 Other mistakes made by driver	12,6	
Germany	**OGPAS**	**14 Insufficient safety distance (Other causes leading to a traffic accident should be allocated to the respective positions, such as speed, overfatigue, etc.)**	**8,94**	**safety distance**
Germany	OGPAS	28 Failure to observe the traffic signs regulating the priority (§ 8) (except pos. 29)	8,34	traffic offence (priority)
Germany	OGPAS	35 Mistakes made when turning (§ 9) (except pos.	6,01	
Germany	**OGPAS**	**01 Influence of alcohol**	**3,89**	**alcohol**
Germany	OGPAS	11 Violation of the rule of driving on the right side	3,07	
Germany	OGPAS	37 Mistakes made when entering the flow of traffic (e.g. from premises, from another part of the road or when starting off the edge of the road) Improper behaviour towards pedestrians	2,84	
Germany	OGPAS	89 Other causes (list and briefly describe)	2,64	
Germany	OGPAS	10 Use of wrong carriageway (or lane) or unlawful use of other parts of the road	2,12	
Germany	OGPAS	73 Rain	1,88	weather condition
Germany	OGPAS	72 Snow, ice	1,84	weather condition
Germany	OGPAS	36 Mistakes made when making U-turn or 33, 40) reversing	1,76	
Germany	OGPAS	42 at other places	1,57	
Germany (north and east)	GIDAS_in-depth	observing right of way	17,57	traffic offence (priority)
Germany (north and east)	**GIDAS_in-depth**	**inappropriate speed**	**13,81**	**inappropriate speed**
Germany (north and east)	GIDAS_in-depth	other mistakes by the driver	7,22	
Germany (north and east)	**GIDAS_in-depth**	**safety distance**	**6,41**	**safety distance**
Germany (north and east)	GIDAS_in-depth	turn	4,68	
Germany (north and east)	GIDAS_in-depth	ignoring the traffic	3,76	
Germany (north and east)	GIDAS_in-depth	LZA, police officers	2,37	
Germany (north and east)	GIDAS_in-depth	pedestrian at other places	2,08	
Germany (north and east)	GIDAS_in-depth	turning, reversing	1,96	
Germany (north and east)	GIDAS_in-depth	wrong lane	1,85	
Germany (north and east)	GIDAS_in-depth	alcohol	1,73	alcohol
Germany (north and east)	GIDAS_in-depth	other causes	1,73	
Germany (north and east)	GIDAS_in-depth	right before left	1,56	traffic offence (priority)
Germany (north and east)	GIDAS_in-depth	lane change	1,56	
Germany (north and east)	GIDAS_in-depth	speeding (exceeded max. speed limit)	1,5	exceeding speed limit

country	database	Contributory factor reported in accident	relative overrepresentation in database (all accidents)	key words
Great Britain	Stats_GB_national	Failed to look properly	10,59	attention
Great Britain	Stats_GB_national	Failed to judge other persons path/speed	5,98	
Great Britain	**Stats_GB_national**	**Careless, reckless, in a hurry**	**5,41**	**Careless**
Great Britain	Stats_GB_national	Poor turn/manoeuvre	5,02	
Great Britain	Stats_GB_national	Loss of control	4,83	
Great Britain	**Stats_GB_national**	**Going too fast for conditions**	**3,89**	**inappropriate speed**
Great Britain	**Stats_GB_national**	**Slippery road**	**3,25**	**road surface condition**
Great Britain	Stats_GB_national	Pedestrian failed to look properly	3,12	
Great Britain	Stats_GB_national	Following too close	2,47	safety distance
Great Britain	Stats_GB_national	Sudden braking	2,34	
Great Britain	Stats_GB_national	Impaired by alcohol	1,8	alcohol
Great Britain	Stats_GB_national	Learner/Inexperienced driver	1,71	experience
Great Britain	Stats_GB_national	Exceeding speed limit	1,67	exceeding speed limit
Great Britain (England (Midlands and Southeast))	**OTS_in-depth**	**Inattention**	**6,78**	**attention**
Great Britain (England (Midlands and Southeast))	**OTS_in-depth**	**Carelessness, reckless or thoughtless**	**6,59**	**Careless**
Great Britain (England (Midlands and Southeast))	OTS_in-depth	Lack of judgement of own path	5,04	
Great Britain (England (Midlands and Southeast))	**OTS_in-depth**	**Excessive speed**	**4,43**	**exceeding speed limit**
Great Britain (England (Midlands and Southeast))	OTS_in-depth	Looked but did not see	3,98	attention
Great Britain (England (Midlands and Southeast))	OTS_in-depth	In a hurry	3,87	Careless
Great Britain (England (Midlands and Southeast))	OTS_in-depth	Failure to judge others persons path or speed	3,68	
Great Britain (England (Midlands and Southeast))	OTS_in-depth	Failed to look	2,73	attention
Great Britain (England (Midlands and Southeast))	OTS_in-depth	Following too close	1,74	safety distance
Great Britain (England (Midlands and Southeast))	OTS_in-depth	Aggressive driving	1,74	Careless

country	database	Contributory factor reported in accident	relative overrepresentation in database (all accidents)	key words
Greece (South)	**HIT_in-depth**	**Excessive speed**	**4,12**	**exceeding speed limit**
Greece (South)	**HIT_in-depth**	**View obstraction**	**2,35**	**visibilty and view obstruction**
Greece (South)	HIT_in-depth	Wrong avoidance maneuver	1,76	
Greece (South)	**HIT_in-depth**	**Light condition (dark)**	**1,76**	**visibilty and view obstruction**

country	database	Contributory factor reported in accident	relative overrepresentation in database (all accidents)	key words
Italy	**SISS_Italy_in-depth**	**Driving with exceeding speed**	**8,4**	**exceeding speed limit**
Italy	**SISS_Italy_in-depth**	**Careless driving**	**7,13**	**Careless**
Italy	**SISS_Italy_in-depth**	**Driving without keeping safety distance**	**3,65**	**safety distance**
Italy	SISS_Italy_in-depth	Driving without respecting the "STOP" sign	1,73	traffic offence (priority)
Italy	SISS_Italy_in-depth	Driving without respecting the "GIVE WAY" sign	1,65	traffic offence (priority)

country	database	Contributory factor reported in accident	relative overrepresentation in database (all accidents)	key words
Netherlands	MAIDS_NL_2000_in-depth	traffic scanning error	5,8	
Netherlands	MAIDS_NL_2000_in-depth	Faulty traffic strategy	4,63	
Netherlands	**MAIDS_NL_2000_in-depth**	**perception failure**	**4,46**	
Netherlands	**MAIDS_NL_2000_in-depth**	**Safe Position**	**3,53**	
Netherlands	MAIDS_NL_2000_in-depth	major unsafe act; likely to cause accident	3,45	
Netherlands	MAIDS_NL_2000_in-depth	Obstructions neglected	3,03	
Netherlands	MAIDS_NL_2000_in-depth	Lane choice	2,86	
Netherlands	MAIDS_NL_2000_in-depth	Speeding	2,78	exceeding speed limit
Netherlands	MAIDS_NL_2000_in-depth	decision failure	2,27	
Netherlands	**Trucks_TNO_NL_in-depth**	**Fog / ICE**	**4,3**	**weather condition**
Netherlands	**Trucks_TNO_NL_in-depth**	**Perception failure**	**2,72**	

