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Deliverable D4.2 Database Transparency

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Executive summary

Road transport and all road transport related industries are clearly very important to European economy and societies. In terms of impact to European employment for instance, road transport is probably the most important transport sector. On the other hand, the relatively poor road safety – accidents, those killed and injured, material damage and other socio-economic costs – constitutes a major socio-economic problem.

While road safety has recently emerged as an issue on all political decision-making levels, it was for a long time neglected compared to the issue of safety in the public transport modes, such as rail, air and maritime. This delay and the requirement of independence for accident investigating entities in the public transport modes result from the characteristics of different transport modes. Independence of an investigation body is to be understood as a means of assuring its impartiality – and that of the investigations it conducts.

However, the independence of the investigation body and processes do not resolve the question of the quality of investigations. The quality of the investigation work relies certainly on the impartiality of the investigating body and processes, but also on the qualifications and experience of the investigators, as well as the investigation methods they use. It is not independence, but transparency that best describes these aspects of accident investigation. We shall define transparency as the *availability of such relevant information on the accident investigation, which allow its quality to be assessed*. In this deliverable, we have applied the concept of transparency only to databases, but it does apply to all accident investigation results: data, case studies or accident reports and any other subsequent data.

Investigation bodies frequently cooperate with similar bodies from other countries or with other stakeholders (manufacturers, operators, regulators, consumers etc.), for specific accident investigations, and such interrelations strengthen their impartiality. In quite a similar manner, transparency can be further facilitated by the use of international methods and standards. The process of building a European road safety community through Commission supported research programmes is important in creating interrelations between research institutes and in creating progressively a body of common European accident investigation methods, standards, data and knowledge.

The reviewed databases can roughly be divided in two categories. There are the police collected data that, in spite of their drawbacks, have the advantage of being national. The percentage of under-reporting and under-recording can be quite consequent, but this is rather irrelevant when national statistics are used for continued trend monitoring for instance. On the other hand there are the research oriented databases, whose uses are specific and depend on the research objectives. In some cases such databases might result for instance from legal obligations set for insurers, and might even contain police or other extensive data from certain areas and for longer periods. Other databases have been designed for a one-off use.

All the databases reviewed in this deliverable are, according to our evaluation, transparent. In other terms, there is sufficient information available on all the relevant aspects of these databases for assessing their actual quality. Making quality evaluations was not an objective of this work package and we have not proceeded to such quality evaluations. The principal reason for this is the fact that databases cannot be evaluated against a single scale. They have been designed for answering specific questions and should be judged on the basis of how well they reach that particular objective. The establishment of criteria for evaluating the transparency of accident investigation data (databases in this deliverable) was in itself a challenging task. Nevertheless we felt it had to be completed by some considerations on the use of accident investigation data and the limits that should be set to transparency.

The only necessary limit that should be set to the transparency of accident investigation data is the right to privacy. Individual, identifiable accident level data should not be made publicly available – unless such data is necessary for understanding the circumstances and the sequence of events in case of major accidents (like the public transport accidents frequently are).

There is another limitation to the transparency of accident investigation data, which results from the nature of that data. The investigation data is not just “observed” but is “constructed” according to specific, well-defined methodological choices. The process of data gathering, which begins with the choice of some particular pieces of information amongst a large number of details about an accident and ends with synthesized data, is a rather complex process and calls for specific qualifications and experience. The same is of course true –unfortunately perhaps – for appreciating the investigation results and participating to any debates about their scientific quality.

While this limitation is real and has to be accepted, there is no need – quite the contrary – to conceal information from the public. Transport safety in all transport modes is an issue of public interest and adequate¹ safety information, including accident investigation data, has to be publicly available. Sometimes public will misinterpret some of the available data, which will need to be dealt with. In any case, this would be a far lesser evil than having to constantly reassure the public that important safety related information is not being concealed.

¹ Keeping in mind the limitations related to the nature of the data.

0. Introduction

The present Deliverable is titled Database transparency instead of Database independence, which was the foreseen deliverable title. The change of title was decided during the work process and results from the difficulties we experienced when working our way through such issues as independence, freedom, autonomy, transparency, openness, interdependence, impartiality and quality on the one hand, and investigation body, investigation process, investigator, investigation results, data and databases on the other. All these issues are intertwined and form a complex domain.

While independence seems to be a perfectly operational concept for evaluating investigation bodies – see *D4.1 Bibliographical analysis* (SafetyNet, 2005) – and the adjective independent suitable for characterising investigation processes, the relation of independence to data or databases appears a lot less evident. The investigation bodies, investigators and the investigation processes can rather easily be called independent, that is – according to the dictionary¹ – free from outside control. This outside control can be multiple. The investigation body has to be *separate* from regulating bodies or other entities with competing interests. It must have the *means* to conduct its investigations *separate* from any judicial or administrative enquiries. The investigators must have the necessary *legal status* as well as the necessary *qualifications* and *experience* to conduct investigations. Finally – and this point should result from all the above – the body, the investigators and the investigations have to be *not easily influenced*.

To qualify any output, investigation reports, facts and analysis, data and databases independent is quite a bit trickier. In what way would an investigation report or a database be independent? Could an accident investigation report that simply leaves out the questions concerning liabilities be called independent? Would it be sufficient for an investigation report to contain a warning, similar to the following, used by the Finnish Accident Investigation Board for all maritime, rail and major accident reports it releases?

This investigation report has for purpose the enhancement of safety and the prevention of future accidents. It does not deal with liabilities or damages. The use of the investigation report for other than safety enhancement purposes should be avoided.

Sarsfield, Stanley, Lebow, Etedgui and Henning (2000) note that in the United States of America, the results of the National Transportation Safety Board (NTSB) investigations are widely used in justice. NTSB is independent, its investigators have a clear legal status and the NTSB investigations have for sole purpose the establishment of the cause or probable causes of the investigated accidents. In spite of this, the investigation results have consequences extending beyond the domain of transport safety. This is because the factual information about an accident is the same whichever the reason that information was gathered for. Safety investigation data can be used

¹ New Britannica/Webster Dictionary & Reference Guide (1988: 455).

also for other than safety enhancement purposes, not because it is not independent, but because it is based on reliable factual information. Uses may differ, but facts remain the same.

Freedom from outside control implies the capacity to defend oneself in one way or another. This capacity is obviously something that investigation results or research data cannot have. Facts cannot be shielded from judicial use on the grounds that they have been established by an independent safety investigation. Could it be then, that data is independent simply because it comes from an independent body? Could investigation results be qualified as independent as the body that conducted the investigation? This would be quite reassuring, since the notion of independence is widely used in relation to investigation bodies. Furthermore, we have already stated that the concept is operational and we have established a checklist for evaluating the independence of an investigating body.

Such a conclusion would, however, miss the point. Investigation results cannot be judged with the same instruments as the investigation bodies. Investigation bodies should be impartial, not easily influenced – independent. Investigation results should be of best possible quality – and the actual quality should be assessable. The point is not whether data is independent, but whether it is accurate. The first is either impossible (shielding data and facts from any other uses) or trivial (data is as independent as the body it comes from). The latter – accuracy – on the contrary, is of utmost importance.

Determining the actual quality of any output is a task beyond our forces – and outside the limits set to our work. Were we to assess quality, we could work on criteria such as representativeness, consistency in space and in time as well as timeliness. Our task, however, is slightly less ambitious. We were to develop procedures for determining the independence of road accident databases. As the work progressed, we realised that we could not make operational the notion of independence in relation with outputs. This deliverable aims therefore at developing procedures for evaluating the transparency of existing national and European road safety databases. We shall, for the purpose of our work, define database transparency as the *availability of such relevant information on the database, which allow its quality to be assessed*.

Before we tackle the issue of database transparency, we need to deal with two questions left un-answered in our previous deliverable. In the deliverable D4.1, we conducted a bibliographical study on the legal framework and the investigation bodies for transport accidents. At the light of what we have seen, the independence of a body responsible for the safety investigation on a transport accident is a rather important issue. We established a check-list for evaluating the level of independence of such a body – or to be more precise, allowing the identification of potential sources of conflict of interest.

The legal framework for accident investigation in the public transport modes is fairly comprehensive at EU level. There is, for civil aviation, a wide-ranging legal framework with two specific European Directives addressing the issue of accident and incident investigation and that of occurrence reporting. In the field of maritime transport, the European Directive is not specific to the accident investigation and does not require the Member States to establish an

independent investigation body. However, while Member States have no formal obligation to establish an independent investigation body for the investigation of marine casualties, this remains an objective. In the field of rail transport, a recent European Directive requires the Member States to establish an independent accident investigation body.

Concerning road transport, we noticed that traffic accident investigation differs from the accident investigation in public transport modes. There is no international or European legal framework and only two of the Member States, whose accident investigation practices were assessed for the deliverable D4.1, have a legal national framework applicable to road accident safety investigation. In France a decision by Minister of transport initiates a safety investigation on a road accident. In 2004 only three accidents involving road traffic vehicles were investigated. In Finland all fatal road accidents and some non-fatal road accidents are investigated. On average some 500 road accidents, out of which 370 fatal, are investigated annually.

The bulk of research in road safety in all involved Member States (i.e. in Germany, France, Italy and UK), at the exception of Finland, is therefore made by research bodies that do not have a legal status of a body responsible for conducting safety investigations. This statement raised the two questions we need now to answer. *Why is there such a difference in accident investigation practices between road traffic and other transport modes? Does the lack of legal framework for road accident safety investigation, in several Member States, hamper road safety research?*

These questions are, of course, closely related to the central issue of this deliverable, the database transparency. The possible adverse effect of the lack of legal status of the research body and the issue of evaluating transparency of road safety databases are indeed two faces of the same coin. *Can a non-independent research body produce transparent data? How can database transparency be evaluated?* Concerning the first aspect of the issue, the quality of an investigation process is logically separate from the issue of independence of the body conducting that investigation. There are no reasons to assume *a priori*, that an assessed lack of independence of the investigation body inevitably hampers the investigation process.

The French STRMTG (Service Technique des Remontées Mécaniques et des Transports Guidés – technical service of cableways and tracked transports), which has regulatory and investigation activities, enjoys an excellent reputation both in France and abroad. The entire framework in which STRMTG evolves, integrates constructors, operators and consumers. This is beneficial for STRMTG in that it strengthens its impartiality, but also for all parties and in particular the consumers in that it provides information on the investigation body and the investigation processes. The involvement of all interested parties in the process by which the security in cableways is maintained and enhanced, provides information that is useful both technically and socially. It allows the development of trust relations that are essential and characteristic of all public and global (as opposed to private and local) modes of transport¹.

¹ We will propose more precise definitions of these terms in Chapter 1.

The United States National Highway Traffic Safety Administration (NHTSA) also has several roles. It is the authority responsible for the safety regulations and for the safety investigation. This places it in a somewhat uncomfortable position. The main problem seems to arise from the ties NHTSA has to the manufacturers. NHTSA, contrary to STRMTG, has no strong institutional ties to the consumers, which could help in restoring the balance of power.

The CEESAR (European centre for safety studies and risk analysis) is a French association that investigates road accidents. Among its members, there are universities and business schools, automobile constructors, car parts manufacturers, insurance companies and personalities of medicine and industry. The presence of financially interested parties among the members of the association and the lack of financial independence of CEESAR need to be taken into account when evaluating its investigation's results. In spite of this the investigation results can be of high scientific quality.

These examples show that the lack of structural, financial or functional independence does not automatically bring discredit on an investigation body. Such a lack indicates merely a direction where any critical observer should look for possible problems.

In this Deliverable, our aim is to propose a way of evaluating actual road accident investigation practices and database transparency. We shall begin (Chapter 1) by answering the questions formulated in the deliverable D4.1 concerning the possible adverse effects of lack of independence of the investigating body. We shall then (Chapter 2) expose the different elements necessary for evaluating the transparency of a road accident database. After that, we shall (Chapters 3 and 4) evaluate several national and European road accident databases. We shall conclude (Chapter 5) with some general considerations on the use of accident investigation data and the limits that should be set to transparency.

During the work process we drafted various documents that figure in the annex. They contain interesting additional information on the issue of transport mode differences. As such they were too detailed to be included in the Chapter 1. In some cases they revealed a lack of clear official information concerning safety investments and accident costs. When this was the case, we could not verify nor invalidate the idea that there is under-spending in road safety compared to other modes of transport. Since transport safety is an issue of public interest, *clear information concerning accident costs and the safety investments in all transport modes should be made available at all relevant levels*. This kind of information is necessary for determining the appropriate level of public expenditure for all modes of transport.

We would like to thank the SafetyNet Steering Committee and particularly Philippe Lejeune and Vincent Treny of CETE du Sud-Ouest as well as George Yannis, Petros Evgenikos and Costas Antoniou of NTUA for their remarks and suggestions, which contributed to enhance the deliverable. We would also like to thank our other SafetyNet colleagues who have participated in our discussions on the different issues covered in this deliverable. The responsibility for any remaining errors or omissions belongs of course to us.

1. Why is road accident investigation different from accident investigation in other transport modes?

Road transport safety is widely perceived as an important socio-economic issue and it is taken rather seriously by political decision-making (sections 1.1, 1.2 and 1.3) Historically however, road safety issues were less considered and aroused less political passion than transport safety in rail, air or maritime transports (sections 1.3 and 1.4). This differential of political passion is due to the different nature of modes of transport. Compared to the other transport modes, road transport is perceived and thus treated – both individually and politically – in a quite different manner (section 1.5). The importance attached to the independence of the investigating bodies in the other transport modes results quite directly from these differences (section 1.6).

While transport mode characteristics explain the search of greater independence for the investigating entities in aviation, rail and maritime, there is no reason to link the quality of accident investigation solely to the independence of the investigating body – not in public transport modes and *a fortiori* not in road transport. In civil aviation, for instance, international standards and cooperation between investigating entities undoubtedly play a very important role by standardising the practices and supplying the accident investigating community with a framework of common knowledge. Given the differences of transport modes, it is all the more clear that the quality of accident or safety investigation in road transport does not rely so much on the legal status of the investigating body, as on the use of widely recognised standards and methods (section 1.7).

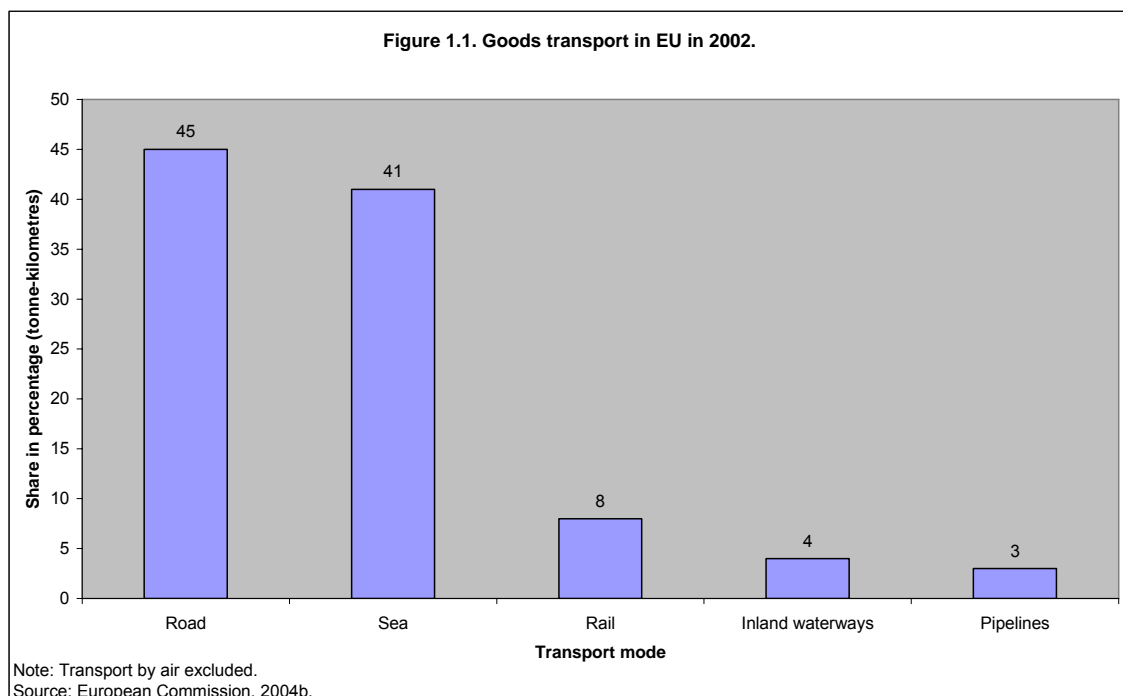
This does not signify that road accident investigation bodies should not strive for more independence – as we have seen in the Deliverable D4.1 (SafetyNet, 2005), the legal framework in which the investigating bodies evolve is far less developed in road transport. On the contrary, they should be granted the same kind of status as the investigating bodies in other transport modes. It simply means that the work of investigating bodies in road transport is in general under less outside pressure – and that the lack of independence might not have direct consequences on the quality of their investigations. In other words, road accident investigating bodies can live with less independence than their counterparts in other transport modes, but *they would certainly be better off with a clearer, more independent status.*

1.1. Road transport in Europe: figures and elements of comparison

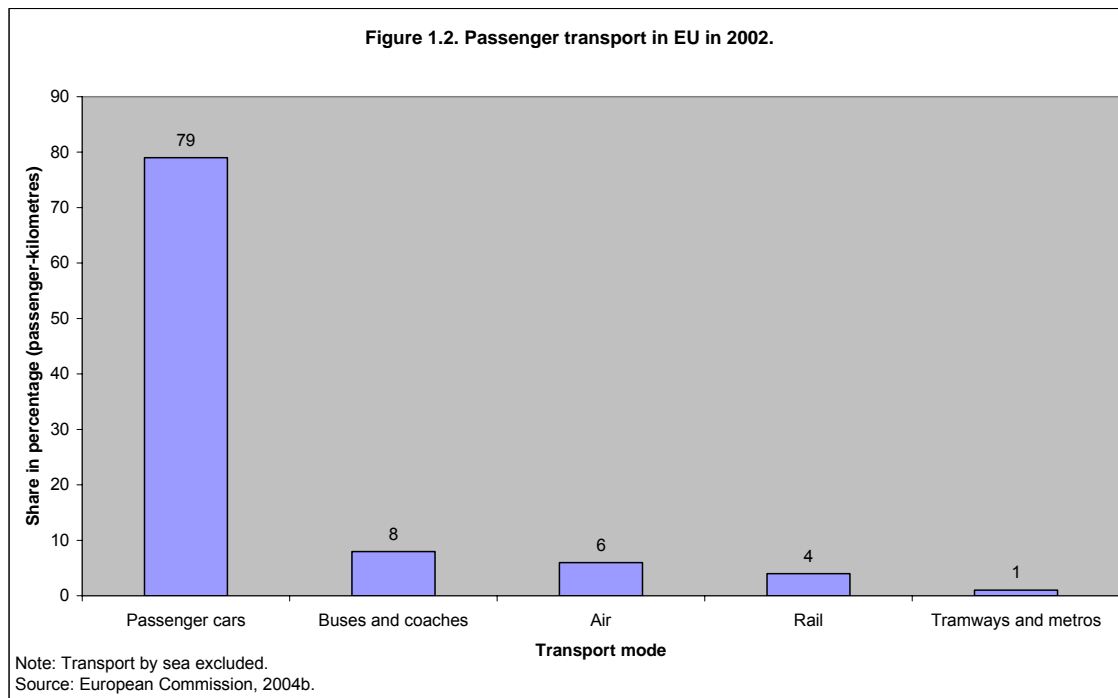
Let us start with some figures in order to remind ourselves just how important the car manufacturing industry and road transport sector are to European economy. The car industry employs directly some 2 million people and the jobs generated by it amount to some 10-12 million people, that is around 8% of all manufacturing jobs in Europe. (European Commission, 2005; Wengel, Warnke and Lindbom, 2003)

Road transport also plays a major role in the European economy and society. It involves a wide range of industries and services, accounting together for 8% of total paid employment and 11.5% of GDP in Europe. (European Union Road Federation, 2004) The whole transport services sector employs about 7.5 million people in EU-25. While 2% work in sea transport and 5% in air transport, 32% work in supporting and auxiliary transport activities – such as cargo handling, storage and warehousing, travel and transport agencies, tour operators – and 61% work in land transport, which include road, rail, inland waterways (European Commission, 2004b). It is reasonably safe to assume that the bulk of those working in land transport, work specifically in road transport (European Commission, 1997). This assumption is further corroborated by the figures available on freight and passenger transport in EU.

In 2002, inside EU-15 almost 45% of goods transport (in tonne-kilometres) was made by road, nearly 41% by sea, 8% by rail, 4% by inland waterways and finally 3% by pipelines. However, these figures exclude freight transport by air.



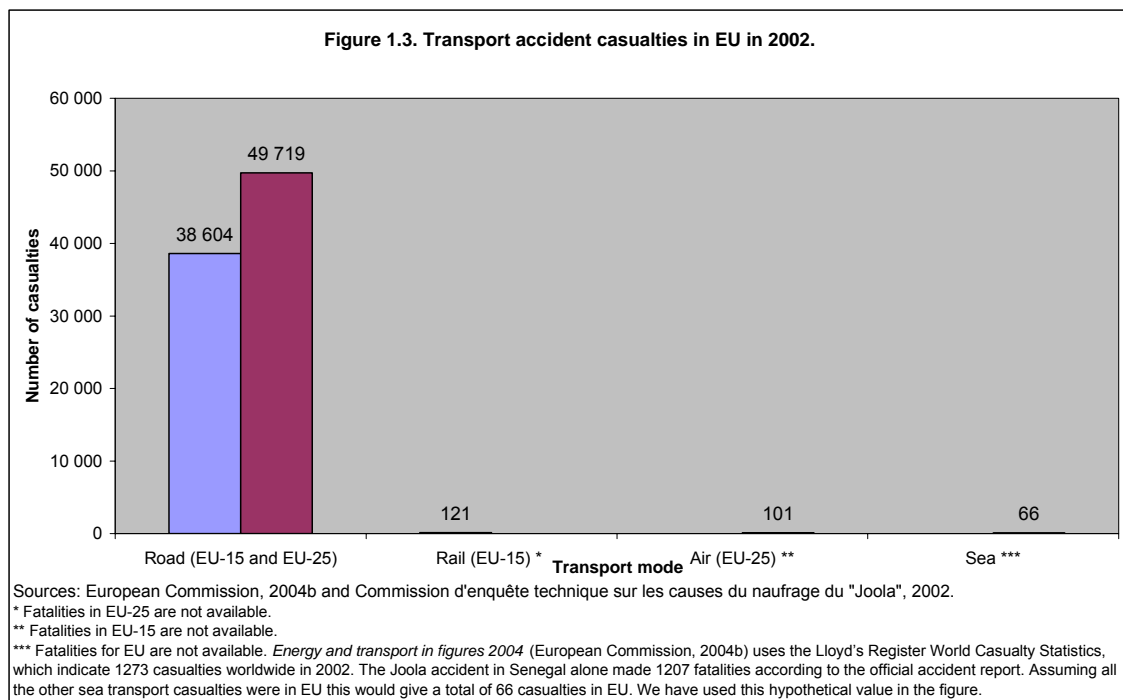
For passenger transport, in 2002 and inside EU-15, passenger cars accounted for 79% of passenger kilometres. Buses and coaches accounted for 8%, air for 6%, rail for 4% and tramways and metros for 1% of passenger kilometres.



