Interim Report and Recommendations of the Accident Causation Analysis Working Group

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Introduction

The Accident Causation Analysis working group of the e-Safety Forum has been in existence for almost two years, which was the original period for the mandate of the group when it was established. The working group was asked to undertake the work to carry out the relevant recommendations that were agreed at the first Forum meeting in November 2002. The recommendations were :

1. Consolidate analyses from the existing EU, Member State and industry road accident data, which give information on the cause and circumstances of the accidents, for allowing the determination of the most effective countermeasures, starting from the most frequent accident types.

2. Define a common format and structure for recording accident data in the EU countries. Develop jointly an European Accident Causation Database covering all EU and enlargement countries, and provide open access to industry and public agencies.

Status

The activity of the working group to meet the requirement of these two recommendations has been under five main headings.

1. Analysis of existing data

The working group carried out a detailed analysis of existing data sources *(Annex 1)*.

- The data sources were assessed on three criteria, which yielded a mixed picture.
- The task to interrogate these data sources was defined.
- A strong recommendation was made that the task of interrogation of the existing data sources be included in a project call in the near future.

2. Links with other connected initiatives and projects

The working group has tried to ensure that duplication of effort was avoided by forging good links with other projects and initiatives. This include :
MAIDS, ETAC, SafetyNet, APROSYS, and a number of national initiatives.

3. Stakeholder Workshop

One element of the task to interrogate existing data sources was the development of the research questions that need to be answered. To help in this and to enhance transparency, a multi-stakeholder workshop was held on 30 June 2004.

4. Development of the short term research questions

The questions that need to be answered during the interrogation of existing data sources have been developed in a report *(Annex 2)*. The questions consist of :

a) Diagnostic questions relating to :

- Infrastructure
- Human factors
- Accident types
- Vehicle safety
- Specific users
- Risk factors
- Discrepancies

b) Evaluation questions relating to the physical benefits from saved lives, reduced injuries and number of accidents from clearly defined safety systems

- Methods
- Results
- Side effects

c) Transversal questions

- European perspective
- Prospective angle
- User acceptance

5. Execution

The above analysis resulted in the clear identification of the need for resources to carry out this interrogation. It is now anticipated that this will be done following an appropriate call. This work should ensure that e-Safety recommendation 1 is fulfilled.

Next steps

The work to carry out the interrogation should now be handed on to the successful project consortium.

There is a need to maintain some continuity between the work that has been done by the working group and that which will be carried out by the project group.

In the future it would also be useful to maintain a bridge between the e-Safety initiative and other activities in accident analysis.

The longer term recommendation of the e-Safety Forum to define a common format and structure for future accident data is being led by Safety and accident causation analysis working group members are in touch with this work and would wish to remain so. This SafetyNet work should fulfil the requirement for e-Safety recommendation 2.

In view of the above, the e-Safety accident causation analysis group recommends that it disseminates the work and reports produced so far and then invoke a temporary moratorium until results from these other initiatives begin to appear or are available for discussion. The work of the group could then recommence to maintain contact and continuity.

Annex 1: Analysis of Existing Data Sources

Accident Causation Analysis WG

ANALYSIS OF EXISTING DATA SOURCES

AIMS

a) To evaluate the essential characteristics and use potential of a sample of European accident causation databases.

b) To assess the extent to which the sampled databases would fulfil the objectives necessary to develop a better understanding of accident causation using existing data sources.

OBJECTIVES FOR USE OF DATA SOURCES

- Description of accident (qualitative) – combination of factors
- Statistical overview of descriptions
- Evaluation of effectiveness of safety "function" (vehicle, driver, infrastructure, environment)
    - Potential for non-existent measures
    - observed effect
- Case studies

FULFILMENT OF OBJECTIVES[1]

1. Qualitative description of accident – combination of factors

	Content	Reliability	Size/scope	Focus	Relevance
EACS	3/4	2/3	2/3		2/3
OTS	4	4	1/2		4 (early)
MAIDS	4	3/4	3		4/5
CCIS	NA	NA	NA		NA
LAB (Lab)	NA	NA	NA		NA
(Eda)	4	4/5	3		4
(PVM)	4	4/5	3		4
GIDAS	3/4	4	4		4
DEKRA					
VOLVO ART	3	5	3		4
NATIONAL CENSUSES	2	3	4		2

[1]
NA	not appropriate for co-ordinated analysis
1	almost no applicability to co-ordinated analysis
2	little applicability to co-ordinated analysis
3	some potential for co-ordinated analysis
4	good potential for co-ordinated analysis
5	excellent potential for co-ordinated analysis

None of these evaluations is meant to construe any criticism of the data source or its use individually. Rather it provides a qualitative evaluation of how the data source might be used collectively i.e. for a purpose for which it was not originally intended.