country	database	Contributory factor reported in accident	relative overrepresentation in database (all accidents)	key words
Spain	**CIDAUT_Spain_national**	**Distraction.**	**4,57**	**attention**
Spain	CIDAUT_Spain_national	Disobeying a circulation order.	4,26	traffic offence (priority)
Spain	**CIDAUT_Spain_national**	**Inadequate velocity.**	**1,81**	**inappropriate speed**
Spain (Catalonia)	IDIADA_Catalonia_national	crossing intersection	13,13	
Spain (Catalonia)	**IDIADA_Catalonia_national**	**Inappropriate speed for conditions on the road**	**4,91**	**inappropriate speed**
Spain (Catalonia)	IDIADA_Catalonia_national	turning right	3,74	
Spain (Catalonia)	IDIADA_Catalonia_national	other	3,17	
Spain (Catalonia)	IDIADA_Catalonia_national	stopped	3,17	
Spain (Catalonia)	IDIADA_Catalonia_national	turning left	2,49	
Spain (Catalonia)	IDIADA_Catalonia_national	Crossing an intersection	2,33	
Spain (Catalonia)	IDIADA_Catalonia_national	rush hours	2,01	
Spain (Catalonia)	IDIADA_Catalonia_national	crossing the road outside the intersection	1,97	
Spain (Catalonia)	IDIADA_Catalonia_national	incorporation to traffic	1,56	
Spain (central)	CIDAUT_in-depth	1.5. Other (specify).	12,34	
Spain (central)	CIDAUT_in-depth	3.8. Not obeying STOP sign.	12,34	traffic offence (priority)
Spain (central)	**CIDAUT_in-depth**	**3.1. Speeding.**	**7,71**	**exceeding speed limit**
Spain (central)	**CIDAUT_in-depth**	**5.1. Tiredness.**	**6,17**	**vigilance**
Spain (central)	**CIDAUT_in-depth**	**1.1. Tyres.**	**3,09**	**vehicle condition**
Spain (central)	**CIDAUT_in-depth**	**3.2. Not keeping safe distance.**	**3,09**	**safety distance**
Spain (central)	**CIDAUT_in-depth**	**1. Weather conditions (rain, foggy, snow/ice).**	**1,54**	**weather condition**
Spain (central)	CIDAUT_in-depth	3.7. Other (Specify).	1,54	
Spain (central)	CIDAUT_in-depth	3.3. Overtake illegally.	1,54	
Spain (central)	CIDAUT_in-depth	3.4. Invade partially the opposite direction lane.	1,54	
Spain (central)	CIDAUT_in-depth	3.7. Not obeying traffic signals indications.	1,54	traffic offence (priority)
Spain (central)	CIDAUT_in-depth	3.14. Other.	1,54	

B) by over representation of contributing factors (from highest to lowest, each for all accidents and fatal accidents only)

database	Contributory factor reported in accident	relative overrepresentation in database (all accidents)	key words
GIDAS_in-depth	observing right of way	17,57	traffic offence (priority)
GIDAS_in-depth	inappropriate speed	13,81	inappropriate speed
Czech_national	visibility	13,61	visibilty and view obstruction
IDIADA_Catalonia_national	crossing intersection	13,13	
BASt_Germany_national	13 in other cases	13,10	
BASt_Germany_national	49 Other mistakes made by driver	12,60	
CIDAUT_in-depth	1.5. Other (specify).	12,34	
CIDAUT_in-depth	3.8. Not obeying STOP sign.	12,34	traffic offence (priority)
Czech_national	state of road surface	11,97	road surface condition
Czech_national	state of road surface (except dry polluted, other)	11,38	road surface condition
Stats_GB_national	Failed to look properly	10,59	attention
BASt_Germany_national	14 Insufficient safety distance (Other causes leading to a traffic accident should be allocated to the respective positions, such as speed, overfatigue, etc.)	8,94	safety distance
Czech_national	condition of driver	8,80	health status
Czech_national	wet	8,72	road surface condition
SISS_Italy_in-depth	Driving with exceeding speed	8,40	exceeding speed limit
BASt_Germany_national	28 Failure to observe the traffic signs regulating the priority (§ 8) (except pos. 29)	8,34	traffic offence (priority)
CIDAUT_in-depth	3.1. Speeding.	7,71	exceeding speed limit
GIDAS_in-depth	other mistakes by the driver	7,22	
SISS_Italy_in-depth	Careless driving	7,13	Careless
INRETS_in-depth	- Automatic driving: low attention level due to high experience of the trip (or its monotony)	7,05	attention
Czech_national	under influence of alcohol	6,94	alcohol
LAB_in-depth	Inappropriate reaction (panic, exaggerated movements…)	6,82	
OTS_in-depth	Inattention	6,78	attention
OTS_in-depth	Carelessness, reckless or thoughtless	6,59	Careless
Czech_national	weather conditions	6,44	weather condition
GIDAS_in-depth	safety distance	6,41	safety distance
CIDAUT_in-depth	5.1. Tiredness.	6,17	vigilance
BASt_Germany_national	35 Mistakes made when turning (§ 9) (except pos.	6,01	
Stats_GB_national	Failed to judge other persons path/speed	5,98	
MAIDS_NL_2000_in-depth	traffic scanning error	5,80	
LAB_in-depth	Excessive speed	5,77	exceeding speed limit
Stats_GB_national	Careless, reckless, in a hurry	5,41	Careless
LAB_in-depth	Alcohol impairment	5,40	alcohol
LAB_in-depth	Wet road surface	5,31	road surface condition
INRETS_in-depth	- Rigid attachment to the right of way status	5,29	
INRETS_in-depth	- Atypical manoeuvres from other users	5,29	
OTS_in-depth	Lack of judgement of own path	5,04	
Stats_GB_national	Poor turn/manoeuvre	5,02	

Table 6-1: Relative overrepresentation within databases of more than 5 times of contributing factors for all kinds of traffic accidents

database	Contributory factor reported in accident	RR % (relative overrepresentation in database (all accidents))	key words
IDIADA_Catalonia_national	Inappropriate speed for conditions on the road	4,91	inappropriate speed
Stats_GB_national	Loss of control	4,83	
GIDAS_in-depth	turn	4,68	
MAIDS_NL_2000_in-depth	Faulty traffic strategy	4,63	
CIDAUT_Spain_national	Distraction.	4,57	attention
Czech_national	external influencing of driver	4,56	attention
MAIDS_NL_2000_in-depth	perception failure	4,46	
OTS_in-depth	Excessive speed	4,43	exceeding speed limit
Trucks_TNO_NL_in-depth	Fog / ICE	4,30	weather condition
CIDAUT_Spain_national	Disobeying a circulation order.	4,26	traffic offence (priority)
HIT_in-depth	Excessive speed	4,12	exceeding speed limit
Czech_national	at night, with public lighting - undeteriorated due to weather conditions	4,09	visibilty and view obstruction
OTS_in-depth	Looked but did not see	3,98	attention
Stats_GB_national	Going too fast for conditions	3,89	inappropriate speed
BASt_Germany_national	01 Influence of alcohol	3,89	alcohol
OTS_in-depth	In a hurry	3,87	Careless
GIDAS_in-depth	ignoring the traffic	3,76	
IDIADA_Catalonia_national	turning right	3,74	
Czech_national	at night, without public lighting - undeteriorated due to weather conditions	3,73	visibilty and view obstruction
OTS_in-depth	Failure to judge others persons path or speed	3,68	
SISS_Italy_in-depth	Driving without keeping safety distance	3,65	safety distance
MAIDS_NL_2000_in-depth	Safe Position	3,53	
INRETS_in-depth	- Temporal inconvenience for visibility (sun, other vehicle)	3,53	visibilty and view obstruction
MAIDS_NL_2000_in-depth	major unsafe act; likely to cause accident	3,45	
Stats_GB_national	Slippery road	3,25	road surface condition
IDIADA_Catalonia_national	other	3,17	
IDIADA_Catalonia_national	stopped	3,17	
Stats_GB_national	Pedestrian failed to look properly	3,12	
CIDAUT_in-depth	1.1. Tyres.	3,09	vehicle condition
CIDAUT_in-depth	3.2. Not keeping safe distance.	3,09	safety distance
BASt_Germany_national	11 Violation of the rule of driving on the right side	3,07	
MAIDS_NL_2000_in-depth	Obstructions neglected	3,03	