When considering the private households consumption in EU-25, roughly 14% (€745 billion) of their total consumption was spent on transport. About one sixth (€124 billion) was spent on purchased passenger transport services, the rest (over 80% or €621 billion) on private transport, that is acquiring and operating “*personal transport equipment*” i.e. mainly cars (European Commission, 2004b).

On the other hand, road transport accidents in EU mean over 1,3 million accidents in which nearly 50 000 persons die every year (fatalities are defined as death within 30 days). Roughly 75% of these are inside the EU-15. In 2002, 49 719 persons were killed in the EU-25, 38 604 of which in the EU-15. In rail transport that same year, 121 passengers were killed inside the EU-15. Again, in 2002, 101 persons were killed in air transport accidents inside the EU-25. That year was particularly sombre for sea transport; 1 273 persons were killed throughout the world¹. The year 2003 was a lot brighter with only 197 victims, while the average between 1998 and 2003 is 526 victims per year.

¹ The figures in this paragraph come from the *Energy and transport in figures 2004* (European Commission, 2004b). For sea transport casualties, the Commission has used the Lloyd’s Register World Casualty Statistics. These casualty statistics take into account the total losses of ocean-going merchant ships over 100 gross tonnes (see <http://www.lr.org/services%5Foverview/shipping%5Finformation/is010lr%5Fsources.htm#casualty>; site accessed the 07 November 2005). In September 2002, Joola, a passenger ship from Senegal capsized off the Gambian coast, killing well over 1000 – some sources estimate that the actual number of killed is over twice that high. The report of the special commission; *Commission d’enquête technique sur les causes du naufrage du “Joola”*, published the 04 November 2002, less than six weeks after the disaster, available at http://www.au-senegal.com/actu/joola_041102.pdf (site accessed the 07 November 2005) puts forward a figure nearer to the lower end of the margin – 1220 passengers and 52 crew members, out of which 65 survived. The current official figure is 1863 fatalities (see http://213.41.65.178/tv5_12mn_afrique/tv5_specialus2.php?par=1&date=2005-09-28; site accessed the 07



In *Transport accident costs and the value of safety*, European Transport Safety Council (1997) stated that “road transport represents by far the greatest transport safety problem in all European countries with around 97% of all transport fatalities occurring in the road sector”. The figure for 2002 is roughly the same or even a little higher.

In addition to the 50 000 killed, there are some 3,5 million casualties per year. The cost of road crashes in the EU-15 is estimated at €180 billion, around twice the total EU budget for all activity, and in the EU-25 at €250 billion. In *Transport accident cost and the value of safety*, ETSC (European Transport Safety Council, 1997) further noted that “around 97 per cent of all socio-economic costs for transport accidents within the EU are made in road transport. This is mainly due to the large share of road transport compared to other modes and the much higher risk levels in road transport.”

A 1999 press release from ETSC highlights the fact that “road crashes are the second most serious cause of death and hospital admission for EU citizens, preceded by cancer and followed by coronary heart disease.” Furthermore, for Europeans under 45 years of age, road crashes are the most frequent single cause of death.

September 2005). The actual number of fatalities worldwide for 2002 is therefore even higher than what the *Energy and transport in figures 2004* puts forward.



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1.2. Road transport safety as a problem: examples from EU level and some member states¹

Road transport accidents have been recognised as a major problem at European level since the 1980s. 1986 was the European year of road safety. During the 1990s, the European Parliament placed road safety as a top priority for transport policy. In 1992 the Maastricht Treaty placed road safety clearly in the domain of the Community. The *Council Directive 91/671/EEC on the approximation of the laws of the Member States relating to compulsory use of safety belts in vehicles of less than 3,5 tonnes* was given on December 16th, 1991. In 1993 the first four-year “European Road Safety Action Programme” was launched and on November 30th, 1993, the Council (Council Decision 93/704/EC) created a road accidents database called Community database on Accidents on the Roads in Europe, now widely known as CARE.

1.2.1. France

In France, the annual Institut de Radioprotection et de Sûreté Nucléaire study (El Jammal & Baumont, 2005) on risk perception and security, shows that road accidents are seen as one of the main social problems placed in sixth position for several years now. Two thirds of the participants in the study consider that the level of road safety represents an important risk. For the transport of dangerous materials the percentage of those respondents considering it an important risk falls under 50%. The risk of a catastrophe or a major accident comes for 12,8% of the respondents from the transport of dangerous materials, while for 4,3% it comes from road transport. Only 1,8% of them name air transport and a mere 0,4% rail transport. Road transport is clearly perceived as the most important general transport sector problem.

The number of road accidents, as well as the number of people killed and injured, started to decrease considerably in 2002. Road accidents decreased by 9,7% that year, the number of killed by 6,2% and the number of injured by 10,5%. In 2003 the figures were even more impressive; they decreased respectively 14,5%, 20,9% and 15,9%. In 2004, the decline continued with 5,4% less accidents, 8,7% fewer killed and 6,2% fewer injured. The most remarkable aspect of this decline in road transport accidents is that there have been no major changes of legislation. The improvement of road safety relies on a tighter application of existing legislation and more efficient control of speeds, alcohol use and seat belt wearing.

1.2.2. Italy

In Italy, a study on risk perception published in the National Epidemiological Bulletin (*Bollettino Epidemiologico Nazionale*, 2004), points out a good level of

¹ It is worth reminding that the present deliverable does not claim to be exhaustive. The authors are from different EU member states –namely Germany, France, Italy, Netherlands, Finland and UK– precisely those member states which have been taken as examples in the different sections of this chapter. In other EU member states the actual situation is undoubtedly very different (in some better and in others worse) and the way in which the actual situation has come to be, differs in the same way from the examples given here. Again, our aim is simply to illustrate the idea that road safety investigation is not at the forefront of progress towards independent, systematic or at least representative accident investigation practices, and that there are some very good reasons to this state of affairs.

knowledge on road safety. 58,3% of the participants consider road accidents as the main cause of death for people under 40 years of age. The survey was carried out at the end of 2003. That same year an important change – the driving licence with penalty points – was introduced in the Highway Code. According to the study, Italians have become more aware of traffic circulation problems.

This measure – introduction of the driving licence with penalty points – has contributed to modifying driving behaviour. In fact, the year 2003 registered a decrease in the number of accidents (-3,2%), number killed (-10,0%) and number injured (-4,2%). The decrease of the number of accidents and of killed and injured persons, continued in 2004 with respectively 3,1%, 7,3% and 3,3% (ISTAT, 2005).

In Italy, about 614 accidents occur everyday, on average 15 persons are killed, and another 867 are injured. Although there has been a significant decrease in mortality due to road accidents, they still represent one of the main social problems, especially because most of these fatalities occur to young people (ISTAT, 2005).

1.2.3. Great Britain

Every year, around 3 500 people are killed on Britain's roads and 40 000 are seriously injured. In total, there are over 300 000 road casualties, in nearly 240 000 accidents, and about fifteen times that number of non-injury incidents.

This represents a serious economic burden; the direct cost of road accidents involving deaths or injuries is thought to be in the region of £3 billion (€4,4 a year). The 2004 figures show that the number of people killed or seriously injured had fallen by almost one third compared to the 1994-98 average, and provisional estimates show the slight casualty rate was 20 per cent below the 1994-98 average.

* * *

These examples show that road safety is taken seriously at all levels – individual, national and European – and continuous progress has been made in recent years in terms of number of lives saved and fewer injuries.

1.3. Evolution of road safety policies in a few EU member states

This section will give an overview of the evolution of road safety policies in three Member States: France, Italy and United Kingdom. Despite the national particularities, the political awareness of the importance of enhancing road safety clearly emerged in the 1980s. Before effective and efficient policies were acted, variable periods of time went by. The evolution of accident statistics show however that considerable progress has been made in the recent years.

1.3.1. France

As early as 1953, the French Economic and Social Council¹, issued recommendations in order to enhance road safety. It is striking to notice that some of these recommendations still sound quite contemporary. The Council recommended the conduct of an investigation, independent of the judicial investigation, into the causes of all accidents of a certain importance, in order to determine the appropriate measures for avoiding such accidents from happening again (Bamberger, 1953). As the Council has no legislative power, its recommendations went unheeded.

Well into the 1960s, road safety remained a purely technical issue. As road safety was not an issue of conflict, its political weight was close to nothing. The administrative, technical answer to the road safety problem (274 476 accidents with 16 617 killed and 388 067 injured in 1972) was the politics of black spots that lasted well into the 1970s. The roads were not safe – “*the road kills*” was the accepted expression – and needed to be improved (Systemans, 1987).

The next step was the idea that the vehicle kills. This idea paved the way for the obligation to wear seat belts in front seats, which came into effect in 1973. For two wheelers, the obligation to wear helmets was established in 1976. The importance of driver behaviour also started to receive attention. Laws from 1970, 1978 and 1983 set or tightened the limits of allowed blood alcohol level and organised controls. The first speed limits were introduced during the same period, in 1974 (Bray, 2003; Systemans, 1987).

In 1982, the road safety policy of the new government aimed at creating an intense social mobilisation that would institute the issue of road safety as a local political problem. One of the main features of this policy was the REAGIR accident investigation programme, which involved voluntary investigators working in locally organised structures. The activity of the voluntary investigators consisted not only of accident inquiries – all fatal accidents were to be investigated – but also focussed on campaigning for road safety in schools etc. The small amount of time actually spent by the individual investigators for these activities (up to ten days per year) was the consequence of the objectives of the national policy. The government wished to make the road users more responsible, and to inaugurate a whole new automobile culture. In practice, investigations were mainly conducted in case of highly emotional accidents and

¹ The Economic and Social Council is the third most important constitutional assembly of the French Republic. It issues recommendations and participates thus in the legislation process. It has no executive or legislative powers. Its members represent the nationwide economic and social interest groups.

or accidents receiving high media coverage (Bray, 2003). The effect of the governmental policies on road safety remained uncertain up until the beginning of the second term of the President Jacques Chirac in 2002.

In 2003 the newly elected President Chirac prefaced a book (Houchard, 2003) and noted on that occasion that

In spite of the stubbornly high and regular accident statistics, we have refused for a long time to consider road unsafety as a political problem. Road accidents have stayed in news in brief [of the local newspapers]. They are still too often considered as individual tragedies...

The political understanding of the reality of road safety has changed the vocabulary used by politicians and in the media, as well as the media coverage of the issue. Only a few years back “road safety” was the only widely used expression and accidents made it only to the local news. Since 2002, the political discourse tends to criminalise deviant driver behaviour (Bray, 2003). Road “unsafety” (*insecurit  routi re* in French) is widely used as an expression and the monthly figures receive national media coverage. Prime Minister Raffarin called the expression “road safety” a lie in September 2002 and added that the “right words” were “violence”, “crime” and “sometimes even manslaughter” (Raffarin, 2002). Later that same year, after a reckless driver had killed five fire-fighters, President Chirac evoked a “national scandal” and declared that “a civilised society could not tolerate barbarian behaviour on its roads” (in *Le Figaro*, 5 December 2002).

1.3.2. Italy

In Italy, the issue of road safety has been faced relatively late in comparison with many other EU countries. As a consequence of this delay, there are roughly 2 900 extra fatalities every year in Italy compared with the four European countries with the best road safety record (Sweden, Finland, The Netherlands and the United Kingdom).

During the 1980s the Italian authorities became aware of the road safety problem and of the necessity of catching up with other European countries. At the end of this period important changes were introduced in the Highway Code in order to improve road safety. For instance, the obligation to implement seat belts on motor vehicles and the obligation to wear seat belts in front seats were adopted respectively in 1988 and in 1989.

In the Highway Code of 1992, road safety education acquired a primary role. For the first time, road safety education is not seen only as a technical knowledge or as a training activity, but as a part of general education. Road behaviour is influenced by the affective life, ethics, social life and psychology of the persons. The political attention focussed more and more on the driver behaviour, for instance in 1999 the obligation for the two wheelers to wear helmets was established. Moreover, in 2001, the limits of blood alcohol level were tightened.

The first report to the parliament, in 1996, on Italian road safety demonstrated the necessity of having a rough plan of multi-sector interventions, in order to radically reduce the high number of road victims that characterizes Italy. This proposal was taken into consideration by the Parliament with law No.144 of

1999, that instituted the "Road Safety National Plan" (PNSS). PNSS set the overall objective of reducing the number of fatal accidents by 40% in a decade. PNSS also defines the objectives and the fields of intervention at the national level, and sets a triennial financing program for the interventions in order to improve road safety.

1.3.3. United Kingdom

Britain has had – relatively speaking – a remarkable success in reducing road casualties. And this is despite the vast growth in traffic since the beginning of the last century. In 1930 there were only 2,3 million motor vehicles in Great Britain, but over 7 000 people were killed in road accidents. Today, there are over 27 million vehicles on the roads but far fewer road deaths.

In 1987 a target was set to reduce road casualties by one-third by 2000 compared with the average for 1981-85. The UK has more than achieved this target for reducing deaths and serious injuries. Road deaths have fallen by 39% and serious injuries by 45%. As a result of this, the UK is now one of the safest countries in Europe (and indeed the world). Reductions in the last period were helped by marked changes in attitudes to drink-driving and legislation on seat belts. However, there has not been any such steep decline in the number of accidents, nor in the number of slight injuries, although improvements in vehicle design have helped to reduce the severity of injuries to car occupants.

The UK government launched a new 10-year target for road safety in 2000 to help focus on achieving a further substantial improvement in road safety over the next decade. By 2010, compared with the average for 1994-98, the UK wants to achieve,

- a 40% reduction in the number of people killed or seriously injured in road accidents;
- a 50% reduction in the number of children killed or seriously injured; and
- a 10% reduction in the slight casualty rate, expressed as the number of people slightly injured per 100 million vehicle kilometres.

The new targets will certainly be challenging. However, it is encouraging to see that in 2004, the number of people killed or seriously injured was 28 per cent below the 1994-98 average; the number of children killed or seriously injured was 43 per cent below the 1994-98 average; and provisional estimates show the slight casualty rate was 20 per cent below the 1994-98 average.

1.4. Transport safety: elements of comparison

As we saw in the Deliverable D4.1 (SafetyNet, 2005), civil aviation was most probably the first transport mode to benefit from effective safety oriented policies. Adequate legislation, investigation practices and investigating entities have nearly always been instituted for civil aviation first. Maritime and rail have followed, in some case very rapidly, but road transport still lacks similar legal framework. This section argues that there is a diverging perception of transport modes and of transport accidents at political decision-making level.

1.4.1. EU level

In the EU there are several directives addressing the issue of accident investigation for safety purposes for rail, air and maritime transports. In civil aviation, two specific Directives – *Council Directive 94/56/EC* and *Directive 2003/42/EC of the European Parliament and of the Council* – concern accident and incident investigation and occurrence reporting. In maritime transport, the *Council Directive 1999/35/EC* aims at promoting principles agreed upon within the International Maritime Organisation (IMO). The Directive addresses, among other things, the accident investigation. Finally, the *Directive 2004/49/EC of the European Parliament and of the Council* addresses the issue of rail transport safety – including rail accident investigation.

For road transport, there are no Directives on speed limits or on blood alcohol limits. In 2000, the number of road crash fatalities on European roads was still around 43 000 and political will had not yet been transformed into concrete measures (ETSC, 2000a). In March 2000, the Commission released a Communication detailing a set of measures aimed at reducing the number of casualties on European roads. However, ETSC press releases between 2000 and 2003 (ETSC, 2000b, 2001, 2002, 2003a, 2003b, 2003c), tend to show that road safety was still not the only political priority when it comes to road transport and car manufacturing sectors.

1.4.2. France

In the field of civil aviation, the Presidents of French National Assembly and Senate decided the January 13th 2004 to set up a fact-finding mission on passenger airline safety (report summary is available at http://www.assemblee-nationale.fr/12/dossiers/securete_transports.asp ; the subsequent proposals are available at <http://www.assemblee-nationale.fr/english/airline-safety.asp>). The mission was set up "as a result of the [Sharm el-Sheikh] catastrophe" on January 3rd 2004, causing the death of 148 persons, of which 135 were French. The foreword to the report (Assemblée Nationale, 2004) reminds that the aim of the mission was not to investigate the Sharm el-Sheikh accident itself. It was, "on the occasion of a tragedy that has marked the public opinion, to inform the parliament of the manner in which the safety of passengers in the air transport is assured". The introduction to the report notes that

every accident, as rare as it might be, causes always a genuine trauma in the public opinion. /.../ Perhaps the oversized media coverage of the emotion provoked by the aviation accidents is out of proportion in respect to the number of deaths, especially when comparing these figures with

those of the road transport. But the figures mean nothing to a person who has just lost someone dear...

On the occasion of the Prestige catastrophe that caused major environmental damage to the French coasts in November 2002 a parliamentary commission was set up with a mission to evaluate the efficiency and the degree of implementation of recommended safety measures concerning the maritime transportation of dangerous or polluting products (Assemblée Nationale, 2003). The introduction to the report is considerably less emotional than that of the report concerning the air transport security. The fact that the Prestige accident caused no human casualties can partly explain this.

Six months after the shock of the new oil slick, the mobilisation, national and international, is still strong. Nevertheless, just like three years ago, it could weaken rapidly once the crisis is over, the beaches cleaned up, and the urgency forgotten. /.../ The public opinion will not tolerate yet another accident like the two recent ones [i.e. Prestige and Erika accidents], of very old single hulled ships, transporting heavy fuel, near the French coasts.

The “tragic fire in the Mont Blanc Tunnel, March 24th 1999, involving a considerable number of vehicles and officially causing 39 casualties” (Assemblée Nationale, 2000), followed two months later by that in the Tauern Tunnel in Austria, sparked a study on “the resources necessary for improving the safety of French road and rail tunnels”. The tone of the introduction is quite neutral.

In an inventory made by the Centre for Tunnel Studies, of 21 tunnel fires among the most serious in the world between 1949 and 1998, 21 had for source at least one heavy goods vehicle, with collision or material incident. Fourteen of those accidents had casualties, and in 1999, at three month intervals, two accidents came to heavily increase the toll.

These three reports and a fourth, subsequent to the Erika catastrophe in 1999, are the only parliamentary reports initiated after a transport accident and dedicated to transport safety. It appears that parliamentary commissions have been charged with a mission to investigate safety issues after an accident that resulted in considerable loss of life or considerable damage to the environment. The scope of the event appears to be a rather decisive factor for seizing parliamentary commissions or offices to investigate. A comment made by the author of the fact-finding mission on passenger airline safety during an interview with a witness, demonstrates this primacy of *extraordinary* events. “We are facing a problem of aviation security that we always state in tragic terms. These accidents involve numerous persons, they can cause problems to the residents and they are a lot more spectacular than road accidents.”

1.4.3. Italy

In the last few years Italy has rapidly adapted European directives and other international requirements concerning transport safety. Different reports are regularly drawn up to inform the Chamber of Deputies and the Senate on Italian transport safety.

The legislative decree n.66 of February 1999 established the National Agency for Flight Safety (ANSV) according to the provisions of Council Directive 94/56/EC of 21 November 1994. For each investigation carried out, ANSV establishes a report containing safety recommendations and useful elements for the prevention. This report is addressed to the President of the Council of Ministers, who transmits it to the Chamber of Deputies and to the Senate, to the Ministry of Transport and Navigation and to the European Commission, as well as to the national and international civil aviation authorities (National Agency for the Civil Aviation, and to the International Civil Aviation Organisation).

After the aviation accident at Linate in October 2001, in which 118 persons died, a debate started on the organisation of the national civil aviation authorities. Several ministerial and parliamentary initiatives proposed organisational changes and guidelines for carrying out a reform of civil aviation structures. According to the study of the Parliamentary Commission, the Italian civil aviation structures proved to be very different from those defined by the ICAO.

In April 1991, 140 persons lost their lives in the fire caused by the collision between the ferry Moby Prince and the tanker AGIP Abruzzo. A judicial inquiry was opened, but after six years of proceedings the defendants were acquitted and the judicial investigation was closed. This led to the constitution of a Parliamentary Commission in November 1997 with the aim of investigating the collision causes. The investigation's objectives are however quite a lot broader: it responds to "*the necessary exigencies of truth, not only for victim's families, but also for the whole national community*". (Senato della Repubblica, 1998)

In the field of the railway transport, the ministry of infrastructure and transport monitors the owners and the service managers of the railway network. Every time an accident with injuries occurs, the ministry carries out an inquiry. The disaster in Piacenza in January 1997, that involved a Pendolino train and caused the death of 8 persons, raised the problem of the Italian railway system safety. Since then, several severe accidents have occurred. In March 1998, in Castello (Firenze) there was an accident that caused 1 fatality and 30 injured. In July 2002, in Sicily, an accident caused 8 fatalities and 30 injured. In October 2003, in Bologna, yet another rail accident caused 1 fatality and 127 injured. Finally, in January 2005, the railway accident of Crevalcore caused 17 fatalities and 80 injured. All these accidents shook the public opinion, which used to consider the railway transport as the safest mean of public transport.

Italy is in the process of adapting its legislation to the recent European norms, for instance on railway safety. Major transport accidents seem to speed up the process of adapting legislation and administrative structures. Transport safety is, however, still considered from the major accident point of view even by the legislative bodies.

