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A European Fatal Crash Database

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ABSTRACT

A lack of representative European accident data to aid the development of safety policy, regulation and technological advancement is a major obstacle in the European Union. Data are needed to assess the performance of road and vehicle safety and is also needed to support the development of further actions by stakeholders. This short-paper describes the process of developing a data collection and analysis system designed to partly fill these gaps. A project team with members from 7 countries was set up to devise appropriate variable lists to collect fatal crash data under the following topic levels: accident, road environment, vehicle, and road user, using retrospective detailed police reports (n=1,300). The typical level of detail recorded was a minimum of 150 variables for each accident. The project will enable multidisciplinary information on the circumstances of fatal crashes to be interpreted to provide information on a range of causal factors and events surrounding the collisions.

1. INTRODUCTION

Each year within the European Union (EU-15), there are approximately 40,000 people killed on the roads and over 1.7 million people injured (European Commission, 2005a). Such incidents cost the Community over 180 billion Euros annually, equal to 2% of the EU's Gross National Product (GNP). With the growth in the number of EU member states (to EU-25), the European road death toll is set to increase to even more dramatic heights. To put these figures into perspective, "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" and for Europeans under 45 years of age, road crashes are the largest single cause of death (ETSC, 1999).

The number of people killed and injured on the roads started to decrease considerably from 2002 onwards (European Commission, 2005b), with improvements year on year for 2003 and 2004. However, there has not been such steep decline in the overall number of crashes. Incidents are still occurring frequently, although improvements in vehicle design and trauma management have helped to reduce the severity of injuries to the people involved in accidents, the number of slight injuries has not decreased. Despite these improvements in injury outcomes, it is estimated that 97% of all socioeconomic costs for transport crashes within the EU are as a result of those on the roads, and that 97% of the transport related fatalities occur in the road sector (ETSC, 1997).

1.1 Effective development of countermeasures

The EU target of a 50% reduction in fatalities on the roads by 2010 (European Commission 2005a) will only be achieved by the introduction of the most effective countermeasures. It relies on the existence of basic knowledge of crashes and their causation and the availability of road safety data to monitor and assess performance. Reduction of road casualties through vehicle design is typically achieved by taking an 'Active' or 'Passive' safety approach. Passive safety normally involves the implementation of safety technology within the vehicle which is specifically designed to reduce injuries in the event of a crash; airbags and advanced seat belt technology are prime examples of such devices. In more recent times, there has been much activity and research in the field of 'Active safety'. This approach is traditionally associated with technologies that are likely to result in crash avoidance and such technologies include Intelligent Speed Adaptation (ISA), Enhanced Stability Programmes (ESP) and Lane Departure Warnings (LDW). These technologies are implemented into the vehicle as information and control devices with the specific intention of ensuring that every measure is taken to prevent the crash from happening in the first place. Most modern vehicles are equipped with a suitable range of both Passive and Active safety devices such that if the Active safety measures are ineffective and a crash becomes inevitable, a level of protection of the occupants can be assured in the crash through deployment of the Passive safety systems.

Accompanying the development of Active safety systems is recognition of the need for good quality representative crash causation data within the European Union so that such technology can evolve with specific consideration to the nature, circumstances and causes of real-world crashes. However, not only are data required for technological development - they are also seen as essential for the purposes of the development of safety policy and monitoring of regulation within Europe. Data are needed to both assess the performance of road safety stakeholders and also to support the development of further actions. An analysis conducted by the European Transport Safety Council (ETSC, 2001) identified that no single crash database could meet all of the needs and that there were in fact still major gaps particularly in respect of both in-depth crash and injury causation. Specific policy questions at EU level include the role of infrastructure in crash causation, the monitoring of progress towards the 2010 casualty reduction targets and in particular, the role of vehicle and road design in crash and injury causation.