Table 6-2: Relative overrepresentation within databases of more than 3 up to 5 times of contributing factors for all kinds of traffic accidents

database	Contributory factor reported in accident	RR % (relative overrepresentation in database (all accidents))	key words
MAIDS_NL_2000_in-depth	Lane choice	2,86	
BASt_Germany_national	37 Mistakes made when entering the flow of traffic (e.g. from premises, from another part of the road or when starting off the edge of the road) Improper behaviour towards pedestrians	2,84	
INRETS_in-depth	- Visibility limited by infrastructure (road equipment, vegetation and buildings)	2,82	visibilty and view obstruction
MAIDS_NL_2000_in-depth	Speeding	2,78	exceeding speed limit
Czech_national	influenced by action of other road traffic participant	2,78	
OTS_in-depth	Failed to look	2,73	attention
Trucks_TNO_NL_in-depth	Perception failure	2,72	
Czech_national	by day - deteriorated due to weather conditions (fog, snowfall, rainfall etc.)	2,70	weather condition
BASt_Germany_national	89 Other causes (list and briefly describe)	2,64	
Czech_national	wiew conditions	2,63	visibilty and view obstruction
LAB_in-depth	Poor experience	2,59	experience
LAB_in-depth	Surroundings obscured by infrastructure or roadside element or road geometry	2,55	visibilty and view obstruction
IDIADA_Catalonia_national	turning left	2,49	
Stats_GB_national	Following too close	2,47	safety distance
INRETS_in-depth	- Automatic driving: low attention level due to high experience of the manoeuvre	2,47	attention
INRETS_in-depth	- Choose of a too high vehicle speed for the situation	2,47	inappropriate speed
GIDAS_in-depth	LZA, police officers	2,37	
HIT_in-depth	View obstraction	2,35	visibilty and view obstruction
Stats_GB_national	Sudden braking	2,34	
IDIADA_Catalonia_national	Crossing an intersection	2,33	
Czech_national	rainfall	2,30	weather condition
MAIDS_NL_2000_in-depth	decision failure	2,27	
BASt_Germany_national	10 Use of wrong carriageway (or lane) or unlawful use of other parts of the road	2,12	
INRETS_in-depth	- Trivialization of the situation (potentially dangerous but treated as 'pain-killer')	2,12	Careless
GIDAS_in-depth	pedestrian at other places	2,08	
LAB_in-depth	Roadside shoulders not driveable (step, bank, trees…)	2,05	road layout
IDIADA_Catalonia_national	rush hours	2,01	

Table 6-3: Relative overrepresentation within databases of more than 2 up to 3 times of contributing factors for all kinds of traffic accidents

database	Contributory factor reported in accident	RR % (relative overrepresentation in database (all accidents))	key words
IDIADA_Catalonia_national	crossing the road outside the intersection	1,97	
GIDAS_in-depth	turning, reversing	1,96	
BASt_Germany_national	73 Rain	1,88	weather condition
GIDAS_in-depth	wrong lane	1,85	
BASt_Germany_national	72 Snow, ice	1,84	weather condition
CIDAUT_Spain_national	Inadequate velocity.	1,81	inappropriate speed
Stats_GB_national	Impaired by alcohol	1,80	alcohol
HIT_in-depth	Wrong avoidance maneuver	1,76	
HIT_in-depth	Light condition (dark)	1,76	visibilty and view obstruction
INRETS_in-depth	- Low level of attention (in its psychological sense: affectation of attentional resources to driving task)	1,76	attention
INRETS_in-depth	- Risky driving (ludic, test of performance, transgression, etc.)	1,76	Careless
INRETS_in-depth	- Difficult site (low radius in bend, rupture)	1,76	road layout
BASt_Germany_national	36 Mistakes made when making U-turn or 33, 40) reversing	1,76	
Czech_national	rainfall beginning, slight rainfall	1,75	weather condition
OTS_in-depth	Following too close	1,74	safety distance
OTS_in-depth	Aggressive driving	1,74	Careless
SISS_Italy_in-depth	Driving without respecting the "STOP" sign	1,73	traffic offence (priority)
GIDAS_in-depth	alcohol	1,73	alcohol
GIDAS_in-depth	other causes	1,73	
Stats_GB_national	Learner/Inexperienced driver	1,71	experience
LAB_in-depth	Poor road surface	1,67	road surface condition
Stats_GB_national	Exceeding speed limit	1,67	exceeding speed limit
SISS_Italy_in-depth	Driving without respecting the "GIVE WAY" sign	1,65	traffic offence (priority)
LAB_in-depth	Inappropriate speed (related to weather, road surface, infrastructure…)	1,59	inappropriate speed
BASt_Germany_national	42 at other places	1,57	
IDIADA_Catalonia_national	incorporation to traffic	1,56	
GIDAS_in-depth	right before left	1,56	traffic offence (priority)
GIDAS_in-depth	lane change	1,56	
LAB_in-depth	Mood (stress, preoccupation, anger…)	1,55	attention
CIDAUT_in-depth	1. Weather conditions (rain, foggy, snow/ice).	1,54	weather condition
CIDAUT_in-depth	3.7. Other (Specify).	1,54	
CIDAUT_in-depth	3.3. Overtake illegally.	1,54	
CIDAUT_in-depth	3.4. Invade partially the opposite direction lane.	1,54	
CIDAUT_in-depth	3.7. Not obeying traffic signals indications.	1,54	traffic offence (priority)
CIDAUT_in-depth	3.14. Other.	1,54	
GIDAS_in-depth	speeding (exceeded max. speed limit)	1,50	exceeding speed limit