1.5. Transport mode differences

In this section we will consider some of the differences between transport modes and propose to distinguish between public¹ and global transport modes on one hand and private and local transport modes on the other. While none of the transport modes fully fit into these categories, they constitute useful ideal types². They allow us to grasp at least some of the reasons why, in the case of public and global transports, the independence of accident investigation became an issue quite early. Conversely, they throw a light on the reasons why, in the case of private and local transports, the status of the investigation body has not emerged as a topic until recently.

1.5.1. Control and value of life

In Transport accident cost and the value of safety, ETSC (European Transport Safety Council, 1997) noted that

there is a little evidence, obtained from a study of willingness to pay for safety on the London Underground, that public transport passengers may be willing to pay about 50 per cent more for risk reduction measures on public transport than they would be willing to pay for risk reductions in road transport. This is mainly because they are willing to pay more for safety in situations where they perceive that they have no control over the risks.

Although there is very little evidence based on factual information, a rather wide consensus (see Boiteux and Baumstark, 2001) exists in favour of evaluating the cost of a fatality in a public transport accident 50% higher than a fatality in a private transport accident³. The fact that in case of public transport the

¹ Even though the use of an expression like “public transport activity” does not seem to raise any particular problems (see for instance European Transport Safety Council, 1997), few words should be said on the meaning of the adjective *public* attached here to *transport activity*. A public transport activity typically involves a great number of persons. It is accessible to anybody for transport purposes and it is scheduled. There is detailed information – such as times of departure and arrival – available on it, whether this information interests or is used by anybody or not. Furthermore, it is an activity related to the community’s interest. The involvement of a great number of persons does not necessarily signify passenger transport. In the case of freight transport, an important number of persons are in a way or another involved, although they are not all involved physically.

² The concept of *ideal type* is attached to the work of Max Weber and more recently to the phenomenological sociology.

An ideal type is, says Max Weber (1949: 75), formed by the one-sided accentuation of one or more points of view and by the synthesis of a great many diffuse, discrete, more or less present and occasionally absent concrete individual phenomena, which are arranged according to those one-sidedly emphasized viewpoints into a unified analytical construct.

According to Alfred Schutz (1967: 187),

Whenever we come upon any ordering of past experience under interpretive schemes, any act of abstraction, generalization, formalization, or idealization, whatever the object involved, there we shall find this process in which a moment of living experience is lifted out of its setting and then, through a synthesis of recognition, frozen into hard and fast “ideal type”.

³ ETSC report on *Transport accident costs and the value of safety* (1997) estimates that the total socio-economic costs per fatality are 3,6M ECU for road, 2,1M ECU for rail, 2,7M ECU for air and 9,8M ECU for water, in spite of the 50% higher valuation of life for public transport modes. This results from the fact that the report takes into account the total socio-economic costs of all transport accidents, whether they were fatal or not, and weights these totals by the number of fatalities. In waterborne transports, the high material and environmental costs of accidents, weighed by the relatively low number of fatalities makes for the

passengers are submitted to risks they have no way of controlling is certainly a major aspect for the higher willingness-to-pay value.

1.5.2. Familiarity and risks

Another facet is the familiarity with a mode of transport and the inherent risks. A riskier day-to-day activity might not receive the same kind of attention as an unfamiliar, yet statistically safer activity. Most people drive a car several times a week, but take a train, a boat or an airplane much more rarely. The experience gained as a driver or even as a passenger of a car usually teaches us that the risk of an accident is actually quite low – and most people get used to the irreducible amount of risk and do not even think about it most of the time. The same kind of experience is, of course, a lot more difficult to gain when it comes to other transport modes, in particular the air transport.

It is a well established fact that in road transport the actual risks rarely correspond to the perceived risks (Benda and Hoyos, 1983). The same is true for the social life in general; actions that we take do not rely strictly speaking on reality, but on the perception we have of that reality and of the context where our actions take place (Milgram, 1974) or on the way information is presented and the risks are formulated (Tversky and Kahneman, 1981). In that respect the actual risks and the perceived risks certainly diverge even more in public transports than in private (road) transport, and air transport is certainly the most ideal-typical example of this. A recent survey showed that over 50% of the French were most afraid of having an engine stop on flight, while only 2% were most afraid of pilots making an error. Flight safety statistics show of course that about 75% of aviation accidents result from a direct human error.

1.5.3. Public transport accidents and media visibility

Early September 2005, an aviation accident killed some one hundred and fifty persons on the island of Sumatra. This accident made the news in Europe (see for instance) and will most probably be considered an important event, when discussing the evolution of air transport safety. On the other hand, the information concerning the number of fatalities on Indonesian roads that same day (or any other day for that matter) probably did not make the news in Europe or anywhere else. Furthermore that information would certainly not be considered relevant when discussing the evolution of road safety (other than in Indonesia).

Nerb, Spada and Lay (2001) relate an analysis made by Greenberg, Sachsman, Sandman and Salomone (1989) on television reports about anthropogenic environmental risks in the US. Accidents were extensively covered, but the probability of the event was not crucial for determining what to cover. The authors counted “*seven times as many reports on airplane crashes than on risks associated with smoking, although the latter contributed 26.5 times more to the number of fatalities in the same period of time.*” Accidents that occur rarely but kill numerous persons receive a better coverage than common ones – common meaning accidents that happen often and kill only a few persons.

extremely high value of a transport fatality. Even with 50% higher willingness-to-pay value for a fatality in air and rail, the total socio-economic costs for a road fatality remain 30% to 70% higher.



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

Nerb, Spada and Lay (2001; see also Slovic, 1999, for an analysis of the visibility and the weight of negative and positive events in nuclear industry) point out that the entertainment value of an accident is dependant on its importance. A catastrophe has superior entertainment value than a routine accident, which in turn has superior entertainment value compared to an incident. Reports on how such events could be *prevented* are the least entertaining.

1.5.4. Global character of public transports

In the preceding sub-section we took a recent aviation accident as an example. We could have as well referred to a recent maritime or rail accident – such as the rail accident that killed over 100 persons in Andhra Pradesh, India, the October 29th 2005 (see for instance http://news.bbc.co.uk/2/hi/south_asia/4387474.stmh). A rail or maritime accident that kills or injures a considerable number of persons or causes significant environmental damage – such as the Prestige accident in November 19th 2002 off the Spanish coasts (see for instance <http://news.bbc.co.uk/2/hi/europe/2487739.stm>) – will similarly make the news worldwide. However, global news coverage of public transport accidents is just the tip of the iceberg. Public transport modes are global by nature.

If we consider air transport (taken again as an ideal-typical mode of public transport) it is rather easy to recognise the international aspect of the industry. The development of financially viable air transport operators was from the very beginning –except for a few demographically and geographically important countries such as the United States of America– synonymous of operating international routes. The development of commercial air routes and therefore of the industry as a whole, was until quite recently, entirely dependent on the will of sovereign Governments to grant commercial operating rights to foreign companies. As the Chicago Convention's first article proclaims, "*The contracting States recognize that every State has complete and exclusive sovereignty over the airspace above its territory*".

Civil aviation and air transport is therefore essentially an international and public activity. International is not all there is to global though. Giddens (1990: 64) defines globalisation "*as the intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa.*" In this sense anything that concerns air transport is global. An air route (but the same applies to rail and maritime routes) links distant localities in multiple ways. Even before an airplane may depart, the pilots must know they will be able to land at destination and pass all the intermediate points on their route. On its arrival, the passengers will continue their journey with taxis, coaches and trains that are there, knowing this particular flight was to arrive. The flight had been scheduled, probably months in advance, perhaps on the other side of the globe and had it been cancelled, those waiting for it to arrive would have modified their plans accordingly.

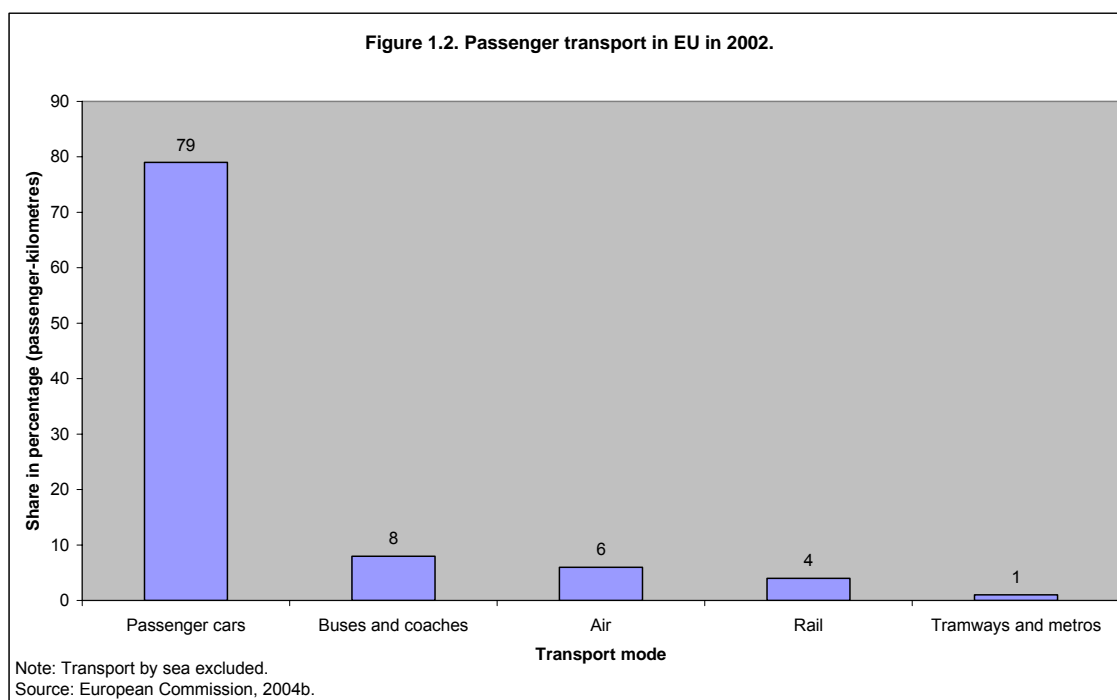
Therefore, in the first place, public transport modes connect across distance in a very routine manner. An international airline connects cities in different countries several times a day. Exotic products transported by sea can be found in the nearest grocery store. As such, this kind of globalisation hardly makes the news. It is when something extraordinary takes place – like in spring 2005,

when clothes imported from China seemed to create a threat to European clothing industries – that media will seize the issue. Major transport accidents are by definition¹ extraordinary events and will thus be covered by the media.

1.5.5. Road transport as private and local activity

If we turn now towards road transport, we see that it is typically a private and local transport mode, while air –and to a slightly lesser extent, maritime and rail– are public and global transport modes.

First of all, road transport is mainly a private activity. As seen earlier passenger cars accounted for 79% of passenger kilometres inside EU-15 in 2002, while buses and coaches accounted for only 8% of passenger kilometres.



Another important figure is the transport oriented private household consumption in EU-25. Over 80% of this consumption was spent on private transport; less than 20% on transport services.

Road transport is also local in a very basic sense. According to the UK's Department for Transport/National Statistics 2005, 41% of all journeys and around a quarter of all car trips made in Britain in 2002/03 were less than 3 kilometres in length. In France, 47% of all journeys by road (public transports, motorcycles and cars) take less than 15 minutes (Gascon, 2001). The average duration of a journey in motorised road transport was 29 minutes in 1991. The average distance of a journey in a car was 5,8 kilometres, while 52% of all car

¹ Accident is usually defined as something which happens unexpectedly and unintentionally. The New Britannica/Webster Dictionary & Reference Guide (1988: 6) defines accident as

1 a : an event occurring by chance or from unknown causes **b** : lack of intention or necessity : CHANCE (we met by accident) **2** : an unintended and usually sudden and unexpected happening and especially one resulting in loss or injury (an automobile accident) **3 a** : a non-essential property : ATTRIBUTE **b** : a chance circumstance (the accident of noble birth) /.../

trips were less than 3 kilometres in length (Athis-Mons, 1999). 66% of all car trips are less than 5 kilometres (Jung, 2001).

When it comes to accidents, they tend to happen in well-known locations, not very far from the point of origin of the journey. Based on the Rhône Road Trauma Register (Observatoire national interministériel de sécurité routière, 2004), that has collected exhaustive injury data from all Rhône *département* hospitals since 1996, as many as 89,8% of accident victims reside in the *département*, further 6,7% in the bordering *départements*, 3,0% in France and only 0,5% outside the national territory¹.

Even the large majority of public road transport, that is passenger and freight transports, remain quite local, when considering the distances. Distances up to 200 kilometres count for 80% of all goods transport (Isabelle Maître in Friends of Europe, 2005). In France, freight is transported the average distance of 109 kilometres. Broken down by transport mode, the average distances are 92 kilometres by road, 362 by rail and 107 by waterways (Bahgat-Farag et al., 2001).

Finally, road transport is local as opposed to global transports, which interconnect distant localities. A road is indeed quite different from a commercial air route, maritime route or rail track. The latter are used for transporting goods or persons from a locality to another in a quite organised manner, while the traffic on roads consists of a multitude of trips decided and undertaken individually in their smallest details. The difference is palpable when reading articles about transport accidents. For the public transport modes, the information on the connected localities is usually given. For the plane crash in Indonesia, mentioned above, *Le Monde* of September, 6th 2005, wrote: “*The Boeing 737-200 had just taken off from the airport of Polonia, in direction of Djakarta*”. The BBC internet page (<http://news.bbc.co.uk/2/hi/asia-pacific/4214452.stm>) gave the same information. For road accidents, the only indicated locality is usually the place the accident happened or the nearest city.

¹ Rhône *département* covers an area of 3 303 square-km for a population of 1 578 869 habitants (in 1999). Rhône is therefore a high population density (478 inhabitants per square-km) *département*. Rhône is also situated at the junction of two major axes: motorways A6 and A7, which link northern France and the Mediterranean Regions – and beyond the French borders, the northern Europe to Iberian peninsula on the one hand, the British Isles and Benelux countries to Italian peninsula on the other. Intuitively one might think that the intense through traffic would show in the accident statistics and yet, 96,5% of the victims are undoubtedly in a familiar road environment.

1.6. Transport safety, trust and independent accident investigation

In this section we shall argue that the passengers' trust in transport safety, and specifically in those representing the transport system, is fundamental for the normal functioning of public transport modes. Any conflicts of interest that the investigating body might have, could have adverse effects on an accident investigation and, should this become known, could have disturbing consequences to the industry in terms of loss of that necessary element of trust and subsequently in terms of declining demand. The establishment of independent investigation bodies is therefore a means of assuring that public transport accidents are investigated in the most impartial manner.

1.6.1. Trust and transport safety

Public transport accidents are rare, but when such accidents take place they can be quite costly in lives. Accidents receive high media coverage and contribute in some occasions to create something close to a psychosis. An Agence France-Presse dispatch, dated September 26th, 2005, quoted a representative of Corse Méditerranée (CCM), a French regional airline, who declared after a minor incident involving a CCM plane, that “[t]here is a sort of a syndrome in aviation, which tends to transform the smallest incident, giving it an importance completely out of scope.” This of course results from the general difficulty of assessing the actual risks. Efforts that are made in the aviation sector for enhancing safety have an effect, which therefore has to be considered also as an objective: convince the public that all is accomplished in order to enhance the actual level of flight safety (Stoop, 2003).

In *Cost effective EU transport safety measures*, ETSC (2003d: 8) indicates quite clearly that should the public loose faith in the safety of air transport system, this would lead to a decline in demand for air transport.

[T]here is an increasingly broad consensus on the need to improve safety, such that the absolute number of accidents per year does not increase. This is considered necessary to prevent that increasing numbers of accidents lead to a perception of deteriorating safety and a subsequent decline in demand for air travel.

From a lay-person's point of view, the calm and professional attitude of the cabin crew is the only tangible proof, when boarding or inside the plane, that the complex system of air transport as a whole is safe¹. Knowing that air travel is statistically speaking the safest mode of transport, is interesting, but it does not permit the establishment of a trust relation, which is necessary when a

¹ An article in *Los Angeles Times*, dated September 28th 2005, “Attendants object to ‘Flightplan’”, by Mary McNamara, relates the hostile reaction of three flight attendant associations towards *Flightplan*, a recent Hollywood movie by Robert Schwentke.

With security concerns what they are, it is not a good time to release a film with a terrorist in the position of flight attendant, said Corey Caldwell, from AFA-CWA (one of the three trade unions). There has to be a layer of trust between the passengers and the crew, to ensure good communication during times of emergency, and a film like this undermines that trust.

passenger has to abandon all idea of control over the system he is in¹ (Giddens, 1990). Independent investigation bodies whose sole mission is to “enhance safety”, play undoubtedly an important role in building up public trust in transport safety. Their independence is a powerful argument in favour of the credibility of their expertise, in the absence of the necessary qualifications to judge their work. (Pages and Bastide, 1987)

1.6.2. Adverse effects of conflicts of interest

In *Independent Accident Investigation—The right of Each Citizen and Society’s Duty*, Pieter Van Vollenhoven (2002) notes that if investigations are carried out by the involved parties, such as the safety regulation authority, these might be tempted to conceal any embarrassing information, discovered during the investigation. Therefore the investigation must be separate from all interests but safety. Most accident investigation bodies rely, in the conduct of their investigations, on resources not entirely their own. This is the case for instance for the U.S. National Transportation Safety Board. *Safety in the Skies* (Sarsfield, Stanley, Lebow, Etedgui and Henning, 2000: XXIX-XLVI) a RAND² study on the NTSB, identifies the main challenges the agency (but this applies to any investigation body using a system similar to NTSB party process³) is currently facing. The study highlights the possible adverse effects of conflicting interests.

The NTSB enjoys a reputation for technical excellence and unquestioned independence throughout the world. /.../ Over the long term, however, RAND believes that the NTSB’s ability to sustain both excellence and independence cannot be ensured. /.../ The party process presents inherent conflicts of interest for entities that are both parties in an investigation and “parties defendant” in related litigation. Indeed, RAND has found that, at least in certain types of complex accidents, the party system is potentially unreliable and party representatives may be acting to further various interests beyond just the prevention of a similar sort of accident. Such potential conflicts may, in some instances, threaten the

¹ As Giddens (1990) points out, such expert systems are an intrinsic feature of modernity and it would be quite difficult to opt completely out of them. Even a private car is an expert system and the introduction of cruise control, ABS, EPS, GPS etc. destined to facilitate and make road travelling safer, increase that aspect. The mechanic, who does the service, is most certainly an *access point* to the system (car). However in the case of a private car, the driver, along with the co-pilot who indicates directions, is also an access point to the larger road transport system. Nearly all those in contact with cars and road transport system as a whole, have some knowledge of the functioning of the involved systems. This “hidden curriculum”, which is generally lacking for air transport, makes it easier to trust the systems will function correctly, even if somebody else (access point) has the actual control over the operations. For those who have absolutely no knowledge on how a car and the road transport system works, the situation may be quite difficult, as it is usually for those taking an aeroplane for the first time. They have to accept not being able to control any aspect of the situation. In case of private road transport, this is in most cases facilitated by the existence of a personal trust relation with the driver – a relation that is not limited to the situation of transport. The ignorance of the lay-person (the lack of “hidden curriculum”) on how the air transport system (again as an ideal-typical example of public modes of transport) functions, is source of distrust or even fear (Giddens, 1990: 83-92). All this blurs somewhat the awareness that private road transport is a far more dangerous mean of transport than any of the public means of transport.

² “The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world.” (<http://www.rand.org/about/index.html>)

³ NTSB investigations usually rely on “Party process”; aircraft manufacturers, administrations, air carriers participate to the investigation process. For more information, see SafetyNet deliverable D4.1 Bibliographical analysis, pages 12-15.

integrity of the NTSB investigative process, raising numerous questions about the extent to which party representatives are motivated to influence the outcome of the safety-related investigation in anticipation of litigation. ...[W]hen the economic stakes in an accident are especially high, as they increasingly are, a greater risk exists for the party process to falter. /.../ The equivocal nature of the party process historically has been balanced by the NTSB's technical leadership; any potential erosion of the NTSB's base of expertise and any challenge to the strength of its professional staff are of great concern.

In Europe, the recent debate about the conclusions of the French Bureau d'Enquêtes et d'Analyses (BEA) investigation on the accident of Concorde (Bureau d'Enquêtes et d'Analyses, 2002) has again raised questions on how independent the BEA *really* is. As Concorde no longer flies, the BEA could hardly be accused of protecting the manufacturer's economic interests. However, the possible consequences –including a fuel tank rupture – of a tyre break were first considered in 1979, after a series of incidents, the most serious of which took place at take off in Washington in June that year¹. At that time, only minor structural changes were requested to be made to the plane. The history of De Havilland Comet is even more interesting from this point of view. The official investigations into the causes of the first Comet accidents concluded to pilot errors. Pilot associations, who felt that information was being held from the public in order to protect the airplane and the manufacturer, contested these conclusions². Further investigations concluded ultimately to a design fault.

1.6.3. Independence as quality assurance

The independence from the judicial inquiry –and all other sources of conflicting interests– is widely considered as a precondition for successful safety investigations. Some specialists even seem to prefer the term independent investigation to safety investigation or accident investigation.

[W]e are talking about two entirely different methods–independent and judicial–with a completely different legal framework for the independent investigation. I have many reasons for feeling so strongly about the need for independent investigations–transparency is one reason. Safety is a complex subject in all business sectors and is beset by many conflicting interests. (van Vollenhoven, 2002)

Whatever the term chosen, an investigation, legally separate from judicial inquiry, into the causes of an accident, with sole purpose of enhancing transport safety is “*the only way to establish exactly what happened and by establishing exactly what happened, [it] put[‘s] an end to any public concern in the aftermath of the accident.*” (van Vollenhoven, 2002)

The stakes are indeed quite high in aviation – but the same is true for a high profile sea event or an important rail accident. One single accident can result in

¹ See www.airandspacemagazine.com/ASM/Mag/Supp/AS01/Concordance.html for a passenger's statement prepared for the NTSB. Site accessed 29 September 2005.

² See for instance <http://www.softdata.co.uk/forums/index.php?showtopic=62> for the Comet history. Site accessed the 30 September 2005.

grounding of an entire fleet¹ and compromise the career of the plane as well as the survival of the manufacturer. In such circumstances the independence of the investigation body is clearly a necessity, so that safety remains the only priority. A single road accident, on the other hand, seldom has such dramatic consequences². The conflict of interests, which is possible in any public transport accident investigation, intervenes rarely at single accident level in road transport. Furthermore, the investigating entities, conducting studies on road accidents, usually work on aggregated data – and even when they work on single accidents, the aim of the case study is rarely to find out the actual causes of the accident.