2. SYSTEM DEVELOPMENT

2.1 European Fatal Crash Data Collection Process and Data Resource

The main purpose of the task was to build an effective data gathering structure to ensure that specific data on fatal crashes can be gathered in a systematic and routine manner, with a bias towards understanding and recording crash causation to assist in the development of countermeasures. The data has been collected using completely compatible methods although there may have been variations between teams according to differences in local infrastructure. This activity has included the development of a broad ranging intermediate level, fatal crash database by obtaining reports of police fatal crash investigations from a number of EU Member States participating in the SafetyNet project (including France, Germany, Finland, The Netherlands, United Kingdom, Italy and Sweden). The data itself is of an intermediate level of detail but covering a representative sample of fatal crashes in each country. There have been no new investigations but research teams from each partner country have brought together available information from within the existing police and other emergency services structure. The information provided in the database has provided enhanced knowledge of the factors involved in fatal crashes at EU level and has made good use of the detailed information collected in the police fatal investigations. The dataset has been systematically selected according to a defined sampling plan and the data are representative of the countries in which the data are collected. The main data collection period involved a representative sample of between 2% and 10% of the fatal crashes in each country covered, depending on the magnitude of the fatal crash population. In all, 1,296 fatal accident cases, involving at least 1 fatality per crash, were collated and analysed. These data describe the environmental factors, vehicle and driver factors to provide a description of the

whole crash. Specific areas of data describe the overall crash circumstances, driver and vehicle characteristics, specific road infrastructure features, and descriptions of other crash participants.

3. RESULTS

The results of the analysis are still being collated and will be published in a forthcoming series of reports, paper and other dissemination media. It was not possible to include any analytical results in this paper although table 1 shows the composition of the resultant database in terms of the vehicles and the road-users involved. By far the largest sub-group within the database were the passenger cars and their occupants which comprised 57% of the 'vehicles' grouping and 65% of the road-user groupings.

Total cases 1296		
	Vehicles	Road Users
Car	1340	2249
Motorcycle	282	303
Truck	218	231
Bicycle	128	128
Van	86	116
Pedestrian	-	259
Other	336	158
Total	2390	3444

Table 1 – Final database Composition According to Vehicle Class and Road-User Type

4. DISCUSSION

In-depth crash databases contain the necessary post-crash information for analyses of causal factors in crashes. They often contain the detailed injury and vehicle crash data generally gathered by teams of medical and technical experts and police specialists soon after a severe incident. These combined details of road crashes are indispensable for input to road safety regulation.

This project demonstrates (i) the efficient use of existing high quality and under-utilised information resources and the use of such to understand crashes and develop effective countermeasures, and (ii) the development of a novel data capture and categorisation system with the use of existing infrastructure to collect high quality, multidisciplinary crash causation data. Crash causation databases traditionally contain the necessary details of the pre-crash data, where the other databases either contain hardly any data on the pre-crash phase of the incidents or only post-crash data. Self-evidently pre-crash data are indispensable for the analysis of effective countermeasures to prevent road crashes. Since the focus on the relevant pre-crash data generally differs for incidents of different road users, there are activities on crash causation data gathering for car crashes, for motorcycle crashes and pedestrian crashes; the latter two for obvious reasons also include data that are relevant for the causation of injuries. Some national crash causation studies have been carried out in several Member States, either in connection with the in-depth injury causation work (e.g. Medical University of Hannover) or by the police in routine recording of incidents and casualties in the national crash database system (e.g. Great Britain). Additionally, some previous studies have been conducted: The Association of European Car Manufacturers (ACEA) has conducted a European Accident Causation Survey on car crashes with financial support from the European Commission. The focus on research interests of the car manufacturers for this study on the pre-crash conditions of car crashes is quite understandable, since improvement of pre-crash conditions may focus more on road infrastructure as much as vehicle design. However, great care must be taken that any database is independent of the major stakeholders if it is to be used to inform public policy and evaluate the effectiveness of safety systems in an impartial way.

Future directions in pre-crash technology, including that undertaken by the eSafety group involve the development and implementation of many technologies that have the potential for casualty reduction

and a representative research in-depth database is needed to ensure that strategic decisions over systems development are directed by estimates of casualty reduction under real-world conditions. Rigorous statistical analyses of data will be undertaken in the coming months now that the database has been finalised and subjected to quality control reviews. These analyses will be reported on in the coming months.

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