Table 6-4: Relative overrepresentation within databases of more 50% of contributing factors for all kinds of traffic accidents

database	Contributory factor reported in accident	fatal RR % (relative overrepresentation in database (fatal accidents))	Key word
GIDAS_in-depth	inappropriate speed	28,40	inappropriate speed
BASt_Germany_national	13 in other cases	20,26	
Czech_national	visibility	15,17	visibilty and view obstruction
Monash_Australia_in-depth	Speeding or using speed excessive for conditions	13,95	excessice speed
IDIADA_Catalonia_national	Inappropriate speed for conditions on the road	13,65	inappropriate speed
BASt_Germany_national	49 Other mistakes made by driver	13,28	
LAB_in-depth	Inappropriate reaction (panic, exaggerated movements…)	11,41	
Stats_GB_national	Loss of control	10,91	
CIDAUT_in-depth	1.5. Other (specify).	10,80	
CIDAUT_in-depth	3.8. Not obeying STOP sign.	10,80	traffic offence (priority)
CIDAUT_in-depth	3.1. Speeding.	10,80	exceeding speed limit
CIDAUT_in-depth	1.1. Tyres.	10,80	vehicle condition
CIDAUT_in-depth	3.3. Overtake illegally.	10,80	
Czech_national	state of road surface	9,93	road surface condition
LAB_in-depth	Excessive speed	9,66	exceeding speed limit
GIDAS_in-depth	other mistakes by the driver	9,47	
GIDAS_in-depth	wrong lane	9,47	
Czech_national	condition of driver	9,47	health status
Czech_national	state of road surface (except dry polluted, other)	9,39	road surface condition
Monash_Australia_in-depth	Alcohol intoxication - the fact that the roaduser is intoxicated is not always a contributing factor (see notes)	9,38	alcohol
LAB_in-depth	Alcohol impairment	9,03	alcohol
LAB_in-depth	Wet road surface	8,89	road surface condition
OTS_in-depth	Failure to judge others persons path or speed	8,64	
TUG_Austria_in-depth	Driving error	8,37	
Monash_Australia_in-depth	Failed to observe other road user - requires statement by crash participant or eyewitness, not simply coders inference; e.g., driver day-dreaming, preoccupied with thoughts, chatting with passenger, reaching down, manipulating radio etc…handling food, removing items of clothing or attending to inappropriate unit/signs outside of vehicle (i.e., monitoring street signs, looking at vehicle other than the one struck, looking at scenery)	8,14	attention

Table 6-5: Relative overrepresentation within databases of more than 8 times of contributing factors for fatal traffic accidents

database	Contributory factor reported in accident	fatal RR % (relative overrepresentation in database (fatal accidents))	Key word
Czech_national	wet	7,48	road surface condition
MAIDS_NL_2000_in-depth	major unsafe act; likely to cause accident	7,40	
MAIDS_NL_2000_in-depth	decision failure	7,40	
Czech_national	at night, without public lighting - undeteriorated due to weather conditions	6,49	visibilty and view obstruction
OTS_in-depth	Carelessness, reckless or thoughtless	6,48	Careless
Czech_national	weather conditions	6,23	weather condition
MAIDS_NL_2000_in-depth	Faulty traffic strategy	6,16	
TUG_Austria_in-depth	Speed (high)	6,12	exceeding speed limit
SISS_Italy_in-depth	Driving with exceeding speed	6,09	exceeding speed limit
TUG_Austria_in-depth	Road geometry (bend)	5,96	road layout
TUG_Austria_in-depth	Attentiveness	5,91	attention
BASt_Germany_national	11 Violation of the rule of driving on the right side	5,80	
TUG_Austria_in-depth	Lightning conditions (Darkness)	5,69	visibilty and view obstruction
GIDAS_in-depth	pedestrian at other places	5,68	
GIDAS_in-depth	alcohol	5,68	alcohol
GIDAS_in-depth	speeding (exceeded max. speed limit)	5,68	exceeding speed limit
Stats_GB_national	Careless, reckless, in a hurry	5,59	Careless
Monash_Australia_in-depth	Other misjudgement by roaduser - e.g., roaduser misjudges road width	5,59	
HIT_in-depth	Excessive speed	5,45	exceeding speed limit
Stats_GB_national	Failed to look properly	5,43	attention
BASt_Germany_national	01 Influence of alcohol	5,42	alcohol
Czech_national	external influencing of driver	5,37	attention
Stats_GB_national	Going too fast for conditions	5,23	inappropriate speed

Table 6-6: Relative overrepresentation within databases of more than 5 up to 8 times of contributing factors for fatal traffic accidents

database	Contributory factor reported in accident	fatal RR % (relative overrepresentation in database (fatal accidents))	Key word
Czech_national	under influence of alcohol	4,99	alcohol
Trucks_TNO_NL_in-depth	Fog / ICE	4,80	weather condition
BASt_Germany_national	12 and exceeding at the same time the speed limit	4,50	exceeding speed limit
LAB_in-depth	Poor experience	4,34	experience
SISS_Italy_in-depth	Careless driving	4,34	Careless
OTS_in-depth	Lack of judgement of own path	4,32	
OTS_in-depth	Excessive speed	4,32	exceeding speed limit
OTS_in-depth	Looked but did not see	4,32	attention
OTS_in-depth	In a hurry	4,32	Careless
OTS_in-depth	Distraction through stress or emotional state of mind	4,32	attention
LAB_in-depth	Surroundings obscured by infrastructure or roadside element or road geometry	4,27	visibilty and view obstruction
Monash_Australia_in-depth	Asleep/fatigue - can apply when there is no direct evidence but facts suggest this to be likely, e.g., prolonged driving (this is the only instance where road user impairment can be coded in the absence of hard evidence)	4,21	vigilance
IDIADA_Catalonia_national	exceeding speed	4,21	exceeding speed limit
BASt_Germany_national	28 Failure to observe the traffic signs regulating the priority (§ 8) (except pos. 29)	4,02	traffic offence (priority)
CIDAUT_Spain_national	Distraction.	3,93	attention
Stats_GB_national	Exceeding speed limit	3,92	exceeding speed limit
Stats_GB_national	Poor turn/manoeuvre	3,87	
TUG_Austria_in-depth	Structure - Vehicle parameter - Mass discrepancy	3,84	
GIDAS_in-depth	other mistakes by pedestrians	3,79	
IDIADA_Catalonia_national	other	3,73	
MAIDS_NL_2000_in-depth	traffic scanning error	3,70	
MAIDS_NL_2000_in-depth	perception failure	3,70	
MAIDS_NL_2000_in-depth	Obstructions neglected	3,70	
MAIDS_NL_2000_in-depth	Lane choice	3,70	
Saxony_fatals_in-depth	Relevant for frequency count if not "dry" Environment factors Roadway condition	3,64	road surface condition

Table 6-7: Relative overrepresentation within databases of more than 3.5 up to 5 times of contributing factors for fatal traffic accidents

database	Contributory factor reported in accident	fatal RR % (relative overrepresentation in database (fatal accidents))	Key word
LAB_in-depth	Roadside shoulders not driveable (step, bank, trees…)	3,43	road layout
IDIADA_Catalonia_national	overtaking on the right	3,41	
TUG_Austria_in-depth	Seat belt	3,41	
Czech_national	at night, with public lighting - undeteriorated due to weather conditions	3,39	visibilty and view obstruction
TUG_Austria_in-depth	Structure - Vehicle parameter - Collapse	3,38	
Stats_GB_national	Failed to judge other persons path/speed	3,27	
CIDAUT_Spain_national	Disobeying a circulation order.	3,26	traffic offence (priority)
Monash_Australia_in-depth	Alcohol + other drug affected - includes prescription and non-prescription drugs; includes any level of canabis when combined with alcohol	3,26	alcohol
IDIADA_Catalonia_national	crossing intersection	3,25	
CIDAUT_Spain_national	Inadequate velocity.	3,11	inappropriate speed
Monash_Australia_in-depth	Other drug affected - includes prescription and non-prescription drugs; for cannabis, must exceed 10ng/ml (or 0.001mg/100ml) of THC acid; the fact that a roaduser is drug affected is not always a contributing factor (see notes)	3,10	drugs
Stats_GB_national	Pedestrian failed to look properly	2,90	
Stats_GB_national	Impaired by alcohol	2,88	alcohol
LAB_in-depth	Poor road surface	2,80	road surface condition
TUG_Austria_in-depth	Road condition Infrastructure Wet road	2,79	road surface condition
Saxony_fatals_in-depth	Relevant for frequency count if not "dry" Environment factors Weather situation	2,76	weather condition
Czech_national	influenced by action of other road traffic participant	2,74	
HIT_in-depth	View obstraction	2,73	visibilty and view obstruction
BASt_Germany_national	64 without paying attention to the traffic	2,73	
LAB_in-depth	Inappropriate speed (related to weather, road surface, infrastructure…)	2,66	inappropriate speed
IDIADA_Catalonia_national	crossing the road outside the intersection	2,62	
LAB_in-depth	Mood (stress, preoccupation, anger…)	2,59	attention
TUG_Austria_in-depth	Visibility	2,57	visibilty and view obstruction
IDIADA_Catalonia_national	avoiding obstacle on the left manoeuvre	2,54	