¹ The Comet fleet was grounded the first time after 3 fatal accidents and the second time after 1 fatal accident. The US DC-10 fleet was grounded after just one fatal accident in Chicago in May 1979.

² There are of course some obvious exceptions. A major bus accident, accidents involving new equipment (like cruise control) or accidents involving public personalities are examples of a high profile road accident. An accident investigation into the causes of that kind of high profile event, that has no special status could easily suffer from conflicts of interests. Such accidents should therefore be investigated as major accidents by an independent investigation body.

1.7. Independent and interrelated investigation bodies

The independence of the investigation body is vital in that it shields the investigations against outside pressure. Indeed, it protects the impartiality of the investigation body. However, there is no reason to link the *quality* of accident investigation exclusively to the independence.

1.7.1. Interdependence and quality in aviation accident investigation

In civil aviation, for instance, the role of international standards is undoubtedly very important. In civil aviation in general and in accident investigation in particular, the degree of international codification is high. The Annex 13 to the Convention on International Civil Aviation, adopted in 1951 (ninth version was adopted in 2001), sets out the obligation for contracting states, to conduct investigations into the causes of aviation accidents. Annex 13 provides the standard format for all aviation accident reports. All accidents and incidents are investigated roughly in the same manner worldwide. A BEA investigator, interviewed in December 2004 stated that

Independence and interdependence mean the same thing here. There could not be two separate systems – one international and another one national – in any State. It would be impossible. The international system has priority over what exists at national level.

In addition to the ICAO standards, which apply to all investigations, civil aviation safety relies also on international cooperation. Indeed, there are usually several investigation teams from different countries working on one event. In the case of Sharm-el Sheikh accident, the investigation is led by the Egyptian investigation body, while the NTSB (USA) and the BEA (France) assist in the investigation. The cooperation between the investigating bodies emphasizes the importance of the international requirements set for safety investigations.

1.7.2. Major road accident investigation

Road accident investigations are seldom conducted in circumstances which are normal in aviation or other public transport modes. The decree organising the French *BEA*mer and BEA-TT, respectively responsible for investigation of all maritime and all land transport accidents (Ministère de l'équipement et des transports, 2004) specifies that the authorities shall notify the investigation bodies in case of events, accidents or incidents that seriously endanger the security of persons, especially when these events involve transports assured by *professionals*. Road accidents that have been investigated by the dedicated safety investigation bodies in Finland and in France, involved one or several of the following elements: transport by professionals, several fatalities, fire and tunnel. In every case the accidents involved either a public transport such as a coach or a particular road infrastructure such as a tunnel.

1.7.3. Routine road accident investigation

The routine type of road accidents receive another type of treatment and will (or will not) be investigated by the existing, usually not dedicated, investigation bodies. Their investigations are not submitted to the same type of acute pressure as in the public transport modes. These investigation bodies base their work on large data sets, rather than on individual case studies. As for the

investigating bodies in public transport modes, the quality of the work of these road accident investigating entities does not rely solely on their legal status, but also on their professional competence.

1.7.4. Interdependence and quality in road safety research: a European example

As for civil aviation, where the international cooperation enforces the independence of the investigation bodies, the construction of a European road safety community leads to set and enforce common standards in terms of investigation practices. Standardisation of Accident and Injury Registration Systems (STAIRS), a 4th framework project, co-financed by the European Commission, which ran from October 1st 1996 to December 31st 1998, brought together partners from France, the United Kingdom and Germany. The objective of the project (STAIRS, 1991) was to contribute to "[a] single European-wide crash injury database, or a compilation of individual, comparable databases". The STAIRS protocol

is intended to facilitate rather than restrict any investigation, so it does not prescribe a particular approach that must be adopted in every case. Rather it provides a set of requirements, for the final datasets in particular, in terms of core variables and the case selection criteria that will lead to comparability of datasets. This will bring about a European-wide agreement on how to collect this type of information, and if followed, will lead to comparable databases being held in each country that adopts and follows the protocol developed.

In other words, the protocol sets some basic, common rules that apply for data produced at local/regional/national level, in order to assure the comparability of that data at European level. It is noted that "[d]ifferences in methods are likely to remain as they are a consequence of local practicalities as well as technical precision, but these can be overcome." The differences concerning the legal framework, ethical aspects and the main study objectives are also pointed out. However, "a close degree of control over the case selection procedure... offers a good basis for future comparability." Beyond the technical quality of the data, the report mentions another aspect of the data quality, which is called *user quality* and defined as "the ability to answer questions that will be asked of it".

This area of quality is determined by the prevalent areas of investigation current at the time, which is in turn dictated by the overall aims of the funding body concerned. In order to be of use, a common database must have datasets from its contributors that cover all the relevant areas of interest, both political and social, to such a level that it can provide useful information on any query that may arise.

The STAIRS project proposes a protocol, which is not specific to any of the original research teams, but which can be used by them and any other research team desiring to do so. The differences concerning the methods, the original study objectives or other local particularities do not affect the overall comparability. The resulting data is not specific to the local contexts. The data is produced in accordance with the STAIRS protocol. STAIRS is of course just one example of the different processes that contribute to the creation of a properly European road safety community.



1.8. Conclusion

The aim of this first Chapter was to explain the causes of the considerable difference in accident investigation practices between road transport and other transport modes (SafetyNet, 2005). The different aspects of transport mode characteristics grasped in this Chapter show that road transport in itself differs from the other transport modes. This means that the investigation of transport accidents cannot and need not always be conducted in the same manner in all transport modes. The independence of the investigating body is essential in public transport modes, but in most circumstances this is not the case for road accident investigation. Nevertheless, while independence is not as crucial for road accident investigation bodies, it remains an objective worth striving for.

While some accident investigation specialists extend the notion of independence to describing accident investigation processes and the results of those processes, we feel it would better to limit its use for characterising the status of the body, that of the persons carrying out an investigation and that of the investigation process. There are, however, some other important notions that emerge at this point. We have seen that in case of a major accident, the investigation bodies rarely investigate completely isolated. In case of a major transport accident, independent accident investigation bodies usually cooperate with other such bodies from foreign countries. The cooperation of several investigation bodies further safeguards the investigation processes and the subsequent results against possible remaining sources of bias.

Such relations made of teamwork and mutual control constitute a variant of the more general notion of transparency. An accident investigation, placed under the auspices of transparency will be perceived as more impartial than a non-transparent investigation – and chances are that it will also be more impartial. In Europe, the creation of a genuinely European road safety community, through projects like STAIRS, PENDANT or SafetyNet to mention but a few, contributes to advance both road safety research (including accident investigation for safety purposes) and transparency. National research teams gain from the experience of other investigation bodies, common methodologies are put in place and research and investigation results are placed under wider expert scrutiny.

The importance of this wider expert scrutiny must not be underestimated, but it is not sufficient by itself. Public trust in the safety of transports is not on solid ground unless the public availability of relevant safety information is guaranteed and effective. This aspect of transport safety is not directly our concern in this deliverable; however it is an important matter and linked to the issues of independence and transparency. We will have the occasion to come back to it in further deliverables, for the time being we shall restrain ourselves to the few short and general comments formulated above and in the general conclusion (Chapter 5) of the present deliverable.

2. How to evaluate database transparency?

This Chapter exposes the different aspects of database transparency. Compared to the checklist for evaluating the structural, financial and functional independence of an investigating body (SafetyNet, 2005), the present list is quite a bit shorter – there are nine questions that need to be taken into consideration – but the questions cannot be answered by a simple yes or no. The objective of the list is however quite similar to the independence checklist. The answers will point out which aspects contribute to move the database away from the optimum transparency. The questions cover domains which may all receive one or several WP4 recommendations in the future.

The questions for evaluating the transparency of a database aim to grasp the whole span of issues from the purpose of the data collection to the use of the data. Below each question there are three letters: (a) contains the ideal answer to the question (i.e. the answer that would assure the database the greatest transparency possible), (b) enumerates some possible answers to the question, and (c) names issues that could prove central for judging the quality of the database.

Our task is not to judge the actual quality of the databases reviewed in this deliverable, but to evaluate to what extent they are transparent, that is to determine whether (or how easily) an assessment of quality could be made. Our efforts were therefore focussed on clarifying for each of the reviewed databases the actual practices and state of affairs (b), in order to estimate how close to or far from (a) these are.

1. Why is data collected?

- a. All safety enhancement purposes: policy, follow-up, research, safety investigation.
- b. Purpose of the database: policy; research; safety; development.
- c. Key issues: *comparability of the data in time and space*. The comparability in time and space is assured by using the same or a comparable data collection methodology over long periods of time and in various locations (localities, regions or states) respecting the sampling scheme.

2. Who collects the data?

- a. Professional safety investigators from a dedicated independent investigation body or research institute.
- b. Professional or non-professional safety investigators from dedicated investigation body, specialised research institute, police or other entity.
- c. Key issues: *status, qualification and experience of the investigators and status of the entity*. The status – structural, financial and functional independence – of the data collecting entity should be assessed. The breadth of expertise, qualifications and experience of the investigation team must be evaluated.

3. How is data collected?

- a. Following a transparent (i.e. standardised European) methodology

- b. Transparent method; local method(s); as part of routine police activity.
- c. Key issues: *methodological transparency – sampling scheme*. The evaluation should assess the robustness of the sampling scheme and the actual accident investigation practices; whether data is collected on the scene, on time or retrospectively. Is data collected properly and is all necessary data collected?

4. How is data manipulated?

- a. Data is manipulated by the above mentioned safety investigators following appropriate statistical techniques.
- b. Data codified by investigators; by others; data re-codified.
- c. Key issues: *methodological transparency – interpretation of source data*. The evaluation should assess the risks of possible bias due to codification problems, whether the data is codified by the investigators or by others.

5. Who pays for the data collection?

- a. Dedicated independent investigation body or research institute.
- b. Dedicated investigation body, research institute, manufacturer or other entity.
- c. Key issues: *status of the entity and methodological transparency*. The status – structural, financial and functional independence – of the entity should be assessed. Questions 1, 2 and 3 need to be reconsidered. Is data collection a continuous activity?

6. Who pays for the database maintenance?

- a. Dedicated independent investigation body or research institute.
- b. Dedicated investigation body, research institute, manufacturer or other entity.
- c. Key issues: *status of the entity and methodological transparency*. The status – structural, financial and functional independence – of the entity should be assessed. Questions 1, 2 and 3 must be reconsidered. Is the database for a one-off use or is it maintained for longer periods of time?

7. Who owns the data or controls access to it?

- a. Dedicated independent investigation body or data is public
- b. Dedicated investigating body, research institute, manufacturer or other entity.
- c. Key issues: *One or several data owners – the entity or entities controlling access to the data*.

8. Who uses the data?

- a. Dedicated independent investigation body and other research institutes.
- b. Dedicated investigation body, research institute, manufacturer or other entity.
- c. Key issues: *status of the entity and methodological transparency*. The status – structural, financial and functional independence – of the entity should be assessed. What kind of data – disaggregated

or aggregated data, knowledge – is used? The strength of interpretation and analysis should be considered.

9. Data and knowledge availability?

- a. All data (facts and analysis) is available for "counter-expertise".
- b. Source or raw data, basic data, i.e. dis-aggregated data or facts; aggregated data or knowledge i.e. analysis.
- c. Key issues: *possibility to conduct further analysis on the data or to check the results*. Existence of publications; the level of access to the data and subsequent knowledge – language and technical difficulty should be assessed. Is knowledge disseminated and in what way?

Some of the questions concern directly or indirectly the organisations that intervene in the process of data gathering or database maintenance. The main concern here is the availability of information (transparency) and not the evaluation of the actual quality of a database. Therefore the status (independence or lack of independence) of those organisations is not a central issue for this deliverable.

The checklist for evaluating the structural, financial and functional independence should of course be used for any quality evaluations. However, it should be remembered that the checklist does not give a straightforward answer that would allow judging an investigation body 100% independent, 50% or 10% independent, or even not independent at all. It simply identifies possible sources of conflicts of interest.

As already pointed out, our task is not to evaluate the quality, but to assess the transparency of some national and European databases. However it must be remembered that database quality cannot be assessed out of its context. Databases are designed to answer particular questions and their quality is measured by the precision with which they answer those questions. Therefore database quality is an issue that cannot be determined in a general manner but on a case by case basis. The criteria for judging depend on the questions to be answered rather than on some general considerations.

3. National databases

In this Chapter, we will review databases from Germany, France, Italy, The Netherlands and Finland. There are two categories of databases: the official national databases, based on police information, and other public databases.

The first databases contain the official road safety data for each of the participating Member State. On European level, the data included in CARE database (see section 4.1) is extracted from these national data.

The second category is less clear-cut. Some of the reviewed databases are quite official and essential aspects concerning the data collection, database maintenance and its purpose are defined by law. This is most obviously the case for the VALT databases in Finland. Some other databases, while they contain data gathered by the police forces, are not public.

All the databases reviewed in this chapter claim however to be representative on their respective national territory.

3.1. Germany: STBA – Federal Statistical Office

1. Why is data collected?

In Germany traffic accidents are largely documented by the police. Evidence is collected for the forensic experts as well as for federal statistics held by Statistisches Bundesamt (STBA). Federal statistics are established on traffic accidents on public roads. The recording criterion is at least one tow-away vehicle as a result of the accident.

2. Who collects the data?

The accident data is collected by the responding police officers. Road accidents are investigated by the police of the respective region. In some major cities there is a special police unit (VUD Verkehrsunfalldienst) usually with specially trained officers that only deal with traffic accidents. In case the VUD is present at the accident scene, they collect the accident data.

3. How is data collected?

Every time a road accident occurs and the police are informed, they have to investigate the accident. The accident is investigated on scene and specific data is noted. The accident investigation results in a police report, which is written on a computer with a standardized program. Thus a police report always contains the same set of basic information but can have additional information. In some states for example there is information about airbag deployment or seatbelt use which may not be there in other states. The data collected in the reports includes information about:

- the vehicles (vehicle data, basic damage information etc.),
- the environment and the weather (road and traffic information),
- the involved persons (age, sex, basic injury information, drivers license, alcohol, drugs, etc.),
- the accident scene (in major accidents also a photo report),
- and the circumstances of the accident.

The legal basis for the collection of accident data is the law on the statistics of road traffic accidents (Statistik der Straßenverkehrsunfälle) dated June 15th, 1990 (BGBl. I 1990, 1078). According to the law, statistics cover those accidents, where persons died or were injured due to traffic on public roads and squares or where material damage occurred.

According to the law on traffic accident statistics (Straßenverkehrsunfallstatistikgesetz) last modified in October 2001 (BGBl. I 2001, 2785) only accidents involving vehicle traffic are recorded. Therefore accidents involving only pedestrians are not included in the federal statistics. Until December 31st 1994, an accident with severe material damage was defined as an accident where the material damage exceeded the limit of 4 000 DM (≈ 2 000 €) for one participant. Since then the criteria is at least one tow-away vehicle as a result of the accident.

The accident causes have been registered since 1975 according to the valid protocol of causes by the recording policemen, according to their assessment in the police report.

4. How is data manipulated?

After the accident investigation, specific data on the accident are entered into the police database. From there the data is transmitted to the federal office of statistics.

In the state of Lower Saxony the police feed the database within the computerized information system called NIVADIS from these accident reports. This database contains information about all issues of the police work including also criminological events and one section of the database is created especially for traffic accidents. The other federal states have similar databases.

5. Who pays for the data collection?

Each federal state of Germany is financially responsible for the police. Therefore accident investigations are financed by the corresponding federal states.

6. Who pays for the database maintenance?

The database of the STBA is maintained and financed by the federal government budget.

7. Who owns the data or controls access to it?

The data is owned by the STBA.

8. Who uses the data?

The data is used by the federal government for monitoring the development of road traffic and for policy making.

9. Data and knowledge availability

General, aggregated data is available to the public and is published in annual reports by the STBA. Information can also be accessed via internet. In-depth, disaggregated data is available only to organisations that meet the strict requirements of the law on data protection. Additionally selected accident data is given to the international network of police reported accident data IRTAD.

Basic information on the STBA database can be found on the internet at www.destatis.de. However, in-depth information about the STBA database is only available by contacting the STBA itself.

3.2. Germany: GIDAS

1. Why is data collected?

Accident trends are presented annually based on the official accident statistics of the STBA (see 3.1. STBA – Federal Statistical Office). These accident statistics use the data from the police accident reports. Unfortunately the information about how accidents occur, the cause of the accident and the injury mechanisms is limited.

The goal of GIDAS (German In-depth Accident Study) is to provide in-depth accident and injury data of traffic accidents. This data is representative for the whole of Germany. On one hand the data of the GIDAS database is used by the BAST (Federal Road Research Institute) to propose guidelines to the federal ministry of traffic. On the other hand the data is used by the automotive industry for safety developments.

2. Who collects the data?

Due to the lack of adequate accident information, the Bundesanstalt für Straßenwesen BAST (Federal Road Research Institute; <http://www.bast.de>) established in 1973 an independent in-depth accident investigation team, the Accident Research Unit (ARU) at the Medical University of Hanover (MUH) (<http://www.mh-hannover.de/forschung/unfallforschung/index.htm>).

This project developed into a long term on-scene accident research study. To collect representative data the study was based in the defined geographical area of the region of Hanover. The Hanover region represents the whole of Germany rather well if we consider the amount of roads and the percentage of urban and rural parts of the region. The area covers both the municipality of Hanover and the surrounding rural areas. There are approximately 1,2 million residents in this area and some 10% of the area (2289 km²) is urban.

In 1999 the accident research team from the BAST, together with the Automotive Industry Research Association (FAT) started a joint project called German In-Depth Accident Study (GIDAS). In this project the geographical area was extended and a second team was set up in the Dresden area at the technical university of Dresden TU-Dresden (<http://www.tu-dresden.de>).

The GIDAS data is collected by the accident research units at the Medical University of Hannover (MUH) and at the Technical University of Dresden (TUD). The on-scene investigation is done by professional and semi-professional team members. The team consists of specially trained students, supported by professional accident investigators.

3. How is data collected?

The data is collected according to the specific GIDAS accident investigation method. This method guarantees a transparent and representative in-depth accident investigation. Each Accident Research Unit in Hanover and Dresden investigates traffic accidents involving personal injury and collects the data in a database. The ARU is notified by the local police and rescue services. With two specially equipped vehicles with flashing blue lights the team of accident investigators (one medic and two technicians) goes to the accident site and

investigates the cases following detailed procedures. Accidents are investigated every day of the week, in two six-hour shifts which follow a 2-week cycle during which the teams' shifts alternate.

Furthermore data from the police may be used to complete the data collection.

4. How is data manipulated?

The data is first recorded on worksheets at the accident scene by the GIDAS investigators. After that the data is coded on datasheets by the GIDAS investigators and is then scanned and stored in the database.

In order to avoid any bias in the database, the collected data is compared to the official accident statistics for the respective areas and weighting factors are calculated.

5. Who pays for the data collection?

The GIDAS project is partly financed by the BAST and partly financed by the FAT (Automotive Industry Research Association). The data collection is financed by these funds.

6. Who pays for the database maintenance?

As above.

7. Who owns the data or controls access to it?

The data is owned by the GIDAS project, the BAST and by the FAT. A steering committee, consisting of representatives from FAT, BAST, MUH and TUD (Technical University of Dresden) coordinate and manage the wide range of activities involved in the project.

8. Who uses the data?

The data is used by the BAST (Federal Road Research Institute) for policy proposals to the federal ministry of traffic. Legislators can study the accident cases in detail to identify future areas for legislation and to quickly identify the development of negative trends.

Data is also used by the automotive industry for safety developments. Both the automotive industry and the BAST can compare real accident situations to crash tests. Feedback regarding road traffic engineering can be obtained (such as assessing the severity of collisions between vehicles and road side objects).

9. Data and knowledge availability

Monthly and yearly reports give an overview of the investigated cases and allow comparisons to be made between the centres in Hanover and Dresden regarding types of vehicle and road users, the severity of the accident, etc. In addition, special reports are produced on topical safety issues based on requests containing recommendations for improving safety.

Aggregated data may be purchased.

Disaggregated data is available to GIDAS members only.

More detailed information about the GIDAS database can be obtained from accident investigation units in Hannover and Dresden.

3.3. France: National road accident data

1. Why is data collected?

Source data, i.e. police report, is collected in order to determine judicial responsibilities, rather than to clarify the events that led to the accident and the circumstances in which it took place. Data for the national road accident database is derived from the police reports. The national database produces general statistical information on road safety.

2. Who collects the data?

The French national road accident data is based on the BAAC (Bulletin d'Analyse des Accidents Corporels de la Circulation) electronic standard forms filled out by the police forces (*police* in urban areas of over 7 000 inhabitants, *gendarmerie* in rural areas and *CRS* on motorways in urban areas) on every traffic accident resulting in injury.

3. How is data collected?

The BAAC forms are filled out at the police station (there are some 3500 of them), on the basis of the police reports. The interval between the accident and the police report in one hand and the filling out of the BAAC form on the other hand may occasionally be several weeks.

4. How is data manipulated?

The local police forces send the BAAC files to the National Interministerial Road Safety Observatory (ONISR)¹ via one or two intermediary levels who either compile and control (*gendarmerie*) or just control (*police* and *CRS*) the transmitted data. Once the data is transmitted to ONISR, it is manipulated by SETRA (SETRA is a technical service of the Ministry of infrastructure). SETRA further controls the quality –identifies duplicates, cross-checks the BAAC against the local road safety figures in order to identify any missing data, eliminates other anomalies– and finally compiles all the files on a monthly basis.

5. Who pays for the data collection?

Data collection and deriving the data from police reports for filling out the BAAC forms is a part of the normal activities of the involved police forces.

6. Who pays for the database maintenance?

Database maintenance, on behalf of ONISR, is a part of the SETRA's normal activities.

7. Who owns the data or controls access to it?

ONISR controls the access to the data.

8. Who uses the data?

Data is primarily used by the ONISR, who publishes the official road safety statistics and other material based on this data. Other data users include

¹ ONISR is in charge of centralizing and analyzing the data gathered by the various ministries involved in road safety as well as of distributing the results. (<http://www.securiteroutiere.equipement.gouv.fr/infos-ref/observatoire/observatory.html>)

different services of the Ministry of infrastructure, such as SETRA and CETE (Centre d'Etudes Techniques de l'Equipement).