Table 6-8: Relative overrepresentation within databases of more than 2.5 up to 3.5 times of contributing factors for fatal traffic accidents

database	Contributory factor reported in accident	fatal RR % (relative overrepresentation in database (fatal accidents))	Key word
Monash_Australia_in-depth	Failed to observe other - as for 501, includes failure to observe road condition; includes failure to observe the fact that vehicle leaving the carriageway	2,49	
MAIDS_NL_2000_in-depth	Safe Position	2,47	
MAIDS_NL_2000_in-depth	Speeding	2,47	exceeding speed limit
Stats_GB_national	Aggressive driving	2,45	Careless
Czech_national	other unfavourable condition	2,40	
Trucks_TNO_NL_in-depth	Perception failure	2,40	
BASt_Germany_national	17 Overtaking in spite of oncoming traffic	2,36	
BASt_Germany_national	35 Mistakes made when turning (§ 9) (except pos.	2,35	
Saxony_fatals_in-depth	Relevant for frequency count if "yes" Accident with alcohol involvement	2,32	alcohol
LAB_in-depth	Impairment through drugs – illicit substances	2,31	drugs
Monash_Australia_in-depth	Other dangerous manoeuvre - this would be distinguished from error of judgement by the fact tht it was probably risky at any time (e.g., doing a U-turn on a busy street) as opposed to one where the crash was a matter of timing; includes deliberately cutting off, harassing or ramming another vehicle; includes deliberate failure to avoid a crash initiated by another road user that was easily avoidable (e.g., deliberate failure to attempt avoidance of vehicle/pedestrian in middle of road when time to do so)	2,27	careless
LAB_in-depth	Luminosity (bright sunlight, reflections…)	2,24	visibilty and view obstruction
BASt_Germany_national	89 Other causes (list and briefly describe)	2,23	
LAB_in-depth	Poor experience of accident site	2,17	experience
LAB_in-depth	Impairment through drugs – medical	2,17	drugs
OTS_in-depth	Inattention	2,16	attention
OTS_in-depth	Failed to look	2,16	attention
OTS_in-depth	Aggressive driving	2,16	Careless
OTS_in-depth	Impairment through alcohol	2,16	alcohol
OTS_in-depth	Panic behaviour	2,16	
OTS_in-depth	Distraction through physical object outside of vehicle	2,16	attention
OTS_in-depth	Tyre worn or insufficient tread	2,16	vehicle condition
OTS_in-depth	Animal out of control	2,16	

Table 6-9: Relative overrepresentation within databases of more than 2.15 up to 2.5 times of contributing factors for fatal traffic accidents

database	Contributory factor reported in accident	fatal RR % (relative overrepresentation in database (fatal accidents))	Key word
Czech_national	rainfall	2,14	weather condition
Monash_Australia_in-depth	Error in speed, distance judgement - e.g., driver turns in front of another mistakenly thinking that there is time to complete the manoeuvre; eg., unsuccessful legal overtaking manoeuvre - includes pedestrian misjudgement of vehicle speed and distance, includes instances of the pedestrian being indecisive or slow	2,14	
BASt_Germany_national	42 at other places	2,13	
Czech_national	other influence	2,07	
BASt_Germany_national	73 Rain	2,06	weather condition
Czech_national	by day - deteriorated due to weather conditions (fog, snowfall, rainfall etc.)	2,06	weather condition
Stats_GB_national	Swerved	2,05	
LAB_in-depth	Fatigue	2,03	vigilance
Saxony_fatals_in-depth	Relevant for frequency count if aggressive / reckless Driving style before accident	2,01	Careless

Table 6-10: Relative overrepresentation within databases of more than 2 up to 2.15 times of contributing factors for fatal traffic accidents

Annex II ALCOHOL as accident causation in the EU

Alcohol involvement in accidents by UNECE data "Statistics of Road Traffic Accidents in Europe and North America, 51th edition, p. 10, United Nations, New York, Geneva, 2007."

E. Road traffic accident profile for 2004: area, population, accidents and alcohol-related share

Country, 2004 except a)	Accidents	of which share involving persons under the influence of alcohol (%)	accidents with alcohol involve ment		Country, 2004 except a)	Accidents	of which share involving persons under the influence of alcohol (%)	accident s with alcohol involve ment
Germany	339 310	a) 7,1	**24245**		Estonia	2 244	**25,4**	569
United Kingdom	207 410	5,4	**11220**		Luxembourg	692	**a) 20,4**	141
Poland	51 069	11,3	**5781**		Denmark	6 209	**17,5**	1085
Hungary	20 957	13,9	**2909**		Lithuania	6 357	**15,6**	990
Austria	42 657	6,6	**2835**		Finland	6 767	**14,9**	1009
Czech Republic	26 516	10,5	**2787**		Latvia	5 081	**14,7**	746
Netherlands	27 760	a) 7,5	**2071**		Hungary	20 957	**13,9**	2909
Slovenia	12 721	13,9	**1764**		Slovenia	12 721	**13,9**	1764
Greece	15 547	9,3	**1452**		Slovakia	8 443	**13,3**	1125
Slovakia	8 443	13,3	**1125**		Poland	51 069	**11,3**	5781
Denmark	6 209	17,5	**1085**		Czech Republic	26 516	**10,5**	2787
Sweden	18 029	5,9	**1056**		Greece	15 547	**9,3**	1452
Finland	6 767	14,9	**1009**		Netherlands	27 760	**a) 7,5**	2071
Lithuania	6 357	15,6	**990**		Germany	339 310	**a) 7,1**	24245
Latvia	5 081	14,7	**746**		Austria	42 657	**6,6**	2835
Estonia	2 244	25,4	**569**		Sweden	18 029	**5,9**	1056
Bulgaria	7 612	5,5	**420**		Bulgaria	7 612	**5,5**	420
Romania	6 860	a) 4,4	**302**		United Kingdom	207 410	**5,4**	11220
Luxembourg	692	a) 20,4	**141**		Romania	6 860	**a) 4,4**	302
Cyprus	2 080	0,9	**18**		Cyprus	2 080	**0,9**	18
France	85 396	…			France	85 396	…	
Ireland	5 781	…			Ireland	5 781	…	
Italy	224 553	…			Italy	224 553	…	
Liechtenstei n	512	…			Liechtenstein	512	…	
Malta	15 643	…			Malta	15 643	…	
Monaco	...	…			Monaco	...	…	
Norway	8 425	…			Norway	8 425	…	
Portugal	38 930	…			Portugal	38 930	…	
Spain	94 009	…			Spain	94 009	…	
Switzerland	22 891	…			Switzerland	22 891	…	

Annex III Reference: EC Report on speeding and drink driving

The followinginformation on blood alcohol limits and speed limits is taken from this report:

David Préat, Arnaud Troizier,(Clifford chance for the **European Commission Directorate General for Energy and Transport***):* **INFORMATION GATHERING ON SPEEDING, DRINK DRIVING AND SEAT BELT USE IN THE MEMBER STATES,** *FINAL REPORT, PART TWO*

Text and tables of the following >> xxx<<< marked passages in Annex II are **completely cited**:

…>>The European Commission instructed Clifford Chance with a view to collecting the rules related to speeding, drink driving and seat belt use, for all the Member States, as well as the actions implemented in order to comply with such rules.