Outside the Ministry, data is used by transport safety research oriented organisations like INRETS (the French National Institute for Transport and Safety Research), ASFA (The Federation of French Motorway and Toll Facility Companies), LAB (the Laboratory of Accidentology, Biomechanics and the Study of Human Behaviour) and CEESAR (European centre for safety studies and risk analysis).

INRETS is a public scientific and technological body, under the dual administrative supervision of the Ministry of Research and the Ministry of Transport (SafetyNet, 2005). ASFA is an association which groups together different private road infrastructure managing companies, for example toll bridges, roads and tunnels. LAB is a common research institute of PSA Peugeot Citroën and Renault, the two French car manufacturers. CEESAR is an association whose members are universities and business schools, automobile constructors, car parts manufacturers, insurance companies and personalities of medicine and industry (SafetyNet, 2005).

9. Data and knowledge availability?

Data is available to the bodies mentioned above.

The official road safety statistics and other aggregated material (knowledge i.e. analysis and synthesis) based on the data are published and also available at ONISR web site: <http://www.securiteroutiere.equipement.gouv.fr/infos-ref/observatoire/l-observatoire/l-observatoire-national-interministeriel-de-securi.html>.

3.4. Italy: ISTAT – National road accident data

In Italy, the national road accident database is maintained by the National Institute of Statistics (ISTAT). The accident database contains information about all traffic accidents that occurred in Italy and caused injuries to persons.

1. Why is data collected?

The purpose is to inform citizens of all aspects related to road safety. For this reason ISTAT produces annually official statistics on road accidents to satisfy necessities of information of the community.

2. Who collects the data?

There is no specific accident investigation body at this moment. According to article 11 of Italian Highway code, “*the law enforcement authorities are in charge of carrying out accident investigation*”. Therefore, data collection is carried out mainly by three police authorities: Road Police, Carabinieri and Municipality Police within the borders of their municipality. Other police authorities, for instance the Guardia di Finanza (Finance Police), can investigate road accidents or collaborate with the above-mentioned police authorities, but this rarely happens.

3. How is data collected?

Data collection is not standardised; police reports are drafted according to local protocols. Police authorities fill out a police report that contains all the accident data concerning the vehicle, environment, weather conditions, accident description, etc. All the data are then used to fill up the “ISTAT module” that is a standardized form drawn up by the National Institute of Statistic (ISTAT). It contains accident information such as type of road, weather condition, lighting, type of accident and so forth. Once this form is completed, it is sent to the local office of the respective police authority. Afterwards, it is then sent to the Provincial Capital Statistical Office (for medium-large cities) and then to ISTAT or directly to ISTAT (for small cities). The Road Police sends data to the ISTAT through the Minister of Interior.

4. How is data manipulated?

Once the ISTAT form has been completed, it is sent to the local office of the respective police authority, who forwards the data either directly to ISTAT (small cities) or to the Provincial Capital Statistical Office (for medium-large cities), who sends it to ISTAT. The quality of final statistical information is strongly related to the level of collaboration of these police authorities. ISTAT is responsible for the data input into the national road accident database.

5. Who pays for the data collection?

Data are collected by police authorities, financed by government.

6. Who pays for the database maintenance?

ISTAT is responsible for the database maintenance. The assignment of funds to finance the ISTAT is foreseen in the financial law of the government, in which are assigned the amount of funds available to support this public institution.

7. Who owns the data or controls access to it?

The national road accident database is property of ISTAT.

8. Who uses the data?

Data are used by ISTAT for the production of official statistics. The ISTAT publications promote the development of the research activities. Data are used mainly by local administrations. The access to the data and to the statistic information is guaranteed by the Centre of statistical information in every region and province.

9. Data and knowledge availability?

Provisional data become definitive after 300 days from data gathering, for instance data of year 2005 will be available at the end of 2006. Data are available in aggregated form on the internet without any cost; raw data can only be requested by research institutes.

3.5. Netherlands: National statistics

1. Why is data collected?

The data are collected to support policy making, road design strategies, black spot analysis, etc.

2. Who collects the data?

The data are collected by the police for the whole of The Netherlands. 99% of all fatal accidents are registered, 60% of all hospitalised. Slight injuries are more under represented (estimate 20% available). For property damage only accidents an estimate of 5% is given.

3. How is data collected?

The police on-scene fills in forms which are send to a central coding agency which implements the data in a database.

4. How is data manipulated?

Data are coded according to special guidelines. Quality checks are made. Links with GIS and in some cases license plate registration and other databases are made to improve the data and data quality.

5. Who pays for the data collection?

The Government. Data can be acquired by paying for it, special data-for-data contracts or data-for-knowledge contracts.

6. Who pays for the database maintenance?

The Government.

7. Who owns the data or controls access to it?

The data is owned by the Government, ministry of transportation.

8. Who uses the data?

Research institutes, companies, government. The data use is wide spread.

9. Data and knowledge availability?

Data can be purchased. But several research institutes also have the data available and can do queries to provide aggregated data (TNO, SWOV). Years of available data up to 2003. Data for 2004 & 2005 are promised to be available in June 2006.

3.6. Netherlands: Sports Utility Vehicle study

1. Why is data collected?

The data was collected to support research on SUV traffic accidents. The objectives were the investigations of the various scenarios and the study of injury patterns sustained by the passengers in the vehicle itself and the other vehicles involved.

2. Who collects the data?

The data was collected by the TNO institute and the Dutch Accident Investigation Police department of two regions around Delft: Haaglanden and Rotterdam-Rijnmond.

3. How is data collected?

The data was gathered according to a methodology developed by TNO and based on previous international in-depth studies (e.g.: MAIDS, EACS). TNO was notified by the technical police department of an accident satisfying the set criteria. Within 24 hours the location is inspected. Vehicles are inspected later. Interviews were sent out to involved parties and witnesses. Special worksheets and questionnaires were made for this project. The police collected the data according to their own national methodology and submitted this information to TNO.

4. How is data manipulated?

The codification of the data was done by the TNO accident investigators in a multi-functional database, according to TNO guidelines.

5. Who pays for the data collection?

The project was financed by TNO and TNO is responsible for the maintenance of the database.

6. Who pays for the database maintenance?

As above.

7. Who owns the data or controls access to it?

The data is owned by TNO.

8. Who uses the data?

The raw data can only be used by TNO.

9. Data and knowledge availability?

Only aggregated data is available. TNO can also provide aggregated data if requested. The report on the results from the SUV study is not publicly available but can be made available on request in special conditions. Only 30 accidents are available.

3.7. Netherlands: Accident Analysis Heavy Trucks TWO (AAHTWO)

1. Why is data collected?

The goals of the project were to explore the primary and secondary safety improvement possibilities and to stimulate an international use and the harmonisation of an in-depth truck accident collection methodology.

2. Who collects the data?

The data was collected by the TNO institute and the Dutch Accident Investigation Police department of four regions covering the whole of the province of Zuid-Holland.

3. How is data collected?

The data was gathered according to a methodology developed by TNO and based on previous international in-depth studies (e.g.: MAIDS, EACS). TNO was notified by the technical police department of an accident satisfying the set criteria. Within 24 hours the location is inspected. Vehicles are inspected later. Interviews were sent out to involved parties and witnesses. Special worksheets and questionnaires had to be made for this project. The police collected the data according to their own national methodology and submitted this information to TNO.

4. How is data manipulated?

The codification of the data in the database was done by the TNO accident investigators in a multi-functional database, according to TNO guidelines.

5. Who pays for the data collection?

Sponsors of the project were DAF Trucks, SCANIA Trucks Holland and the Dutch government. TNO is responsible for the maintenance of the database.

6. Who pays for the database maintenance?

As above.

7. Who owns the data or controls access to it?

The data is owned by TNO, DAF Trucks and SCANIA Nederland.

8. Who uses the data?

The data are used by TNO, DAF Trucks and SCANIA Nederland and can be used within European projects.

9. Data and knowledge availability?

Only aggregated data is available. Results can be found in the Final Report which was published by TNO (05.OR.SA.061.1/YdV). Statistical analysis data is also available for research purposes. For this study only 30 accidents were collected and 30 control group locations were investigated.

3.8. Finland: Statistics Finland

1. Why is data collected?

Road accident statistics are used for evaluating the level of road safety at both national and international levels.

2. Who collects the data?

Data is collected by the police. Statistics Finland receives from the police the data on road traffic accidents that are entered into the PATJA information system of police affairs.

3. How is data collected?

Police collects the data according to manuals as part of routine police activity.

4. How is data manipulated?

Local police districts transfer the data to a central register, from which new data are processed and transferred to Statistics Finland's computer three times a month. The data for each month are further updated three months after the end of the month concerned. The data for a given month become available to Statistics Finland at the beginning of the following month. Statistics Finland checks them, makes further inquiries to the police districts and supplements the data where necessary with data from other registers. In the spring of the year following the statistical reference year Statistics Finland supplements its annual data with data from statistics on causes of death, the National Road Administration's data on accident locations and casualties, and with data on fatal drunk driving accidents from Road Accident Investigation Teams. The data on road traffic accidents are also supplemented annually with the Finnish Vehicle Administration's data on driving licences and motor vehicles.

5. Who pays for the data collection?

Data collection is part of routine activities of police force. The operations of Statistics Finland are funded with appropriations from the national budget.

6. Who pays for the database maintenance?

The operations of Statistics Finland are funded with appropriations from the national budget.

7. Who owns the data or controls access to it?

Statistics Finland is responsible for the maintenance and controls access to the database.

8. Who uses the data?

The principal users of the statistics at the national level are Ministries as well as various central agencies and transport organisations. The main users at the local level are municipalities.

Data on road accidents in Finland are transmitted to the publication Statistics of Road Traffic Accidents in Europe and North America, issued annually by the UN's Economic Commission for Europe (ECE). The OECD's International Road Traffic and Accident Database (IRTAD) includes time series data on population,

vehicles, road networks, traffic performances and road accidents and their victims in the OECD countries. Finnish data are also included in the database and Finland has been a user of IRTAD since the beginning of 1992. The principal user of the IRTAD database is the Finnish Road Administration. The EU's traffic accident database CARE (Community Database on Road Accidents) is based on Council decision 93/704/EC. CARE contains Finnish single unit (accident) level data since 1991.

9. Data and knowledge availability?

Monthly statistics are available for public consultation in electronic form on the website of Liikenneturva (the Central Organization for Traffic Safety in Finland).

The tables of annual publication are available in electronic file format. Data (exclusive of personal information and registration numbers) can also be acquired as files.

3.9. Finland: Finnish Road Administration

1. Why is data collected?

Road accident statistics are used for evaluating the level of road safety at both national and international levels. In addition data is used for road safety research, safety audition, black spot management and calculating accident risks.

2. Who collects the data?

Data is collected by police. The Finnish Road Administration receives from the police the data on road traffic accidents that are entered into the PATJA information system of police affairs.

3. How is data collected?

The police collect the data according to manuals as part of routine police activity.

4. How is data manipulated?

Local police districts transfer the data to a central register, from which new data are processed and transferred to Finnish Road Administration two times a month. The data for each month are further updated three months after the end of the month concerned. The Finnish Road Administration checks them, makes further inquiries to the police districts and supplements the data on accident locations and casualties. The database is compared with the data of Statistics Finland and supplemented where necessary.

5. Who pays for the data collection?

Data collection is part of routine activities of police forces. The operations of Finnish Road Administration are funded with appropriations from the national budget.

6. Who pays for the database maintenance?

The operations of Finnish Road Administration are funded with appropriations from the national budget.

7. Who owns the data or controls access to it?

Finnish Road Administration is responsible for the maintenance of database.

8. Who uses the data?

The principal users of the statistics are researchers and traffic engineers in Finnish Road Administration's central office as well in regional offices. Other users are Ministries as well as various central agencies and transport organisations.

9. Data and knowledge availability?

Two annual reports are published. In addition aggregated data is available as tables.

3.10. Finland: VALT¹ Database on fatal road traffic accidents

1. Why is data collected?

The objective is to produce information and safety suggestions to improve road safety through studying road and cross-country traffic accidents. In practice, files are collected in the field investigation and they are available to the traffic safety work as laid down in the data protection legislation. According to the Road Accident Investigation Act and its preamble, accident investigation serves to strengthen the information base made available for road safety work done in an effort to increase safety. The use of data obtained in road accident investigation is restricted for this purpose.

2. Who collects the data?

Caption from section 4 in Act on the investigation of road and cross-country traffic accident (19 Jan 2001 /24):

The Road Accident Investigation Delegation is a cooperation body made up of the participating bodies which steers the investigation work.

The Road Accident Investigation Delegation shall comprise representatives of the Ministry of Transport and Communications, the Ministry of the Interior, the Ministry of Social Affairs and Health, the Ministry of Justice, the Ministry of Education, the Finnish Road Administration, the Vehicle Administration and the Finnish Motor Insurers' Centre. More detailed provisions on any other bodies that may be represented in the Road Accident Investigation Delegation shall be given by Council of State Decree. The Road Accident Investigation Delegation may invite Special Advisors.

The Road Accident Investigation Delegation appoints the Road Accidents Investigation Teams which carry out the investigation of traffic accidents. The basic members of the team are a traffic police officer, vehicle specialist, road safety specialist, physician and psychologist. They participate in the investigations and the analysis of the accident as necessary and, at the request of the investigation team, may include, among others, a railway or tram specialist, a bus specialist, and special advisors who represent for example specialist areas in vehicle safety, commercial traffic, or traffic medicine.

3. How is data collected?

Data is collected using a standardized VALT Method (2003) under legislation. The investigation team begins the investigation together at the accident scene if this is possible.

4. How is data manipulated?

Data is collected into standard forms and codified by separate personnel. Original data collection sheets are stored with photographs and other information.

¹ VALT is the Traffic Safety Committee of Insurance Companies. See SafetyNet, 2005: 84-86.

5. Who pays for the data collection?

Section 16 in Act on the investigation of road and cross-country traffic accident (19 Jan 2001 /24):

Funding and supervision of the operations and adoption of action plan

The funds collected for the promotion of road safety as referred to in subsection 1 of section 18a of the Motor Liability Insurance Act (279/1959) may be used for covering the cost of road accident investigation.

The operations may also be funded with other means appropriated for the purpose.

The Ministry of Transport and Communications shall supervise road accident investigation work and adopt all action plans made for road accident investigation.

Section 18a in Motor Liability Insurance Act (26 June 1959/279, amendment 361 / 16 April 1993):

The Ministry of Social Affairs and Health may set a reasonable fee to support activity that is deemed to be of general importance in the promotion of safety in traffic. Every insurance company engaging in motor liability insurance business in Finland as mentioned in Section 17, Subsections 1 and 4, is accountable for the payment set by the Ministry to the Finnish Motor Insurers' Centre, which makes the payment for the promotion of safety in traffic as directed by the Ministry.

6. Who pays for the database maintenance?

Database maintenance is funded from dedicated traffic safety fee included in motor liability insurance premiums (see above).

7. Who owns the data or controls access to it?

The investigation report is a public document and contains no identification data. Database is maintained by Finnish Motor Insurers' Centre.

8. Who uses the data?

Data is used widely by researchers, universities and Ministries.

9. Data and knowledge availability?

The investigation report is a public document and contains no identification data. The information contained in the database is freely available for road safety research, providing the user ensures protection of the privacy of the participants in accordance with privacy regulations and complies with the provisions of the investigation law.

3.11. Finland: VALT / Database on accidents compensated from Motor Liability Insurance

1. Why is data collected?

Data is collected to enhance traffic safety.

2. Who collects the data?

Data is based on policyholders' claims forms which include special traffic safety questions.

3. How is data collected?

The file is built from accidents compensated under motor liability insurance. Insurers' claims handlers record the data in the company's database and also forward certain files to Finnish Insurance Data Ltd, who makes the database available to VALT. The database of insurance claims can be complemented in insurance companies to include data originating from police examination records and any other documents that may have been issued on the case.

4. How is data manipulated?

The Finnish Insurance Data Ltd works the data into an accident file and checks whether any information is missing. The claims information is reported to the Finnish Insurance Data Ltd accident by accident and is complemented with details of the amount paid in compensation. In case of a special research, the statistics can be supplemented with other relevant information available in the master file of all insured vehicles, with the help of vehicle registration numbers. This makes it possible to calculate the risks of individual car makes and models in terms of accidents per insured year.

5. Who pays for the data collection?

The data is collected during the claims handling process and the costs are covered by Motor Liability Insurance Companies.

6. Who pays for the database maintenance?

VALT is responsible for database maintenance. Funding is covered by dedicated traffic safety fee collected in motor insurance premiums.

7. Who owns the data or controls access to it?

Data is maintained by Finnish Motor Insurers' Centre.

8. Who uses the data?

Data is used widely by universities for research, governmental institutions and media. Internationally the data has been used for Traffic Safety Model and SARAC projects.

9. Data and knowledge availability?

Accident files are available, subject to data protection regulations, also to outside researchers and other relevant institutions free of charge for road safety purposes.

4. European databases

In this Chapter, we will review European road safety databases i.e. databases that receive (or have received in case of databases that have not been maintained) funding from the European Commission.

The Community database on Accidents on the Roads in Europe (CARE) has a somewhat special status. Indeed it is based on data extracted from national databases. CARE data is therefore not restricted to any specific road user type but covers the road safety issue as a whole. CARE thus provides general data on road safety in Europe.

The other reviewed databases focus on specific aspects of road safety. Some have been set up for studying coach or motorcycle accidents for instance. Others focus on certain type of accident outcomes in terms of injury severity.

4.1. CARE – Community Road Accident Database

1. Why is data collected?

The purpose of CARE system is to provide a powerful tool which would make it possible to identify and quantify road safety problems throughout the European roads, evaluate the efficiency of road safety measures, determine the relevance of Community actions and facilitate the exchange of experience in this field. (European Commission, 2004a.)

2. Who collects the data?

The Community database on Accidents on the Roads in Europe (CARE) data are collected by the national authorities in accordance with the Council Decision (93/704/EC) that requires Member States to establish road accident statistics and to communicate these data for a given year to the Statistical Office of the European Communities.

3. How is data collected?

Each Member State produces its own road accident database following its own procedures and using national protocols and formats (see the relevant sections in Chapter 3). Member States then submit their data in the form of a report to the European Commission. The reports exclude confidential information like the precise location of the accident or the make of vehicle. The Member States provide also the necessary information on the definitions and the structure of the data.

4. How is data manipulated?

CARE comprises statistical information of reported road accidents in the European Union resulting in injury or death since 1991. Accidents resulting only in material damage are not included in the database. The main difference between CARE and most other international databases is the high level of disaggregation of the accident data; it contains detailed data on individual accidents as collected by the Member States.

Instead of defining and adopting a standardised European collection methodology, data variables and variable definitions, which would have been a quite lengthy process and would have required major changes for the national administrations, the national data sets are integrated into CARE database in their original national structure and definitions but without any confidential data.

5. Who pays for the data collection?

The CARE database comprises annual national sets of accident data in their original form supplied by the Member States without harmonisation of individual variables at European level. The information in CARE database should therefore correspond to the information extracted from the national databases.

6. Who pays for the database maintenance?

CARE is a European database, hosted by the European Commission at the Luxembourg data centre.

7. Who owns the data or controls access to it?

The European commission controls access to CARE database. At the moment there are two or three access by Member State.

8. Who uses the data?

Data is used by DG TREN and by national road safety experts.

9. Data and knowledge availability?

As stated above, data is available only to DG TREN and few selected bodies of each Member State. Statistical information is available on the CARE web site and studies based on CARE data are accessible through CARE or other web sites such as SafetyNet web site at <http://safetynet.swov.nl/>.

Further information on the database

Each Member State is responsible for the quality of its data and is requested to validate its data after inclusion in the CARE database.

CARE provides a framework of transformation rules from an analysis of the original structure and definitions to ensure the comparability of variables and values. The use of transformation rules inside the CARE system allows European comparisons and exchange of experiences between Member States.

The CARE database includes more than 20 million accident records and it is representative of all the accidents resulting in injury or death, that have occurred in the 15 Member State involved in the project since 1991. The process of integrating the new Member States into CARE is under way, using the existing common variables and values. No change is scheduled for these common variables and values as long as the accident databases of the 10 new comers are not included in the CARE system.

More information about CARE on http://europa.eu.int/comm/transport/care/index_en.htm

4.2. EACS – European Accident Causation Survey

The European Accident Causation Survey (EACS) is a research project that was launched by the European Automobile manufacturers Association (ACEA), with the support of the European Commission, in 1996, under the patronage of the European Road Safety Federation (ERSF).

1. Why is data collected?

The project aim is to gain accurate information on road accident causation. Most of data collected focuses on the pre-crash phase, particularly on vehicular factors and safety systems (e.g. ESP); there is less in-depth data on injuries. This is understandable, given the presence of car manufacturers in the consortium.

Expected outcomes of EACS were:

the identification of critical situations, the analysis of countermeasures effectiveness, some help in designing new technical devices, the understanding of accident genesis, the analysis of malfunction of the 'driver/road/vehicle' loop the definition of typical accident scenarios, the ranking of priorities for crash avoidance and the definition of a detailed accident collection form and methodology. (Sferco et al., 2001)

2. Who collects the data?

Data were collected by nine research institutes:

- DEKRA (Germany),
- Medical University of Hannover (MUH, Germany),
- French National Institute for Transport Safety Research (INRETS-MA, France),
- Centre Européen d'Etudes sur les Accidents et l'analyse des Risques (CEESAR, France),
- University of Oulu (Finland),
- University of Turku (Finland),
- Universidad Politecnica de Madrid (INSIA-UPM, Spain),
- Netherlands Organisation for Applied Scientific Research (TNO automotive, The Netherlands), and
- ELASIS (a consortium of companies of the FIAT Group) for Italy.

CEESAR was entrusted by ACEA to coordinate the work provided by EACS partners. CEESAR was responsible for the collection of the data from its partners and organised the exchange of relevant information that was needed.

Most of the partners have a permanent investigation team for accident data collection and a consolidated experience in safety investigation. Their investigation teams consist of specialists in several fields (from police officers to road infrastructure and reconstruction experts).

3. How is data collected?

Up to June 2000, 1 674 accidents cases had been investigated and coded in the so-called DAMAGE database (a Databank to analyse Accident Mechanism and Accident Genesis in Europe). All records of the database refer to crashes involving cars where an occupant is injured.

Accident data were recoded from existing files in contributing organisations because the project did not support data collection activities. Therefore, data are recorded according to national protocols although specific data coding methodology (EACS methodology) were defined in order to harmonise data and ensure consistency across countries.

4. How is data manipulated?

Since the project did not include any data collection campaign, existing data were used to create a common database. To ensure data harmonisation and consistency, a specific coding protocol was defined. The protocol use is described in detail in the Manual for coding the EACS's questionnaire (for further details on questionnaire, see: *European Accident Causation Survey (EACS) methodology*, Chenisbest, Jähn and Le Coz., 1998).

To ensure the easy handling of data input, CEESAR developed, and distributed to its partners and ACEA, a data capture software tool, where Input masks are oriented to the structure of the EACS's associated questionnaire forms.

5. Who pays for the data collection?

The funding of EACS was provided by the European Commission - DG Energy and Transport and by the car industry.

6. Who pays for the database maintenance?

As above.

7. Who owns the data or controls access to it?

Copies of the data are held by project co-ordinator (CEESAR) and contributing industry groups.

8. Who uses the data?

Data are used by EACS partners and contributing industry groups.

9. Data and knowledge availability?

Some publications have been carried out analysing EACS data (e.g. Sferco, Page, Le Coz and Fay, 2001).

4.3. ECBOS – Enhanced Coach and Bus Occupant Safety

1. Why is data collected?

The ECBOS project took place under the 5th Framework Programme. The project ran from January 2000 to June 2003. Current knowledge on the optimum protection of passengers in buses and coaches was still rather limited, particularly the importance of different accident and collision types which are still not well analysed. The ECBOS project was developed to make improvements in current regulations and propose new regulations and standards for the development of safer buses and coaches. The major community added value is the decrease of incidence and severity of occupant injuries and social suffering which occur as a result of bus and coach accidents. In the EU approximately 20 000 (4%) of buses and coaches of more than 5 000 kg are currently involved in accidents with personal injuries each year. More than 30,000 persons are injured due to these accidents and about 200 occupants suffer fatal injuries.

2. Who collects the data?

ECBOS was split into 4 work packages (WP). WP1 investigated two different kinds of databases: Government databases and in-depth studies. Six teams of researchers obtained both types of information from the existing data sets. These investigation teams were from:

- Technische Universität Graz (TUG, Austria),
- Cranfield Impact Centre Ltd (CIC, UK),
- Verkehrstechnisches Institut der Deutschen Versicherer (GDV), represented by the Institute for Vehicle Safety Munich (IFM, Germany),
- Politecnico de Torino (POLITO, Italy)
- Universidad Polytechnica de Madrid (INSIA-UPM, Spain), and
- Vehicle Safety Research Centre Loughborough (VSRC, UK).

3. How is data collected?

The Governmental databases of different countries were investigated in a first step to see the injury risk in relation to the different accident types. The original Government data was collected from police reports (or equivalent) representative of each of the countries concerned. The injury mechanisms were not well known for many of these different accident situations, so in-depth studies of specific accidents were performed. This entailed the partner institutions examining more detailed accident records, e.g. fatal police reports, reports from bus companies etc.

4. How is data manipulated?

Out of the governmental accident databases of each involved country, a statistical analysis of all bus accidents was performed regarding criteria relevant for active and passive safety. The last 5 available years of accident data were investigated. Based on the results of this task, 100 significant accidents were

selected for in depth studies from the extended database. Therefore the partners who were active within this task reviewed the extended databases to identify suitable cases for detailed reconstruction. The data from the various sources (Governmental- and Extended) databases were integrated into a general bus accident database. The in-depth studies, which were based on well documented bus accidents, gained from various existing databases formed the basis for a set of new numerical simulation models developed in WP2. These numerical models in combination with accident and full scale reconstructions generated the knowledge necessary to understand the various occupant injury mechanisms. In WP3 these numerical models, component- and full-scale tests were used to develop new numerical and experimental test methods for the validation of driver and occupant safety in buses. The various test methods were compared through a cost benefit analysis. In WP4 written standards were suggested based on those newly developed test methods. Their efficiency was demonstrated by means of numerical models for improved bus and coach designs.

5. Who pays for the data collection?

The data collation for the ECBOS data set was funded by the European Commission. The original data from which the ECBOS data set was developed, was collected as part of the partner countries' Government initiatives and generally funded accordingly with taxpayers' and Government money.

6. Who pays for the database maintenance?

Not applicable – the database has not been maintained since its original compilation: the objective of gathering the data into the ECBOS database was to form the basis of new written regulations including new and extended test methods on enhanced bus and coach occupant safety.

7. Who owns the data or controls access to it?

The data is owned by the consortium and the European Commission.

8. Who uses the data?

The ECBOS data will be used by the European Commission and by the project partners to form the basis of new written regulations including new and extended test methods on enhanced bus and coach occupant safety.

9. Data and knowledge availability?

Aggregated data was demonstrated in the final project reports. The reports were publicly available as were the associated guidelines.

4.4. CHILD – Child Injury Led Design

1. Why is data collected?

The Child Injury Led Design (CHILD) project started in 2002 with partners from 6 different countries and it is a follow up of the Child Restraint Systems (CREST) project. Based on the results obtained in CREST, CHILD aims to collect in-depth accident data (allowing the reconstruction of accidents) and put it into a database together with the data from CREST. The objective of the CHILD project is to increase the knowledge on injury mechanisms in relation with child protection devices.

The CHILD database is designed to support the research on both future child restraint systems and vehicle safety devices. CHILD is expected to collect the data of some 300 accident cases with:

- Information about the crash scene (scene plan with impact position and configuration; vehicle trajectories; post crash vehicle positions and photos of the scene)
- Information about the vehicles/obstacles (measurements of the vehicle deformation; photos and description of damage; information about the object size, weight, constitution, location, damage)
- Information about the child restraints used (type; make and model; condition; evidence or suspicion of misuse)
- Information about the occupant (detailed injury data, AIS coded; autopsy information if possible; seating position; specific restraint use; age; weight; height)

2. Who collects the data?

The data collection is done by the following 7 partners of the CHILD project:

- Medical University of Hannover (MUH, Germany),
- IDIADA (Spain),
- Chalmers University of Technology (CTH, Sweden),
- Vehicle Safety Research Centre Loughborough (VSRC, UK),
- PSA (France),
- German Insurance Association (GDV, Germany), and
- ELASIS (Italy).

3. How is data collected?

The data is collected according to the CHILD methodology. Special worksheets are filled out during retrospective or nearly-in-time accident investigations. The case data put into the database are mostly collected by retrospective accident investigation due to strict selection criteria. For the CHILD database only cases with the following criteria are used:

- at least one child up to 12 years, correctly restrained has to be involved

- only accidents with frontal or side impacts are used
- a minimum severity of accident and injuries is required
- misuses of restraint are accepted if well defined and possible to reproduce.

4. How is data manipulated?

The data is first recorded on worksheets on location by the investigation teams of the partners. During meetings with all partners each case is discussed and it is then decided whether the case shall be used for the database or not. After that the relevant cases are coded and entered into the database by the responsible partner.

5. Who pays for the data collection?

CHILD is a research project which is financed by the European Community.

6. Who pays for the database maintenance?

The database maintenance is financed by the European Community.

7. Who owns the data or controls access to it?

The owners of the data are the European Commission and the project partners.

8. Who uses the data?

The data of the CHILD database is used by some of the involved partners for further research. TNO uses the data for the development of crash test dummies. Furthermore the European Community may use this data.

The accident data is used to enable the reconstruction that will permit the consolidation or establishment of injury criteria and injury risk curves. Furthermore the cases contained in the database are being analyzed periodically to consider injury pattern, child restraint use/misuse. The information will be disseminated to other bodies dealing with child occupant safety.

9. Data and knowledge availability

Only aggregated data is available to the partners. Statistics on this data will also be found in the final report of the project.

More information about CHILD on <http://www.lboro.ac.uk/research/esri/vsrc/research/child%20web%20site/>.

4.5. RISER – Roadside Infrastructure for Safer European Roads

RISER is a European road safety focused project co-financed by the European Commission through its Competitive and Sustainable Growth Programme that lasted for 36 months (from December 2002 to December 2005). Safety on roads can only be achieved through innovative solutions, which recognise that the infrastructure is a determining factor in the origin and seriousness of road accidents. In particular, almost a third of road fatalities are linked to single-vehicle accidents. At the same time there is no European consensus on the appropriate design, implementation and operation of road safety devices. Well-researched operational guidelines to roadside infrastructure design and maintenance can play a significant role in ensuring that motorists no longer are the victims of poorly designed, built and maintained roadside infrastructure. More information about RISER on <http://www.riser-project.com>.

1. Why is data collected?

The overall objective of RISER is to provide resources and guidelines for highway safety professionals to design and operate safer roadside infrastructure. These resources will allow the stakeholders to identify the best design for a given road section based on objective and technically supported guidelines. Once in place, operation and maintenance guidelines will ensure that the infrastructure continues to operate as desired. With these project deliverables, a significant reduction in the number of single vehicles collisions – and especially their consequences - can be achieved.

2. Who collects the data?

RISER was split into 5 work packages (WP). WP1 investigated two different kinds of databases: Government databases and in-depth studies. Seven teams of researchers obtained both types of information from existing data sets and, a proportion of information, from new data sets*. The seven investigation teams were from:

- Chalmers University of Technology (CTH, Sweden),
- Centre d'Etudes Techniques de l'Equipeement Nord-Picardie (CETE, France),
- Centro de Investigación y Desarrollo en Automación (CIDAUT, Spain)*,
- Helsinki University of Technology (HUT, Finland),
- Netherlands Organisations for Applied Scientific Research (TNO, The Netherlands)*
- Technische Universität Graz (TUG, Austria),
- Vehicle Safety Research Centre Loughborough (VSRC, UK).

3. How is data collected?

The statistical databases of different countries were investigated to understand single vehicle collisions in Europe. Additionally, in order to set up a detailed database for single vehicle accidents, data was collected from existing



databases for an in-depth study to derive the circumstances of roadside accidents and their outcomes.

4. How is data manipulated?

Statistical data provided the basis for determining the relevance of single vehicle collisions in Europe. Detailed collision data was necessary to determine the specific performance of roadside infrastructure. In the first phase of the project the statistical data from Austria, Finland, France, Spain, Sweden, the Netherlands and United Kingdom were collected and the coding strategies were summarised. Additionally, because another objective of the RISER project was the set up of a detailed database for single vehicle accidents (which included data not available from national statistics), data was collected from existing databases (along with some from new accident cases) for an in-depth study to derive the circumstances of roadside accidents and their outcomes. Furthermore, maintenance data was collected to evaluate a potential source of collision statistics.

5. Who pays for the data collection?

The data collation for the RISER data set was funded by the European Commission. The original data from which the RISER data set was developed, was collected as part of the partner countries' Government initiatives and generally funded accordingly with taxpayers' and Government money.

6. Who pays for the database maintenance?

Not applicable - the database has not been maintained since its original compilation: the objective of gathering the data into the RISER database was to form the basis of new written guidelines for roadside design, maintenance and operation.

7. Who owns the data or controls access to it?

The data is owned by the consortium and the European Commission.

8. Who uses the data?

The RISER data will be used by the European Commission and by the project partners to form the basis of new written guidance on road infrastructure.

9. Data and knowledge availability?

The deliverables and reports produced from this project will be publicly available along with the associated guidelines, which are being disseminated at workshops across Europe.

4.6. PENDANT – Pan-European Co-ordinated Accident and Injury Database

The European Commission maintains competency for vehicle-based injury countermeasures through the Whole Vehicle Type Approval system. As a result of this, the Commission has recognised that casualty reduction strategies must be based on a full understanding of the real-world need under European conditions and that vehicle countermeasure effectiveness must be properly evaluated.

To this effect, a new study known as PENDANT (short for Pan-European Co-ordinated Accident and Injury Databases) commenced in January 2003. The PENDANT study continues the work of the STAIRS project - the overall aim of STAIRS was to take the first steps towards the goal of harmonising accident data within the EU. Therefore the STAIRS project involved standardisation of in-depth road accident data collection methodologies to provide the core framework for pan-European crash injury studies. This included specification of a number of key data variables, case selection criteria and general (although not specific) investigative approach

Therefore the PENDANT study is developing a co-ordinated set of targeted, in-depth crash data resources to support European Union vehicle and road safety policy. Around 1,100 investigations of crashes involving injured car occupants and pedestrians are being conducted in eight EU countries to a common protocol based on methodologies developed in the STAIRS programme. Each case involves collection of data on vehicle crashworthiness performance, injury outcomes and occupant characteristics (in terms of age, sex, etc). Brief details on accident causation are also specified in the protocol. The data are being further enhanced by the linking of hospital and police information to provide additional data on the trends and injury patterns of over 60,000 road users of all types.

1. Why is data collected?

One of the main objectives of the study is to analyse the composite crash-injury database in order to identify priorities for future European regulatory action. However, it is expected that the data will have further valuable purposes particular in support of other road safety initiatives within the EU.

2. Who collects the data?

The data are being collected by the partners of the PENDANT project including:

- Vehicle Safety Research Centre Loughborough (VSRC, UK),
- Institut National De Recherche sur les Transports et leur Securite (INRETS, France),
- Association Registre des Victimes d'Accidents de la Circulation (ARVAC, France),
- Accident Research Unit-Medical University of Hannover (ARU-MUH, Germany),

- Netherlands Organisations for Applied Scientific Research (TNO, The Netherlands)
- Technische Universitaet Graz (TUG, Austria),
- Centre d'Etudes Techniques de l'Equipement Sud-Ouest (CETE S-O, France)
- Chalmers University of Technology (CTH, Sweden),
- Universidad Politecnica de Madrid (UPM, Spain)
- University of Turku/Finnish Motor Insurers (VALT) (Finland), and
- SVOW Institute for Road Safety Research (The Netherlands).

3. How is data collected?

The data are being collected according to the PENDANT methodology, which is based on the STAIRS protocols. Special worksheets which specify data on the vehicles are filled out either at the crash scene or some 2/3 days after the crash. Hospital data is collected a few days after the crash from A&E Departments and hospital wards. Brief information on accident causation (as specified in CARE) is normally obtained from Police reports.

4. How is data manipulated?

The data from each case are coded and entered into the database by the investigating partner. Any personal information is removed by the data aggregation procedures. Data can be analysed by using standard statistical packages (e.g. SPSS, SAS etc.)

5. Who pays for the data collection?

The PENDANT project is a research project which is co-financed by the European Commission and a number of national administrations.

6. Who pays for the database maintenance?

The maintenance of the database is financed by the European Commission

7. Who owns the data or controls access to it?

The data are owned by the European Commission and the PENDANT partners.

8. Who uses the data?

It is expected that the data will be used by the European Commission for the development of future policy and regulation. The partners will also use the data for research on specific topics (e.g. injury biomechanics).

9. Data and knowledge availability

Only aggregated data will be available. A final report with statistical analyses and Methodology write-up is planned for June 2006.

More information about PENDANT can be found at the following website; <http://www.vsi.tugraz.at/pendant/>.

4.7. ETAC - European Truck Accident Causation Study

1. Why is data collected?

This project, initiated by the European Commission and the IRU (International Road Transport Union), was launched in order to set up a heavy goods vehicle accident causation study to identify future actions which could contribute to the improvement of road safety. The project commenced on 1 May 2004, due for completion on 31 March 2006. The *Centre européen d'études sur les accidents et l'analyse des risques* (CEESAR) in France are the coordinating research group, with institutes from seven other European countries involved. The aims of the project are:

- to investigate at least 600 truck accidents in order to identify the causal factors of these accidents,
- to provide a database of truck accidents containing road accident criteria, established in a scientific, unbiased, structured manner and permitting better knowledge of the causes of truck accidents, and
- to permit the identification of actions contributing to reduce truck accidents and/or their seriousness and, generally, to improve road safety.

2. Who collects the data?

Nine teams of researchers obtained both types of information from the existing and new data sets. These investigation teams were from:

- Centre Européen d'Etudes sur les Accidents et l'analyse des Risques (CEESAR, France),
- CEMEK (Slovenia),
- DEKRA (Germany),
- CIDAUT Foundation (Spain),
- IdB (Hungary),
- IDIADA (Spain),
- REGES (Spain),
- Netherlands Organisations for Applied Scientific Research (TNO, The Netherlands), and
- University of Pavia (Italy).

Together they will examine at least 600 accidents across Europe involving trucks. Accident analysis started in April 2004 and the study is expected to take two years to complete.

3. How is data collected?

The research teams collected the data which was based on a prospective, 'on-the-spot' investigation of the accident. It means studying the road dysfunction process, the cause and effect relationship, on the basis of detailed data collection. In-depth data from accident cases were collated, including aspects of



passive and active safety, with road user behaviour, vehicle mechanisms and injuries sustained being examined. This information was gathered as close to the time of the accident as possible, using driver interviews, eye witness testimonies, scene examinations, and police records. The sampling criteria stated that each accident investigated must involve at least one truck (commercial vehicle of Gross Weight >3.5t), all accidents must involve at least one injured person and all cases must refer to accidents having occurred as from 1 April 2004.

4. How is data manipulated?

Raw data was entered into the ETAC database about the causes of a truck related accident. The data will be manipulated in order to allow for:

- identification of the main causes of accidents involving trucks,
- reconstruction of the pre-collision phases,
- identification of critical situations,
- analysis of malfunctions,
- definition of scenarios of accident types,
- study of the information needed by drivers in the "pre-collision" phase, and
- a priori quantification of the potential interest of certain driver aids.

5. Who pays for the data collection?

The ETAC project was co-funded by the European Commission and the International Road Transport Union (IRU).

6. Who pays for the database maintenance?

Not applicable.

7. Who owns the data or controls access to it?

The data is owned by the consortium and the European Commission and the International Road Transport Union.

8. Who uses the data?

The ETAC data will be used by the European Commission and by the project partners for analysis and preparation of recommendations.

9. Data and knowledge availability?

The reports may be available from the project consortium.

More information about ETAC on <http://www.iru.org/Presenting/Welcome.E.html>.

4.8. MAIDS – Motorcycle Accident In-depth Study

1. Why is data collected?

The purpose of the study was the identification of the causation factors of motorcycle accidents. The project was focusing on injury prevention, motorcycle improvements and a better understanding of the human influence.

2. Who collects the data?

The data was collected by research institutes and university related teams. The investigation teams had to use a certain methodology developed by the Organisation for Economic Co-Operation and Development (OECD).

- AIT/FIA Foundation (CH),
- The British Motorcyclists Federation (UK),
- Comité Européen des Assurances (FR),
- International commission for driver testing (NL),
- The Federation of European Motorcyclists Association (BE),
- Fédération Internationale de Motocyclisme (CH), and
- Verkehrstechnisches Institut der Deutschen Versicherer (DE)

3. How is data collected?

Each team used their own method of data collection. All teams had to collect the same variables, but they had to develop their own worksheets, questionnaires and interview methods, which were the most efficient per country. Data privacy issues also required a different access to data.

4. How is data manipulated?

In most of the teams, the codification of the data in the database was done by the accident investigator himself. The codification was done according to harmonised guidelines for all five teams.

5. Who pays for the data collection?

Sponsors of the project were the Association of European Motorcycle Manufactures (ACEM) and the European Commission. The database maintenance is paid by ACEM.

6. Who pays for the database maintenance?

As above.

7. Who owns the data?

The data is an ownership of ACEM.

8. Who uses the data?

The data is used by ACEM itself and the ACEM members, but the team data can individually be used by a team, after ACEM's concern.

9. Data and knowledge availability?

Only aggregated data is available. This data can be found in the Final Report which was published by ACEM. Aggregated results can also be available by the teams after ACEM's concern.

4.9. SafetyNet WP5

SafetyNet Work Package 5 aims at building up two European databases. One will be a broad-ranging, intermediate level, fatal accident database, while the other will be an in-depth accident causation database. The need for harmonized European databases comes from the limits of the CARE database. These limits concern the methodology and the scope of the database. Indeed, CARE integrates national data gathered following different methodologies and it has a limited number of variables.

The databases include a contrast of 7 (6 in the case of the in-depth database) different countries from northern, western and southern Europe. Germany, France and Italy represent the high fatality countries. The Netherlands, Finland, Sweden and the UK represent the lower fatality countries. The participating institutions are MUH, INRETS (only for 5.1 intermediate level database), DITS, TNO, VALT, Chalmers and VSRC. The new central European Member States are not participating in the project.

More information about SafetyNet on www.svow.nl/safetynet.

4.9.1. SafetyNet WP5.1

1. Why is data collected?

The intermediate level fatal database will provide support for policy making. The data will be a great deal richer than the CARE data with over 100 variables, addressing environmental and infrastructure factors, vehicle and driver factors as well as casualty factors. This intermediate level database tends to be comparable to the U.S. Fatality Analysis Reporting System.

2. Who collects the data?

The information inserted into the database is drawn from the data of the national police forces (or insurance data in the case of Italy). This data is collected as part of their routine activities into fatal road accidents. For a detailed description please see the preceding chapter on National databases.

3. How is data collected?

As above.

4. How is data manipulated?

The data source for the intermediate level database is the police reports and in some cases the insurance reports (Italy). The researchers of the participating bodies extract the required data from police reports and feed it into the database. If data is missing from the police report, the researcher will locate the missing information from other sources, for example from the car manufacturer in case of missing technical specifications.

All the issues concerning the database – data variables, definitions, database development – have been discussed and the decisions have been taken by the participating research institutes. The privacy laws of Member States are taken into account.

The sample will integrate between 2% and 10% of the fatal accidents in the participating Member States. The data will be representative of the Member State where it is collected.

5. Who pays for the data collection?

The database development is a part of the SafetyNet integrated project. The SafetyNet project is financed by the European Commission.

6. Who pays for the database maintenance?

SafetyNet WP 5.1 intermediate level database will be developed and various activities related to the database will be conducted throughout the duration of the project. At the end of the project the database, with some 1 300 cases in it will be handed over to the European Commission services, who have funded the research (including the database maintenance).

7. Who owns the data or controls the access to it?

The access to the data is granted by the Project consortium.