Clifford Chance has been charged to collect the following information on the three abovementioned

topics:

- ***the existing traffic rules as laid down in relevant legal rules;***
- ***the sanctions and penalties (administrative as well as judicial) laid down for infringement of the rules;***
- ***the practice of checking infringements to the rules;***
- ***the practice of sanctions and penalties actually applied, including court decisions.***

For that purpose, Clifford Chance Paris drew up a questionnaire, which has been approved by the European Commission, and sent it to the Clifford Chance offices or correspondent law firms in the 14 other Member States.

2.6 Drink-driving as cause of accidents

Data are very difficult to aggregate, as far as the total number of accidents or the total number ok killed persons is not always available. Moreover, distinction is not always made between drivers and passengers, alcohol as only cause or not, and if alcohol tests are compulsory or not after accidents.

2.1 Rules on drink driving

Table 2: The maximum authorized blood alcohol level (BAL) (questions 6.1., 6.2. and 7 in Part I)

	Maximum authorized BAL	Application of the rule before, during and/or after driving	Variations of the severity of the rules	Specific rules for young drivers or other categories of drivers
United Kingdom	80 mgs /100 mls or 35 mgs /litre of breath.	Unknown	- The sanction will correspond to the degree of the offence, - Specific sanctions for high risk offenders (i.e. if driving 2.5 times over the legal limit or if convicted of 2 or more drink driving offences in a 10 year period) (1992)	No
Sweden	0.2 /1000 in the blood or 0.1 mg /litre of breath.	During or after driving.	- Gross drink-driving, mainly if above 1/1000 in blood or above 0.5mg/l of breath.	No
Netherlands	0.5 mg/ml.	During driving	Yes (see sanctions below)	No, although it is considered to lower the authorized BAL for young drivers.
Finland	0.5mg/1000 in the blood or 0.25mg/litre of breath.	During or after driving.	Serious intoxication if above 1.2/1000 of blood or 0.6mg/l of breath.	No
Germany	0.5mg/1000 in the blood.	Unknown	- Above 0.3/1000 (with additional factors), presumption that the driver is not able to drive safely, - Above 1.1/1000, general presumption of incapacity to drive, - Sanctions are higher in case of risk of violation of other persons' or properties integrity and in case of repeated offences.	No

	Maximum authorized BAL	Application of the rule before, during and/or after driving	Variations of the severity of the rules	Specific rules for young drivers or other categories of drivers
Denmark	0,5/1000 or 1.2/1000 in the blood.	During driving and if attempting to drive.	Yes: there are 2 different offences depending on the blood alcohol concentration: driving while intoxicated (between 0,5 and 1,2) and drink driving (above 1,2 or if the driving is unsafe - rarely used).	No, except concerning the payment of fines.
Ireland	80 mg/100 ml of blood or 107 mg/100 ml of urine or 35 mg/100 ml of breath.	If controlled so during driving, within 3 hours after driving or if attempting to drive.	- 3 different thresholds (from 81 to 100 mg/l of blood, from 101 to 150 mg/l of blood, more than 151 mg/l of blood) corresponding to driving licence disqualification of respectively 3 months, 1 year and 2 years, - Sentence doubled if second offence.	No
Italy	0.5g/l. of blood	Unknown	Yes, depending on the severity of the offence or in case of repeated offences in a given time period.	No
Austria	0.5/1000 of blood or 0.25 mg/l of breath.	Tests can be conducted on a person who starts a vehicle, is driving or has recently driven.	Severity of the sanctions depends on: - The degree of intoxication, - The type of driving licence (learner's licence), - Whether the offence is repeated.	Special laws for inexperienced drivers and for special categories of vehicles (special maximum threshold of 0.1/1000)
France	0.5g/l. Of blood	While driving.	- From 0.5 to 0.8g/l., the sanction is a fine and 3 points are diverted from the driving licence, - Above 0.8g/l, the fine is higher, 6 points are diverted and imprisonment is incurred as well.	If a foreign driver commits an offence without being able to justify a job or registered address in France, the vehicle used to commit the offence may be retained to obtain payment unless payment is immediate.
Belgium	0.5g/1000.	Unknown	- From 0.5 to 0.8g/1000, the sanction is a fine, - Above 0.8, the fine is	No special rules for young drivers. A transaction is

	Maximum authorized BAL	**Application of the rule before, during and/or after driving**	**Variations of the severity of the rules**	**Specific rules for young drivers or other categories of drivers**
			higher and the driving licence can be suspended for a longer period, - Above, 1,5, transactions generally do not take place	proposed to non-resident drivers. In case of acceptance, no prosecution will take place. Vehicle may be retained.
Spain	0.5g/l of blood or 0.25mg/l of breath. For drivers of transportation vehicles, 0.3g/l of blood or 0.15mg/l of breath.	Unknown	Various thresholds and corresponding levels of fines.	Maximum threshold is 0.3 g/ l. of blood: - During a two-year period after obtaining the driving licence, - For drivers of several categories of vehicles (vehicles destined for the transportation of more than 9 passengers, public service, transportation of scholars, of dangerous carriage, urgency services or special transports).
Luxembourg	0.8g/l. of blood	While driving.	- From 0.8 to 1.2g/l, a fine is imposed and 2 points are automatically diverted from the driving licence, - Above 1.2, imprisonment is incurred, the fine is higher, 4 points are automatically diverted and prohibition of driving is incurred.	If a foreign driver commits an offence without being able to justify a registered address in Luxembourg, the vehicle used to commit the offence may be retained to obtain payment.

	Maximum authorized BAL	Application of the rule before, during and/or after driving	Variations of the severity of the rules	Specific rules for young drivers or other categories of drivers
Portugal	0.5g/l. of blood	While driving.	Sanctions increase together with the BAC.	Lower amount of points during a two-year period after obtaining the driving licence.
Greece	0.5g/l of blood or 0.25g/l of breath.	Unknown	Three thresholds: up to 0.8g/l of blood (or 0.4g/l of breath), then up to 1.1g/l of blood (or 0.6g/l of breath) and finally above 1.1g/l of blood (or above 0.6g/l of breath).	0,20 g/l of blood for: - Drivers of vehicles of more than 3,5 tons, - Bus drivers (including school buses), - Drivers of ambulances, - Drivers of vehicles with dangerous carriage, - Young drivers (holding their licence for less than 2 years).

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"3.6 Speeding as cause of accidents (questions 80, 81 and 82 in Part I)

Data are very heterogeneous and not always available in this matter. It is indeed very difficult to know whether speed is involved in accidents, and if so, in what proportion. The fact that speeding is not always considered as a criminal offence also reduces the source of available statistical data - through reports on criminal offences for instance.

However, speed is generally considered as a key factor in accidents: in Sweden and France, it seems that speed is a contributing factor in one accident out of two, whereas it is presented as the most frequently involved factor in Austria (before drink driving), and as often the main cause in Italy; it is the cause of 18 % of all accidents in Germany, 14,8% of all accidents in Ireland (in 2000).

In Finland, the number of traffic accidents has decreased in the areas where the speed limit has been lowered to 50 km/h: the number of people who were injured fell by 20% and the number of seriously injured persons fell by 40%.

3.2 Speed limits in the Member States

Table 15: Speed limits in the Member States (questions 48.1, 48.2, 48.3 and 48.4 in Part I)

	Speed limits			Specific limits (weather conditions)	Specific limits (vehicle, driver)	Existence of traffic calming zones in built up areas
	Built-up areas	Motorways	Other roads			
United Kingdom	30 mph	70 mph	60 mph (70 on dual carriage way)	No (although electronic speed limit signs may be used on motorways in case of fog, accident, …)	Yes, for: - Cars towing caravans or trailers, - Buses and coaches (not exceeding 12 meters in length), - Goods vehicles (not exceeding 7,5 tonnes maximum laden weight, (heavy goods vehicles (exceeding 7,5 maximum laden weight). (Details in the Preliminary Report)	Yes, in particular through road humps and pinch points. One way systems and access only areas also exist.
Sweden	50 km/h (30 around schools and hospitals for instance)	110 km/h	70 (90 km/h on dual carriage way)	- Possible, under the responsibility of the Swedish National Road Administration	- Heavy vehicles: 80 km/h (90 on motorways), - Vehicles transporting dangerous carriage, - No specific limits for young drivers.	Local authorities are entitled to prescribe 30 km/h Bumps and other obstacles are also used to prevent speeding.
Netherlands	50 km/h (with 30 km/h zones)	100 or 120 km/h	80 km/h	No. However, electronic signs on highways are installed which signal a deviant speed limit in case of bad weather or road construction activities)	- Mopeds, vehicles for handicapped people, trucks, buses, trailers, agricultural vehicles, - Specific rules are in preparation for young drivers.	Yes (bumps, road markings and signposts)
Finland (1)	50 km/h (unless otherwise indicated by traffic signs)	80 km/h (unless otherwise indicated by traffic signs)	80 km/h (unless otherwise indicated by traffic signs)	Yes: - During the winter period, - General obligation for drivers to adapt their speed to the circumstances.	- Possible, under the responsibility of municipalities. - The specific 80 km/h for young drivers was removed in 1996. - Specific speed limits for several types of vehicles are set in the *Decree on the use of vehicles on roads (1992)*.	Yes: the municipality is entitled to determine appropriate speed limitation measures.
Germany	50 km/h at the most	No limit	100 km/h	-Yes: - Specific signs in case of particular weather conditions, - General obligation for drivers to adapt their speed to the circumstances.	- Heavy vehicles and trailers: 80 km/h (60 if more than 7,5 tonnes), - Public work vehicles and dangerous cargo, - No specific rules for young or learning drivers.	Yes
Denmark	50 km/h (with derogation) (2)	110 km/h (with derogation) (2)	80 km/h (with derogation) (2)	- General obligation for the driver to take the environmental circumstances into account in order to adapt the speed.	- 80 km/h for buses (of more than 3,5 tonnes in weight), - 70 km/h: trucks above 3,5 tons, buses, cars with trailers (50 in built-up areas), - There are also specific limits for tractors, heavy public works vehicles, mopeds.	Yes (bumps, chicanes, warning signs).
Ireland	30 mph	70 mph	60 mph	- 40 mph normally at the edge of a built-up area, - 50 mph: special speed limit (usually at the edge of an urban area with wide public roads), - A driver shall not drive at a speed exceeding that which will enable him/her to halt the vehicle within the distance he/she can see to be clear.	- 50 mph: ordinary speed limit for station wagons and certain public service vehicles, - 40 mph: ordinary speed limit for certain public service vehicles and articulated vehicles, - learner driver are prohibited from driving on motorways, - courts may take a lenient view of speeding offence if there was a good reason for it (e.g.: a driver speeding to take a sick person to hospital), - ambulances, fire brigades and vehicles used by *Gardai* in performance of their duties are excepted from the speed limits.	Yes

	Speed limits			Specific limits (weather conditions)	Specific limits (vehicle, driver)	Existence of traffic calming zones in built up areas
	Built-up areas	Motorways	Other roads			
Italy (3)	50 km/h	- 130 km/h - 150 km/h on highways with 3 tracks and an emergency track for both directions - starting from June 2003.	- 110 km/h on main extra urban roads, - 90 km/h on secondary and local extra urban roads.	In case of rain, snow or any other bad weather condition (except fog), the speed limits are as follows: - 110 km/h on motorways, - 90 km/h on main extra urban roads, - 50 km/h on other roads. In case of visibility inferior to 50 m, all speed limits are reduced of 50 km/h on all roads and motorways. .	Yes, notably: - 45 km/h for motorbikes, - 50 km/h for loaded vehicles transporting dangerous carriage (30 km/h in built-up areas), - 40 km/h for works vehicles using tyres (15 km/h in the other cases), - vehicles used for the transportation of people, - heavy goods-vehicles (more than 12 tonnes): 70 km/h out of built-up areas, 80 on motorways. Moreover, during the first 3 years from obtaining the driving licence, speed limits are 100 km/h on motorways, 90 on main extra urban roads.	Yes

	Speed limits			Specific limits (weather conditions)	Specific limits (vehicle, driver)	Existence of traffic calming zones in built up areas
	Built-up areas	Motorways	Other roads			
Austria (4)	50 km/h	- 130 km/h - 100 km/h on narrow highways	100 km/h on country roads	Yes, determined by specific regulations.	No specific limitations for young drivers. - 60 km/h (between 10 pm and 5 pm) for trucks with a maximum weight of more than 7,5 tonnes, - buses, trucks and semi-trailers must be equipped with a speed limiting mechanism, allowing a maximum speed of 100 km/h for buses, and 85 km/h for trucks and semi-trailers, - specific limits during certain periods of the day on specific roads, for certain types of vehicles (buses, trucks).	Residential streets and pedestrian zones.