8. Who uses the data?

The database will be used, during the duration of the SafetyNet project, by the participating research bodies and the other research bodies participating to the SafetyNet project, to extract information for analysis.

9. Data and knowledge availability?

The issues concerning the data and knowledge availability have not yet been thoroughly treated – the privacy laws of the participating Member States might in some cases limit the availability of data. Aggregated knowledge (analysis based on the data) will be made publicly available on the SafetyNet/ERSO web site.

4.9.2. SafetyNet WP5.2

1. Why is data collected?

The in-depth accident causation database will be useful for technology development activities and infrastructure development. While the intermediate level database tends to be comparable to the U.S. Fatality Analysis Reporting System, there is no direct model for the in-depth database. The database will contain over 400 variables on the accident circumstances, with a strong focus on understanding the causal factors leading to the accident.

2. Who collects the data?

The data is collected by accident investigators within the participating research bodies. The bodies involved in the project and in charge of the investigation and data collection have no commercial interests at stake.

3. How is data collected?

The data will be collected using harmonised methodologies and identical definitions of variables. The data will be representative of the Member State where it is collected.

The accident investigation team visits the accident scene as quickly as possible after the accident. Investigation teams will use photographs, scale-scene drawings, reconstructions and they will conduct interviews with the victims and witnesses to have a detailed understanding of the causes of the accident.

4. How is data manipulated?

The database development takes into account the privacy laws of Member States.

5. Who pays for the data collection?

The database development is a part of the SafetyNet integrated project. The SafetyNet project is financed by the European Commission.

6. Who pays for the database maintenance?

SafetyNet WP 5.2 in-depth accident causation database will be developed and various activities related to the database will be conducted throughout the duration of the SafetyNet project. At the end of the project the database, with some 1 000 cases in it will be handed over to the European Commission services, who have funded the project (including the database maintenance).

7. Who owns the data or who grants the right to access the data?

The access to the data is granted by the Project consortium.

8. Who uses the data?

The database will be used, during the duration of the SafetyNet project, by the participating research bodies and the other research bodies participating to the SafetyNet project.

9. Data and knowledge availability?

The issues concerning the data and knowledge availability have not yet been thoroughly treated – the privacy laws of the participating Member States might in some cases limit the availability of data. Aggregated knowledge (analysis based on the data) will be made publicly available on the SafetyNet/ERSO web site.

5. Conclusion

In this deliverable we have proposed the use of the notion of transparency, instead of independence, in relation to accident investigation results. We have established a list of questions to be answered, in order to define whether – and to what extent – a database (but it could as well be accident reports or other data) can be said to be transparent. After reviewing several national and European databases, we consider the concept operational and adapted to such a use. We consider the databases reviewed in this deliverable as generally transparent. Once again, transparency means the *availability of such relevant information on the database, which allow its quality to be assessed*. For the reviewed databases such information is available. When saying this, we have not emitted a judgement on the actual quality of these databases. The issue of evaluating the quality is left to the reader¹.

Furthermore, it should be noted that there can be no unified scale for measuring quality. We should perhaps reason in terms of *necessary* characteristics and not try to find a way of assessing an overall quality. Indeed, databases are designed to answer specific questions (we have seen that some databases only gather information on certain types of vehicles, while others focus on accident causation in general or on injury causation etc.) and any quality evaluation should take this into account. Quality evaluations should be restricted to assessing whether a database can answer the questions it was designed to answer or simply whether it is useful or not.

From this point of view the reviewed national databases as well as CARE are very useful. Their overall quality might be judged sub-optimal because of the problems related to the under-reporting and under-recording for instance. Nevertheless they succeed remarkably well in giving us a general picture of road safety throughout Europe. Any constant differences in reporting and recording are not relevant when discussing longer term trends in European road safety. The issue would of course be quite different if the main objective of these databases was to answer to more specific questions or determine priorities.

Research oriented databases on the other hand usually contain smaller samples and the case selection depends on specific research objectives. Issues such as sampling criteria and investigation methodologies become dominant because of the scientific claims involved. At this point we reach the limitations to the transparency of accident investigation results. The authors of this deliverable estimate, that the necessary information for evaluating the quality of the reviewed databases is available. Our vision is necessarily that of experts.

A lay-person would probably find it difficult to judge, on their own, the quality of transparent, but highly technical investigation results. Proceeding to such an evaluation requires a certain amount of experience and qualifications, which not everybody has. To some extent, discussions about transparency and quality of

¹ There are some very good reports available that provide further information on some of the databases reviewed in this deliverable. *Traffic Safety Research: a literature survey* (Margaritis, Rook, Wijnhuizen, Mooi, de Vries and v/d Horst, 2004) is probably one of the most recent ones.

any scientific research are bound to remain within expert circles. This does not mean that information is or should be concealed from the public; it means that participating to a purely scientific debate requires sound scientific arguments.

There is yet another limitation to the transparency, which is privacy. Individual, identifiable accident data must not be available to the general public unless such data is necessary for understanding the circumstances and the sequence of events that led to a major accident. For the present deliverable, a major accident is however a borderline case, for the investigation result is most probably an investigation report drafted by a dedicated investigation body and not a database. Detailed accident level data is useful for road safety research and the use of individual accident data, permitting the identification of the involved persons, should to be restricted to such circumstances.

We can now draw some general conclusions on the basis of the two SafetyNet work package 4 deliverables, *D4.1 Bibliographical analysis* (2005) and the present one. There are two types of arrangements for assuring the impartiality of an accident investigation for safety purposes and the transparency of the subsequent data. The first type of arrangements calls for independent accident investigation entities. The second type of arrangements calls for a well-defined institutional framework in which all the interested parties are involved.

These two types of institutional arrangements share, in practice, a basic characteristic. For instance, in the aviation sector, an investigation into the causes of an accident is rarely conducted by only one investigating body. There are usually other investigating entities involved and chances are that their cooperation is beneficial to the investigation. The independence of the investigation body and the need (or obligation) to cooperate with other similar bodies strengthens the impartiality of the investigation process. On the other hand, when the cooperation of non-independent investigation entities with other stakeholders is institutionally organised, the same type of processes emerge and tend to reinforce the impartiality of the investigation¹.

Whichever solution adopted, *adequate (that means adapted to the public) safety data must be publicly available* since transport safety is an issue of public interest. If accident investigation data is used in research, for policy-making or as material in a judicial or administrative enquiry, it must also be available for scientific counter-expertise. The only acceptable limits to transparency are the intrinsic complexity of the data and the right to privacy. The right to privacy must shield identifiable accident data from being available to the general public. The complexity of the data on the other hand can make road safety data difficult to comprehend for others than specialists. This should encourage European road safety community to continuing efforts in diffusing knowledge.

At the term of our first two tasks of the SafetyNet work package 4, we have reached a general understanding of the issues of independence and transparency. The following tasks of this Work Package, tasks 4.3 and 4.4 aim at producing recommendations for assuring the optimum transparency and independence of road accident investigation processes.

¹ Not to mention all the other beneficial effects, which have already been evoked.

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7. Annex: Valuing casualty prevention

Our intention was to compare safety motivated investments and the number of fatalities or, if available, estimates on the number of lives saved. This would have meant distinguishing spending that improves safety but is not safety oriented – like constructing separate carriageways because of increasing traffic flow – from spending that is done for safety purposes – like putting bumps on a road in front of a school. It would also have been necessary to know the amount of money that goes into accident investigation and into straight forward security enhancement activities, such as campaigns to promote road safety.

For the costs, we did not want to complicate things too much either, given the timeframe and the available means. Looking for the number of fatalities and estimates of loss of economic output related to those fatalities, without taking into account ambulance attendance at scene or disruption to traffic flow etc. seemed complicated enough. We wanted to compare (even though we knew that leaving out, for instance, costs not directly related to the fatalities, would inevitably bias our figures) what the society loses in transport accidents and what it invests in order to reduce those losses. This task turned out to be too ambitious as the necessary information is not always available.

This annex does not respect the usual order in which we present the situation in the different Member States. As the introduction was drafted by the British partners, the section presenting the situation in United Kingdom follows it immediately. Indeed they were drafted as a whole and we did not wish to separate them as this would have made reading the document somewhat more difficult. The sections on France and Italy follow in the usual order.

7.1. Introduction

The UK Department for Transport (DfT) publishes figures for the estimated value of preventing road casualties and road accidents. The precise methodology for calculating these values has been set out in a number of publications, including Road Accidents Great Britain (RAGB) 1992, 1994 and 1997, and Hopkin and Simpson (1995). Since 1993 the valuation of prevention of both fatal and non-fatal accidents has been based on a willingness-to-pay approach. This encompasses all aspects of cost associated with accidents, both direct economic costs and human costs (such as grief, suffering etc).

A detailed discussion of the calculation can be found at

http://www.dft.gov.uk/stellent/groups/dft_rdsafety/documents/page/dft_rdsafety_026183-02.hcsp

7.1.1. Willingness to Pay Approach

The willingness-to-pay approach to injury costing was first used in 1988 by DfT to value the cost of road accident fatalities. The concept behind it is to consider what people would be prepared to pay in order to reduce the risk of being killed in a road accident. According to UK's Transport Research Laboratory's (TRL) Report 163 this approach is "*consistent with cost benefit analysis, in that decisions reflect the preferences and attitude to risk of people who are likely to be affected by them.*"

In 1993 the same method was used to revise the values for non-fatal road accidents and in 1994 other accident costs were also derived.

There are two areas of costs which have been defined; casualty related costs which include lost output, human costs and medical and support costs and accident related costs which encompass property damage, insurance administration and police costs.

Fatal Casualties – Costs

After extensive research into the value of saving road accident fatalities, the overall amount was given as £784 090 (approximately €1,15 million) in June 1994 prices. This value includes gross lost output, medical costs and human costs, which are less easy to quantify.

Lost output

Lost output, in simple terms, was calculated as the average current and future income for members of the population of the same age and gender. The process is very complex, including activity rates, economic growth, mortality rates and contributions to society.

Medical & Support

These take into account Emergency Services costs, hospital costs and other administrative costs associated with a road accident fatality.

Human costs

The human cost of a casualty is less tangible and so the figure was worked out by taking the published overall cost of a fatal road accident casualty and

subtracting the lost output and medical costs, leaving a human cost component. Human costs reflect the non-resource element of the cost of road accident casualties; the pain and distress suffered by accident victims, their relatives and friends, and in the case of fatalities, the intrinsic loss of enjoyment of life, beyond the consumption of goods and services.

Serious Casualties – Costs

Severity of an accident is defined as fatal, serious or slight. A serious injury is defined in TRL Report 163 as covering a wide range “*from a fractured finger, to those resulting in severe permanent disability, or death more than 30 days after the accident.*”

Serious injuries were divided into sub-groups according to treatment length, extent and duration of pain and recovery time.

Table 7.1. Injury state descriptors.	
Injury Code	Injury State
F	Recover 3-4 months (Out-patient)
W	Recover 3-4 months (In-patient)
X	Recover 1-3 years
V	Mild permanent disability (Out-patient)
S	Mild permanent disability (In-patient)
R	Some permanent disability with scarring
N	Paraplegia/Quadriplegia
L	Severe head injuries
Source: Hopkin and Simpson, 1995.	

Lost output

The lost output for each serious injury group was costed using three factors; the average loss of output after one year, the loss of output for those who took longer than one year to recover and the loss of output for those who suffer permanent and severe disability. Again the costing process included average annual income, based on age and gender and economic growth rates.

Medical & Support

Information on the costs of services used for the different types of serious accidents was collected, including hospital treatment, District Nurses, the provision of medical appliances and Social Security costs.

Human costs

Here the willingness to pay approach was implemented. A Standard Gamble questionnaire was used to carry out a survey of 450 people, asking them how much they would be willing to pay to reduce the risk of injury, relative to the cost of a fatality.

The respondents ranked the injury states and placed each one on a scale from 0-100 (best). The majority regarded injury state L as being as bad as or worse than death and injury state N as only slightly better than death. The respondents were also asked to specify the level of risk at which they would opt for treatment of an injury. It was then possible to convert the survey results into values relative to the value of death and as a percentage value of death. Therefore the human cost of each injury state can be expressed as a percentage of the human cost of a fatality.

Slight Casualties – Costs

Slight injuries are predominantly minor cuts and bruises, however, whiplash neck injuries are also included in this group, which often result in prolonged periods of temporary disability.

Lost output

The method to calculate lost output for slight injuries was very similar to that used for serious injuries, taking into account lost working time and lost earnings. Slight injuries were divided into those with minor injuries and those with whiplash.

Medical & Support

Again information on medical costs was collected, this time for hospital out-patients and also taking into account any possible disability as a result of whiplash.

Human costs

Again whiplash injuries were separated from other slight injuries, and the value for the injuries assessed using the willingness to pay approach. Respondents considered whiplash injuries to rank between serious injury states W and X and the value was calculated accordingly. For the other slight injuries, the survey including a question asking how much people would be willing to pay for an injury with minor cuts and bruises and complete recovery.

Other Accident Costs

Other accident costs are also calculated in TRL Report 163. Damage to property, insurance administration and police costs are costs not attributed to a particular casualty, but still occur as a result of the accident.

It is important to appreciate is that the relevant calculation of accident cost will depend on the use to which the estimate will be put. Costs can be used for the ex post (i.e. after the event) assessment of past resource losses resulting from accidents. In this case, valuations of grief, suffering etc are less relevant. However, if calculations are to be used for ex ante (before the event) investment planning and allocative decision-making then a wider view of the consequences of potential accidents must be taken.

7.2. Values - UK

7.2.1 Introduction

In general, the elements used in the costs calculations include:

- Loss of life or limb, which is a statement of fact, rather than an item in the calculation.
- Loss of productive output to the economy,
- Costs of medical treatment,
- Repair costs of damage to property,
- Dislocation costs to traffic at the scene,
- Administrative costs of police, rescue services and insurance industry,
- Grief, bereavement and pain, and
- Anxiety to friends, relatives and witnesses.

Some people are uncomfortable with costing casualties in this way, arguing that it is in some way unethical or immoral. In reality, even if explicit costings are not produced, there will be some kind of implicit valuation. By costing explicitly in this way, the government is attempting to maintain a single criterion for assessing safety investments. However, whilst this might be the position for road transport, there are big differences in the way investment in other modes is appraised. Section 7.2.2 outlines the values that are used when evaluating road transport investments. Section 7.2.3 provides estimates of the likely cost of the proposed rail accident investigation board, the investigation component of road accidents, and the actual costs of the marine and air accident investigation branches. Section 7.2.4 gives examples of rail safety investments, and the valuation of life that is implied by these investments. Section 7.2.5 draws conclusions about the different values placed on preventing a casualty on the roads as opposed to the railways, and tries to explain these differences.

7.2.2. Breakdown of Costs

Table 7.2 breaks down the total by accident severity and cost component. As can be seen from the table, according to these calculations, the average value of preventing a fatality is almost £1,5 million (approximately €2,1 million).

Table 7.2. Average costs of accident by severity.							
			Accident severity				
			Fatal	Serious	Slight	All injury	Damage only
Cost Element (June 2002)	Casualty related costs (£)	Lost output	479 750	19 520	2 320	11 410	-
		Medical & ambulance	5 400	11 700	980	2 520	-
		Human costs	952 100	132 820	11 030	41 050	-
	Accident related costs (£)	Police cost	1 460	200	40	90	3
		Insurance and admin	230	140	90	100	40
		Damage to property	8 550	3 890	2 300	2 600	1 450
Total (£)			1 447 490	168 260	16 750	57 760	1 490
Total (€)			2 140 759	248 970	24 780	85 453	2 204
Source: Department for Transport, 2002. http://www.dft.gov.uk/stellent/groups/dft_rdsafety/documents/page/dft_rdsafety_026183-03.hcsp#TopOfPage							

Table 7.3 gives the average value of preventing a casualty, by different types of road user. Note that the variation in value between classes of road user is due to differences in proportions of fatal, serious and slight casualties among each class of road user.

	£ June 2002	€ June 2002
Pedestrian	61 840	91 552
Pedal Cyclist	37 820	55 991
Bus and Coach occupants	21 100	31 241
Goods vehicle occupants	41 910	62 054
Car and Taxi occupants	32 940	48 774
Motorised two-wheeler riders and passengers	68 950	102 095
All motor vehicle users	34 900	51 677
Average, all road users	40 290	59 661

Source: Department for Transport, 2002.
http://www.dft.gov.uk/stellent/groups/dft_rdsafety/documents/page/dft_rdsafety_026183-03.hcsp#TopOfPage

According to Highways Economic Note (1) (Department for Transport, 2002), the total value of road accident prevention in Great Britain (2002) can be summarised as per table 7.4:

Category	Total number	Cost (£ million)	Cost (€ million)
Fatal	3 124	12 808	18 965
Serious	30 521		
Slight	188 106		
Damage only	3 300 000	4 951	7 332

Adapted from Department for Transport, 2002.

This gives a total value of prevention of all road accidents of £17 760 million (approximately €26 214 million). Since it is calculated using a willingness to pay approach, it represents the ex ante benefit of avoiding road accidents, rather than the ex post value of the resource costs of having them.

According to the DfT, the total annual cost of rail accidents is somewhere in the region of £105 million (€155 million), compared to over £17 000 million (€25 000 million) for road accidents. Additionally, the figure for rail accident casualties

includes the cost of worker injuries and fatalities. Some road casualties and fatalities involving workers are not included in the figures, as they are categorized as construction industry casualties. Clearly the inclusion of these additional casualties would further increase the road accident costs in comparison to those for rail.

7.2.3. Safety Decisions Based on Costs

Having derived a methodology for valuing casualty prevention, it is important to spend a little time considering how these costings are used in implementing policy.

There are several theoretical models on which investment decisions in safety could be based. These include:

- to eliminate all injury-accidents wherever they occur regardless of risk,
- to reduce the risk of injury below some pre-determined “safety standard”,
- to achieve the maximum overall reduction in casualties within a given budget, and
- to achieve an equal marginal rate of return on all safety investment.

Hills and Jones-Lee (1991) state that *“Many... argue that safety is not essentially an economic matter, and that improvements should be sought, if not actually ‘regardless of the cost’ at least in a way which is consistent with some predefined targets.”*

There are a number of problems with this approach, not least that if the standard is set too high, resource costs make the objective unrealistic. Of course, the pragmatic response to this is generally to set standards so low in the first instance as to make no difference. Additionally there is a problem not just in determining the absolute safety standard that should apply, but also in the allocation of resources to competing schemes within the given budget. It is likely that this would be done on the basis of “applying the most grease to the squeakiest wheel” (i.e. by committing resources to locations with the most accidents). Where this approach fails is in taking no account of the likely effectiveness of resources invested in different schemes.

In the UK, investments in road safety are evaluated on a cost-benefit basis. Taking the case of a local authority as an example; the authority will have responsibility for non-trunk roads through an area. It will receive data on road accidents from the relevant police force, which it will monitor over a rolling three year period. It will assess the data for evidence of any accident clusters, either “by eye” or using relevant software. These could be clusters around a junction, along a route, or of similar accidents in a geographical area (for example, pedestrian accidents in one area of a town). It will then design a scheme, estimate the likely cost of implementing it, and estimate the likely casualty savings resulting from its implementation. The scheme will be monitored, and a first year rate of return for the scheme will be calculated, based on the cost of the scheme, and the realised benefits in terms of accident reduction.

7.2.4. Costing Accident Investigation

Since there is no one body with dedicated responsibility for investigating road accidents, it is difficult to estimate the accident-investigation component of the cost of road accidents. However, for the maritime and aviation industries, these bodies exist, so their costs can be calculated. In addition, the proposed rail accident investigation branch has also been costed. These calculations can be used to produce some broad estimates for the resources that should be invested in road accident investigation, considering the relative scale of the problem across the different modes.

Table 7.5, below, shows the staffing structure of the Aviation Accident Investigation Branch (AAIB), Maritime Accident Investigation Branch (MAIB) and proposed structure for the Rail Accident Investigation Branch (RAIB).

Table 7.5. Staffing structure of the accident investigation boards.			
Personnel Status	AAIB	MAIB	RAIB
Chief inspector	1	1	1
Deputy CI	1	1	1
Principle Inspector	4	3	2
Inspector	26	10	6
Support staff	14	11	8
Total	26	26	18
Source : www.rail-reg.gov.uk			

Of course, since the scale of the accident problem on the roads far exceeds that in the other modes, one might expect that the resources invested in road accidents should exceed that in the other modes to a similar degree. However, it is unlikely that it could ever be practicable to carry out road accident investigation on the level or to the depth that it is in the other modes of transport. Nevertheless, it is perhaps reasonable to suggest that road accident investigation should attract at least the same level of funding as is deemed appropriate for the other modes.

Table 7.6, below shows the costs of running the AAIB and MAIB, and estimates of the costs for the RAIB

Table 7.6. Expenditure on accident investigation branches (£ and € thousands).				
	Staff costs (£k)	Running & other cost (£k)	Total cost (£k)	Total cost (€k)
AAIB	2 720 (75%)	916 (25%)	3 636	5 366
MAIB	929 (64%)	522 (36%)	1 451	2 141
RAIB	1 000	400	1 400	2 066

Source: www.rail-reg.gov.uk.