	Speed limits			Specific limits (weather conditions)	Specific limits (vehicle, driver)	Existence of traffic calming zones in built up areas
	Built-up areas	Motorways	Other roads			
France (5)	50 km/h (30 km/h in traffic calming zones)	130 km/h	- 110 km/h on dual carriage way roads, - 90 km/h on other roads.	In case of rain or snow, the speed limits are as follows: - 110 km/h on motorways, - 100 km/h on motorways where the speed limit is generally lower than 130 km/h and on roads with two separated roadways, - 80 km/h on other roads, - 50 km/h in built-up areas. In case of visibility inferior to 50 m, all speed limits are reduced of 50 km/h, on roads and motorways.	For young drivers (*i.e.* holding their licence for less than 2 years), the speed limits are as follows: - 110 km/h on motorway portions where the usual speed limit is 130 km/h (100 km/h on motorways where the speed is lower than 130 km/h, and on roads with 2 separated roadways). - There are also specific limits for heavy vehicles (under and over 3,5 tons), vehicles transporting passengers, vehicles transporting dangerous carriage, public works and agricultural vehicles.	Yes
Belgium	50 km/h (30 km/h in traffic calming zones)	120 km/h	- 90 km/h, - 120 km/h (on roads divided in minimum 4 traffic lanes by another way than lines on the ground).	No	- Trucks of a maximum allowed weight of more than 12 tonnes, buses and coaches with a maximum allowed weight of more than 10 tonnes must be equipped with speed limiting mechanisms (90 km/h). - There are also specific limits for buses and coaches, heavy vehicles, vehicles carrying hazardous carriages…	Yes
Spain	50 km/h	120 km/h	100 or 90 km/h	No specific regulation: the authority	- No specific limits for novel	Yes

	Speed limits			Specific limits (weather conditions)	Specific limits (vehicle, driver)	Existence of traffic calming zones in built up areas
	Built-up areas	Motorways	Other roads			
				in charge of the road will indicate the maximum speed according to the specific condition of it.	drivers, - Specific limits for buses, trucks and articulated vehicles, cars with trailers, vehicles dedicated to school transport, or with dangerous carriage.	
Luxembourg (6)	50 km/h (30 km/h in 30 km/h zones and 20 in pedestrian/resident ial zones)	130 km/h	90 km/h (75 km/h for heavy vehicles)	In case of rain or other precipitation, the speed limits are as follows: - 75 km/h for trucks, buses, coaches, articulated vehicles on motorways (instead of 90), - 110 km/h (instead of 130) for other vehicles.	- Specific limits for novel drivers, - Specific limits for public works and agricultural vehicles, long and/or heavy vehicles.	Yes (30 km/h zones, pedestrian zones and residential zones)
Portugal	50 km/h	120 km/h	90 km/h (100 km/h on roads reserved for cars)	No. However, there is a general obligation for the driver to take the environmental circumstances into account in order to adapt the speed.	Lowered speed limits for vehicles with a trailer and for commercial vehicles	Yes
Greece	50 km/h for all vehicles (except in designated areas, where the limit can be lower)	120 km/h for passenger vehicles	90 km/h for passenger vehicles (110 km/h on high speed roads)	No specific limits, but the driver has to reduce speed in the event of rain, snow, fog, frost and, in general, whenever the road surface is slippery.	There are specific limits for certain types of vehicles (e.g. : 60 km/h on all types of roads for school buses, 80 km/h on all types of roads for trucks of a maximum weight over 3,5 t). However, in urban areas, the maximum speed limit is 50 km/h for all vehicles.	Yes Drivers also have to reduce speed when close to schools, and when passengers get on or off another vehicle.

(1) Finland: There is currently no specific rules applying to young drivers. The specific 80 km/h limit that was in force for a one-year period after obtaining the driving licence was removed in 1996. Specific speed limits for different types of vehicle are set in the Government Decree on the Use of Vehicles on Roads (4.12.1992/1257).

(2) Denmark: derogation (both up and down) can be ordered by the Government, regional or local authorities, provided it is not detrimental to safety (for higher limits) or if safety dictates a lower speed.

(3) Italy: the owner of the road may increase or decrease the speed limits on its roads (e.g.: next to schools, sporting fields) and for a certain period, within the directions of the Ministry of Public Works. A Mayor is also entitled to lower the speed limits in his/her geographical zone of intervention.

(4) Austria: The indicated limits may be changed to increase road safety or to protect the population and the environment.

(5) France: these limits may be lowered in case of pollution, on certain roads and in cities.

(6) Luxembourg, France and Sweden: the above-mentioned speed limits are applicable in optimal conditions of driving. In different conditions, drivers must adapt and control their speed, for instance in curves, in case of fog, or when overtaking stopped vehicles.

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The following "KEY FINDINGS" >>xxx<< is copied from the Joint OECD/ECMT Transport Research Centre's report, *Speed Management.*

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The following is a synopsis of the key findings of the Joint OECD/ECMT Transport Research Centre's report, *Speed Management.*

• Speeding -- i.e. excessive and inappropriate speed -- is a widespread social problem as, typically, at any time 50 % of drivers are above the speed limits. It is the number one road safety problem in many countries, often contributing to as much as one third of fatal accidents and speed is an aggravating factor in the severity of all accidents.

• Higher vehicle speeds also contribute to increased greenhouse gas emissions, fuel consumption and noise and to adverse impacts on quality of life, especially for people living in urban areas.

• Research indicates that co-ordinated actions taken by the responsible authorities can bring about an immediate and durable response to the problem of speeding. Indeed, reducing speeding can reduce rapidly the number of fatalities and injuries and is a guaranteed way to make real progress towards the ambitious road safety targets set by OECD/ECMT countries, as well as to reduce environmental pollution and energy consumption.

• Speed management -- which should be a central element of any road safety strategy – can help achieve appropriate speeds, taking into account mobility and economic needs as well as safety and environmental requirements. A coherent consistent policy will produce better results than a series of isolated measures. The speed management package should encompass the following elements:

− Targeted education and information to the public and policy makers.

− Assessments of appropriate speed for all types of roads and a review of existing speed limits in relation to accident risk based on road function, presence of vulnerable road users, traffic composition, and road design and roadside characteristics. In urban areas, the speed limit should not exceed 50 km/h and 30 km/h zones are recommended in areas where vulnerable road users are particularly at risk, as they have proven very effective in reducing accident risk and severity and protecting vulnerable road users.

− Infrastructure improvements which are aimed at achieving safe, "self explaining" roads; these should guide drivers in choosing the appropriate speed.

− Sufficient levels of traditional police enforcement and automatic speed control, encompassing all road users (including foreign drivers), and the development of section control (control of average speeds over sections of a road). More effective enforcement can be achieved through measures like minimum tolerances above speed limits and use of mobile cameras.

− Development of vehicle engineering, such as collision avoidance systems and speed limiters. In countries where this is not the case, consideration should be given to mandatory speed limiters for trucks and coaches.

• Given the great potential benefits that new technologies can bring, their progressive implementation is encouraged. Appropriate actions could include:

− All new cars equipped with manually adjustable speed limiters, and as soon as practicable with voluntary informative or supportive Intelligent Speed Adaptation (ISA) systems.

− To help secure the potential benefits of the ISA technologies, governments are also encouraged, in co-operation with relevant partners, to develop interoperable digital speed limit databases.

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List of Abbreviations

AIS: Abbreviated Injury Scale.

DIANA: in-Depth Investigation and ANalysis of Accidents.

Delta-V: Subtraction between 'Post-impact speed vector' and 'Pre-impact speed vector'

Df: Degree of freedom.

EBS: Energy Barrier Speed

EES: Energy Equivalent Speed.

ETS: Equivalent Test Speed

GDL: Graduated Driver's License

HP: Horse Power

Sig. Significance level

ISA: Intelligent Speed Adaption

LKA: Lane Keeping Assistance

ESP: Electronic Stability Program

BA: Brake Assistance

ACC: Active Cruise Control

CA: Collision Avoidance

SAVE-U: Vulnerable Road Users Protection

NV: Night Vision

DDD: Driver Drowsiness Detection

LCA: Lane Changing Assistance,

AAFS Advanced Adaptive Front light System

TPM: Tyre Pressure Monitoring and Warning Systems

CW: Collision Warning

OGPAS: (Official German Police Accident Statistics