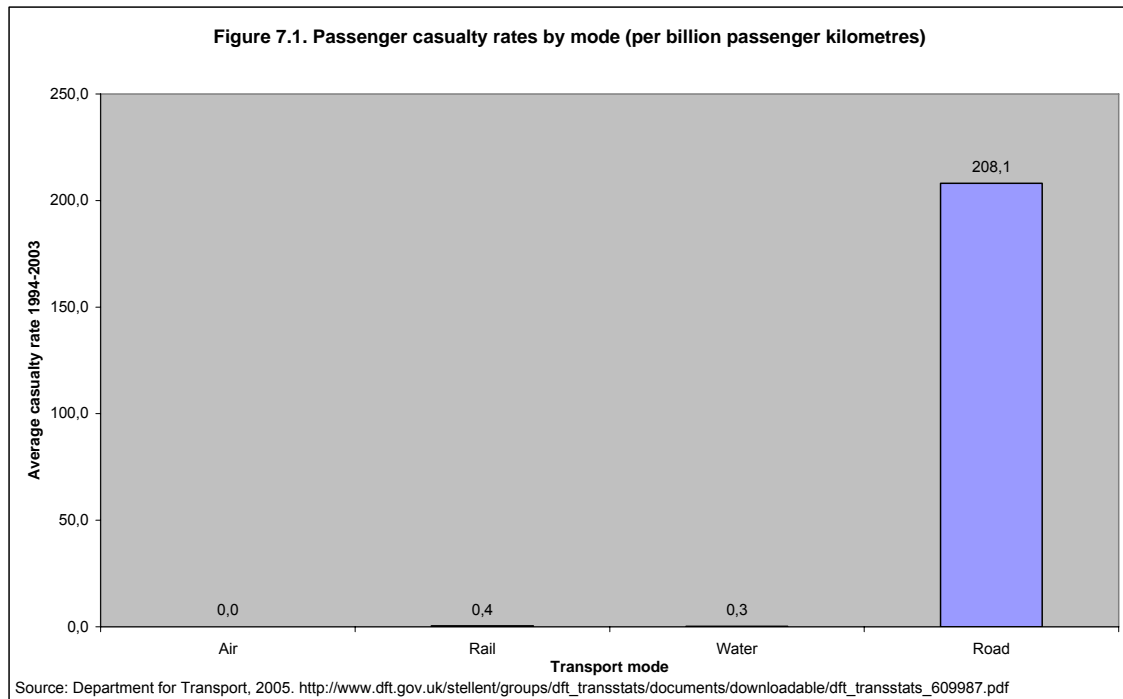
For more detail on how the projected figures for RAIB have been calculated, see www.rail-reg.gov.uk.

It should be noted that in the case of the RAIB, these costs represent additional costs, to some extent. The railways are already required to cooperate on safety matters with the Health and Safety Executive (HSE) and the British Transport Police (BTP). Both of these bodies will retain an interest in the investigation of rail accidents. So, for example, where an accident involves criminal activity, the BTP will take the lead in any resulting investigation.

The DfT estimates that the potential benefits of a rail accident investigation branch would exceed the costs if the reduction in accidents resulting from such a body was as small as 2.5% by 2012 (www.rail-reg.gov.uk). Similar calculations for road accident investigation would be possible, but would depend very much on the form and scope envisaged for such a body. For example, would a road accident investigation board investigate only fatal accidents, multiple fatalities, accidents involving vulnerable road users, or a sample of all road accidents (based on some pre-determined criterion)?

7.2.5. Case studies

Figure 7.1 (on the next page) shows the contribution to total transport fatalities of each mode, for the years 1993 to 2003. Whilst it is not particularly relevant to the discussion on casualty valuation, it is nevertheless a useful pictorial aid. It demonstrates quite clearly the contribution to accidental deaths the different modes are responsible for. Whatever scale is chosen, and whichever measurement method, the number of road fatalities dwarfs those of the other modes.



Having outlined in the previous section the rationale on which investment decisions in road safety are based, and the level of resources invested in accident investigation in the other modes, this section will attempt by means of case studies to draw some comparisons between valuations of life in the road and rail sectors. Whilst the two are very different in terms of the number and scale of incidents, the likely severity of outcome for those involved, and the way in which investment decisions are taken, the rail industry is a useful one against which to benchmark road transport.

Case study 1 – Automatic Train Protection

The debate about the introduction across the UK rail network of Automatic Train Protection (ATP) was fuelled by the accident at Ladbroke Grove near London's Paddington Station, on October 5th 1999. It was one of the recommendations of the enquiry that followed (the Cullen Enquiry) that the rail network be fitted with this technology. However, the potential cost (as well as the reliability of the technology) has always been an issue. What follows is an excerpt from an article by the respected rail analyst Christian Woolmar, in which he outlines some of the main criticisms of ATP, and in particular the different approach taken to safety investments on the railways compared to the roads.

According to the opening statement by counsel at the joint Cullen/Uff inquiry ... it was initially thought that the whole fleet and 5,000 signals could be fitted (with ATP) for £33m. By the time of the accident, the cost had risen to about £220m for Railtrack alone. Now the cost to Railtrack has increased to £361m, to which must be added the costs of fitting rolling stock, now thought to be £100m. So given that ATP is now reckoned to cost £1.6bn, it is quite feasible that the eventual cost would be double. That's £50 for every person in this country. In a little-publicised section of the same statement by counsel, he explained that the 'Value Per Life' figure – the amount which is assessed as reasonable

to spend if one life were saved – used to justify road improvements is currently around £1.15m. This is a theoretical figure and, in fact, the amount of money available for road investment means that the real amount is around £100,000... Yet, for the railways, the current figure – which is a real rather than a theoretical one – is £3.22m.

In other words, it can be suggested that the value of preventing a fatality on the roads is £1,15 million (€1,70 million), in reality we spend only around £100 000 (€147 555) because of resource constraints, but on the railways an investment of £3,22 million (€4,75 million) to prevent a fatality is not thought unreasonable.

Case study 2 – Train Protection Warning System

The train protection warning system was developed in response to the persistent problem of conflicting movement SPADs (signal passed at danger) on the rail network. It was developed as a lower cost alternative to Automatic Train Protection (ATP) and was predicted to reduce ATP-preventable casualties by about 70%. (Evans, 2000). Evans (2005) estimates that the cost per fatality or equivalent fatality prevented by the introduction of TPWS is £10,8 million.

According to Taig (1999) “every time we add an extra costly feature to a public transport service we make an already very safe mode of transport just a little bit less affordable, accessible and attractive to the public...”

7.2.6. Conclusions

This section has presented the UK situation for casualty prevention and the cost of accidents within the main transport modes. The figures indicate the current discrepancies between safety and prevention spending across road and non-road transportation modes. Some interesting issues for accident investigation have been flagged which will need to be considered in the development of the WP4 best practice guidelines, including when to investigate accidents, how to investigate and the individuals who conduct the investigation, and the associated cost benefits of accident investigation processes.

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7.3. Valuing casualty prevention in France.

7.3.1. Introduction

When Jacques Chirac was re-elected as president in 2002 he made road safety and the reduction in the number of fatal accidents one of the three priorities for his term in office. Between 2002 and 2004 spending on road safety (infrastructure and police costs included) increased by €213 million and during that same period the number of deaths fell from 7 242 in 2002 to 5 232 in 2004. It seems from these basic figures that France is taking seriously the problem of road safety but how does this compare to other forms of transport? What is the socio-economic cost to France of all these road accidents?

This section starts out by outlining how the costs are estimated for both private road transport and public transport. The proposed spending on road safety and the budget of the different accident investigation bureaux is then presented to show what is invested in each form of transport to reduce the number of casualties. However it is not possible to compare these figures across the different transport modes due to the lack of detail relating to types of investments/budgets etc.

7.3.2. Breakdown of socio-economic costs for transport accidents in France.

Private transport

The methodology for estimating the socio-economic costs of road accidents in France is based upon a 1992¹ study which set out the broad guidelines still in use today. The human capital approach is used to calculate the cost of death or injury. The figures and methodology were revised in 1999 to take into account the different practices in other countries. The overall cost of a crash is broken down into three groups, the direct costs, indirect costs and non-market costs.

The direct costs are all the costs directly caused by the accident such as medical and social costs (emergency services, medications, physiotherapy, home help and, in the case of a fatality, funeral costs), material costs (vehicle damage, property damage, damage to public or private land) and general expenses (fire and police expenses, administrative expenses, judicial and expertise expenses).

The indirect costs make up the largest part of an accident's cost and they are calculated using the human capital approach. For those killed in a crash the loss of future output/income represents the cost of a human life, for those who did not work the potential loss of output is estimated. As for the injured their temporary loss of output is estimated. Also included in the temporary loss of output are people put in prison following an accident, the people stuck in traffic because of an accident, and even the loss of output of other members of the injured person's family.

The non-market costs are items that can not easily be given a monetary value; these costs are based on assurance companies' jurisprudence. In the case of a

¹ Le Net (1992) Prix de la vie humaine, application à l'évaluation du coût économique de l'insécurité routière.

death the following damages are taken into account for those close to the victim; sentimental damage and pain and suffering damages. In the case of those injured the pain and suffering, disfiguration, and loss of life amenities damages, amongst others, are used for the calculation.

In 1999 the figures were updated, for every death on the road the cost to society was estimated as €602 231. This value was still rather low when compared to other countries' figures so in 2001 a working group¹ was formed to, amongst other things, update the methodology used to calculate the socio-economic cost of road traffic accidents. Instead of carrying out a detailed empirical study to reevaluate the costs in France the report's authors based their analysis on recent studies carried out in the domain. The report shows that the French estimation was at the lower end of the scale compared to other European countries. Based on the other studies a value of 1 million euros in 2000 prices was given for the cost of a fatality. As for the cost of serious and slight injuries the report concludes that further work is needed in this area and that they should be estimated as a fixed proportion of the fatal accident value, which has been the case since the 1992 report. A serious injury has the socio-economic cost of 15% the fatal accident value and slight injuries equal to 2,2%; therefore €150 000 and €22 000 respectively. The report authors recommend that the value increases each year at the same rate as per capita household consumption. Therefore the value of a death on the roads in 2004 is equal to €1 130 914. The table below shows the different values for each category of injury plus the total cost in 2004.

	Cost per person killed injured (in €)	Total number	Total cost (billion €)
Fatal	1 130 924	5 232	5,9
Serious injury	169 937	17 435	3
Slight injury	24 880	91 292	2,3

Source: Observatoire national interministériel de sécurité routière, 2005.

The above is just the cost of the lives lost or the injuries, to that you must add any material damages incurred. In 2004 there was 85 390 accidents involving at least one injury, the material damage of all these accidents was estimated as 0,5 million euros for 2004. In addition to the accidents which caused an injury there are many that only cause material damage, the cost of these accidents is based on insurance companies' statistics and is estimated as being €12,6 billion. In total the cost to the nation of road traffic accidents was €24,3 billion in 2004. To reduce by 1 the number of deaths on the road it would have been cost effective, in 2004, to invest €1,13 million in road safety measures, equally this value would also be cost effective in reducing by 6 the number of serious

¹ Boiteux and Baumstark, 2001. *Transports : Choix des investissements et coûts des nuisances.*

injuries and by 45 the number of slight injuries. This doesn't include all the non-reported accidents per fatal accident that may be prevented from happening by the measures.

Public transport

Like many other countries little work has been done on estimating the socio-economic costs of public transport accidents (buses, trains, planes etc). The 2001 Boiteux report mentioned above briefly analyses their costs. Initially the report says that it is difficult to justify a difference between 2 deaths but from a perspective of cost-benefit analysis it is possible to envisage a situation where the two are valued differently. Previous studies note that the public seems more willing to pay to avoid a fatal public transport accident than for a private transport accident. These studies are uncertain and varied but it is difficult to deny that there is a difference between the two. The report presents the following explanation. In private transport safety demands are split between the user and the body in charge of the infrastructure. The user has some control over the risk by buying a car with more safety features or by changing his behaviour. The organisation in charge of the road infrastructure is also responsible for reducing the risk and increasing the safety, for example by improving a poorly designed junction. As for public transport the user is completely passive, they can not do anything to improve their own safety. Finally the report states that public transport accidents affect to a greater extent public opinion because of the scale of it and the coverage in the press. All these reasons must be treated with prudence and more studies need to be done, as with all these estimations. The working groups therefore advise a value of €1 500 000 (2000 value) per fatality for a public transport accident. A fatality in public transport costs therefore 50% more than a fatality in private transport. In 2004 prices the value is equal to €1 696 371 per fatality.

7.3.3. Safety Decisions Based on Costs

The annual road safety statistical publication¹ outlines all the different safety initiatives (policies, safety campaigns etc) undertaken during the year in question but there is no discussion about the cost of these measures. The global budget of what the government plans to spend has been published since 2001 in the *budget jaune*, it gives the budget for all the relevant ministries namely the Transport Ministry, Interior Ministry, Ministry of Defence, Education and Research. Included in the total of what the government spends on road safety is road infrastructure improvements, money spent on law enforcement, education and advertisement campaigns, amongst others. In 2005 the French government intends to spend a total of €1 725M on road safety with the Transport Ministry and the Ministry of Defence spending the most (€657,99M and €471,45M respectively). A detailed breakdown of how the money is split between the different departments is available in the *budget jaune*, although there is no analysis of how much a certain policy initiative is calculated to cost. It includes not only what is done on a national level but what is happening on a regional level as well as what private vehicle manufacturers are doing in favour of road safety. It is impossible from this document to say if and how the government takes into account costs when deciding upon safety measures.

¹ La sécurité routière en France, Bilan de l'année en 2004

The *Conseil National de la Sécurité Routière* (2005) recently recommended 9 safety measures that should be put in place ranging from using headlights during the day, reducing the legal alcohol limit to the suppression of lateral obstacles. Very few details are given in this document on the costs of these measures – it is not known in many cases whether they are even studied in a serious cost-benefit appraisal.

To conclude it seems that it is possible to have a very general figure for what is spent on all road safety measures but not for specific ones. It is unclear how the governments decided to invest its money in road safety measures and whether the safety decisions are based on costs or not.

7.3.4. Costing Accident Investigation

In France there is no dedicated accident investigation authority that systematically investigates all road traffic accidents. The police fill in reports for all accidents in which at least one person is injured but it does not go into detail about the causes and the quality of these reports tends to vary depending on the location of the accident and its severity. The situation is very different for other transport modes.

BEA civil aviation investigates all air accidents to determine the circumstances and the causes of the accident, whether the aircraft is private or public transport. Its budget was €3,4M in 2004. They investigated 329 incidents which included 90 fatalities.

Maritime accidents are investigated by the *BEA*mer. Its budget was equal to €318 163 in 2004. They investigate about 200 accident/incidents each year. The accidents investigated in 2002 included 22 fatalities.

As for inland transport modes, road, rail, canal and even cable ways, it is the BEA-TT that investigates these accidents. However it does not investigate all accidents, only serious events generally involving public transport. In 2004 only 10 events were investigated. In 2004 the budget put aside for the BEA-TT was equal to €240 000.

As there is no permanent accident investigation in France for road traffic accidents it is impossible to directly compare the spending of the different accident investigation bodies. Therefore it is difficult to give a value for preservation of life on the different transport modes. To some extent the fact that there is no dedicated accident investigation team and the scale of the problem (85 390 accidents involving at least one injury in 2004) shows that the value of a private road users life is “worth” less than those on public transport and where the accident is more “spectacular”.

7.3.5. Conclusions

Values for casualty prevention have been calculated in France since the start of the 1990s but details of how they are calculated and also how they are used is unclear. The methodology used gives higher values to those killed or injured whilst on public transport (buses, trains, planes, and boats), one third higher than private road users (car users, cyclists, pedestrians etc). The reasoning behind this seems plausible enough; public transport users are completely passive and can not reduce the risk of having an accident, whereas private road

users can, to some extent. The fact that there is no dedicated independent investigation authority supports this practice. It would be interesting to confirm that there is under spending in road safety compared to other modes by having more detailed budget information or examples of cost benefit analysis for infrastructure investments in both road and rail. Unfortunately this is not available and there are no hard figures which show that the value of a casualty prevented on the roads in France is worth less than other transport mode casualties. It is possible to speculate about this but the figures in France aren't available.

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7.4. Values – Italy

7.4.1. Introduction

In Italy, it is not possible to perform a reliable road accidents cost-benefit analysis. This is mainly due to the lack of knowledge on: the exact amount of economic resources allocated to the implementation of road safety measures, on detailed information on the implemented measure (e.g. type, location, etc) and on benefits related to their implementation in terms of reduced number of injured and victims.

However, even if a lack of knowledge on road safety measures' benefits exists, a raw estimation of costs related to road accidents is published yearly by the National Institute of Statistics (ISTAT).

ISTAT estimation on road accidents costs is based on both direct and indirect costs; in details, the analysed monetary indicators are:

- loss of productiveness;
- human costs, these are split in two sub-categories: moral damage and biological damage. This approach has been chosen in order to distinguish a fatality from an accident related invalidity;
- medical and hospitals costs; and
- damage to things and other costs.

It should be noticed that road accidents costs estimation are underestimated due to the underestimation of ISTAT data. More precisely, a comparison on the total number of road accident victims detected either by ISTAT and by Hospitals, in the time period 1984-1994, showed an under-estimation of the former of 25-30%.

An innovation has been introduced in year 2000 by the Ministry of Transport with the publication of the Road Safety National Plan (PNSS), where criteria to allocate resource among different regions and road safety measures have been introduced. These are based, among other, on the estimation of road accident social costs.

7.4.2. Breakdown of Costs

In 2002, the estimation of costs related to accidents for Italy, has been equal to €34 108 million.

Accidents data source is the ISTAT that is responsible for all fatal and injured road accidents data gathering, and from ISVAP (*Istituto per la vigilanza sulle assicurazioni private e di interesse collettivo*) that is a body with functions of control and supervision of all national insurance companies.

To take into account the underestimation of the total number of accidents due to the local administration under-reporting to central statistical offices (ISTAT), a correction factor has been introduced.

In Table 7.8 and Table 7.9 casualty related costs and accident related costs are reported by type of cost and severity (reference year 2002).

Table 7.8. Total road accident related costs by element of cost in year 2002.

Cost Element (in million €)						
Casualty related costs			Accident related costs			
Lost output	Medical and ambulance	Human costs	Police cost	Insurance	Damage to things	TOTAL
11 017	665	6 361	1 999	3 661	10 404	34 108
Source: ISTAT, 2002.						

Table 7.9. Total road accident related costs by severity in year 2002.

Category	Cost (in million €)
Fatal	9 320
injured	8 723
Damage only	16 064
Source: ISTAT, 2002.	

According to cost values reported in tables 7.8 and 7.9 the average social cost of a victim and of an injured person have been calculated.

The average social cost of a road accident victim is 1 134 056€; it takes into account medical costs, the lost of productiveness and the *moral cost*.

The average social cost of a road accident injured person is 21 161€; it is calculated taking into account the same cost categories used to estimate victims' social costs. In absolute terms, it can vary from 10 000€ up to a maximum of 750 000€ according to injury severity. The reason for such a low average cost is due to the high number of slight injury that represents almost 80% of the total.

7.4.3. Safety Decisions Based on Costs

An important innovation in terms of safety decision based on cost has been introduced in 2000 by the Ministry of Infrastructures and Transport by means of the Road Safety National Plan (Piano Nazionale della Sicurezza Stradale - PNSS).

The PNSS has been designed to reduce the number of road accident deaths and serious injuries by 40% by 2010, as foreseen by the European Commission *White Paper. European Transport Policy for 2010: time to decide*. It can be considered the national strategic planning tool for road safety, pointing out the

objectives and actions that each Region should undertake to improve road safety at local level.

Moreover, it provides the resources allocation criterion used by the Ministry to split economic resources among the different territorial area (e.g. regions). It is based on the comparison of a specific parameter that makes it possible to evaluate the total social cost related to road accidents and its trend over the last 5 years.

In addition, the PNSS defines specific criteria to determine monetary investments among different road safety measures. These are based on the following remarks:

- Investments have to be proportional to accident related costs.
- The difference between total investments on road safety during the PNSS operational time period (10 years) and total benefits (in term of reduction of accident costs) must be positive, and the ratio between above mentioned investment and benefits should never be lower than 70%.
- Among all the economic resources assigned by the Transport Ministry to road investments, the quota allocated to the implementation of road safety measures should progressively get to a 10-20% value, for intervention on national and local road networks, and to a 5-6% value, for intervention on highways;

Applying these criteria the Ministry of Transport has been able to identify a maximum budget to assign (by means of the PNSS) to road safety investments. It should be noticed that this budget estimation is effected by two limitations: a lack of knowledge on benefits related to road safety measures implementation and a lack of a systematic monitoring procedure on road safety economic investments and accidents reduction.

7.4.4. Costing Accident Investigation

In Italy, road accidents are investigated by police authorities (e.g. Police, Road Police, Carabinieri, Guardia di Finanza, and Municipality Police within the borders of their municipality) and a specific accident investigation body does not exist; all information collected by police authorities are then sent to ISTAT. Since a specific accident investigation does not exist it is difficult to estimate costs related to it.

For the other transport modes (aviation, maritime, rail), aviation is for the time being the only one with a specific investigation body. This body is called Agenzia Nazionale per la Sicurezza del Volo (ANSV that is National Agency for Flight Safety) and it was established in 1999.

At the end of 2003, ANSV counted a total number of 23 persons (six of them inspectors), due to the need of other technical resources to carry out accident investigations, five other inspectors have been hired during 2005. The lack of inspectors and in general of staff is mainly due to decreasing funds allocated to the Agency. In 2003, ANSV financial report highlighted a total personnel costs of about €1,5 million.

Due to huge differences existing between accident investigation activities in aviation (few cases deeply analysed) and in road safety (very high number with a not such detailed analysis), it is not easy to transfer aviation experience into road safety area. However, economic resources allocated to aviation could be considered as a reference budget for road safety since no reasons exist to allocate a minor budget to it.

7.4.5. Conclusions

In Italy, an accurate cost-benefit analysis on road safety investments can't be easily performed due to a lack of knowledge of: the exact amount of economic resources allocated to the implementation of road safety measures, of detailed information on the implemented measure (e.g. type, location, etc) and of the benefits related to their implementation in terms of reduced number of injured and victims.

In 2000, the Ministry of Transport published the Road Safety National Plan (PNSS) that introduced innovation on the criteria used to allocate resources from central administration to regions and on the estimation of the impact of road safety measures implementation. These criteria take directly into account social costs related to road victims and injured; an average value has been estimated for this calculation on the basis of National Institute of Statistics (ISTAT) data. In details, the average monetary value for a road accident victim has been settled equal to 1 134 056€ while for an injured person equal to 21 161€. The reason of such a low average cost for injured is due to the high number of slight injuries that represents almost 80% of the total.

The PNSS represents (in Italy) the first attempt to introduce a standardized methodology to identify the most suitable road safety measures on a cost basis. These include both investments costs (e.g. design, implementation etc.) and social costs (average fatal and injured costs).

Some difficulties arose to evaluate costing for road accident investigation due to the lack of a dedicated body. Therefore, a draft estimate of economic resources that could be allocated to road accident investigation has been performed analysing other transport mode (aviation, maritime, rail) accident investigation body, if any existing. The only transport mode that had such investigation body is the aviation (ANSV) for whom a total budget of €1,5 million has been disposed by the Transport Ministry in year 2003. Even if huge differences exist between accident investigation activities in aviation and in road safety this resource allocation could be considered as a reference budget for road safety since no reasons exist to allocate a minor budget to it.

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