2. Statistical overview of descriptions

	Content	Size/ Scope	Sub-samples	Reliability	Relevance	Limiting factors
EACS	0	NA	NA	NA	NA	Unbalanced, snapshot, finished, old
OTS	2	1/2		3	2	UK only
MAIDS	3/4	4		4	4	motorcycles
CCIS	NA	NA	NA	NA	NA	-
LAB (Lab)	NA	NA	NA	NA	NA	-
(Eda)	3	2		2	2	France only, cars only → 2002
(PVM)	4/5	3		4	4	France only, cars only, snapshot
GIDAS	3/4	3/4		4	4	Germany only, limited causation
DEKRA						
VOLVO ART	3	4		5	4	Trucks
NATIONAL CENSUSES	4 2	4/5 3		4/5	4/5 2	

3. **Evaluation**

- Many methodologies.
- Many data sources needed (each database can make a contribution but no universal solution).
- Exposure data missing.
- Near miss data interesting (but collection difficult using current methods).
- Methodologies not necessarily identified or mature.
- Much more complex for active safety than passive safety.

4. Case Studies

		Limiting factors
EACS	Yes	Now old
OTS	Yes	
MAIDS	Yes	
CCIS	Yes	Not much pre-crash phase
LAB (Lab)	Yes	Not much pre crash phase
(Eda)	Yes	
(PVM)	Yes	
GIDAS	Yes	
DEKRA	Yes	
VOLVO ART		Limited to accidents causing Injury to truck occupants
NATIONAL CENSUSES	No	

Annex 2: Questions to Interrogation of Existing Data Sources

Questions to be Answered During the Interrogation of Existing Data Sources

1. Background and Needs

The e-Safety Forum adopted a recommendation to consolidate analyses from existing data sources for a better understanding of the causes and circumstances of road accidents and to determine the most affective counter measures.

The Accident Causation Analysis working group of the e-Safety Forum has in response to this recommendation set itself the task to identify the remaining needs for a diagnosis of safety issues and for an evaluation of the expected and observed effectiveness of the counter measures.

A stakeholder workshop was organised on 30 June 2004, which was followed up by further work by the working group.

The following report synthesises the discussions at the workshop and the working groups efforts to try to provide the most important questions for the necessary diagnosis and evaluation

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2. The needs

2.1 Diagnosis

Parameter	Generic Question	Detailed Questions
Road Infrastructure	How does road infrastructure design and maintenance cause or contribute to accidents?	• Road furniture (including speed bumps, etc.) • Road architecture (including visibility) • Road surface questions • Road edges and barriers • Road markings and signs • Road maintenance and repair • Traffic engineering • Changing conditions (surface, illumination, etc.)
Human Factors	How would our improved understanding of human factors help in obtaining better information on accidents?	• Physical attributes (eyesight, etc.) • Road user status (biorhythmic, fatigue, vigilance, alcohol, drugs, etc.) • Attention • Perception • Cognition (e.g., knowledge of other road users) • Failure and violation • Emotions • Ergonomics • Experience • Attitude towards risk • Capacities • Age, gender • Road user workload • Training and licensing • Social and cultural differences (e.g., lifestyle) • Distraction (e.g., use of cellular phone)

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Parameter	Generic Question	Detailed Questions
Accident types	How might accident types be classified*, clustered and their frequency assessed?	• Loss of control • Roadway departure • Intersection • Pedestrian crossing street • Vehicle following or overtaking • Lane change • others
Vehicle Safety	How would vehicle characteristics and safety systems help our understanding of the causes of accidents?	• Vehicle dynamics (including tyres, brakes) • Type, age, etc. of vehicles • Vehicle maintenance • Human-Machine Interface • Event Data Recorders • Lighting and visibility • Safety Systems • Crashworthiness
Specific Users	How would the development of prototypical scenarios for specific road users provide a better understanding of accidents?	• Pedestrians • Motorcyclists • Cyclists • Heavy Commercial Vehicles • Light Commercial Vehicles • Buses • Car occupants • Trains and Trams • Tractors

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* Possibly down to 10 or 15 different categories

Parameter	Generic Question	Detailed Questions
Risk Factors	In what ways do risk factor cause or contribute to accidents?	• Animals, etc. • Obstacles • Weather conditions • Road works • Speed • Rubbernecking

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2.2 Evaluation

Evaluation in this context means an assessment of the physical benefits from saved lives and reduced injuries and accidents. It does not include an monetary estimation of either the costs or the benefits of those physical benefits and therefore is only part of an impact assessment.

2.2.1 Expected

Try to foresee the expected benefit/side effects of safety functions in terms of saved lives or avoided casualties.

2.2.1.1. Methods

Clear description of systems (e.g. in terms of reaction time).
Identify existing methods to achieve the prediction stated in 2.2.1 (methods may not only include data analysis but also experiments, simulator studies, etc.)

2.2.2.2 Results

Confirmation/validation of the effect of safety features

2.2.2.3 Side effects

Side effects within the same user group as well as across user groups.

3. Transversal questions

Descriptive methods for diagnosis :

- Statistics (distributions, risk analyses).
- In-Depth scenarios
- Single case studies

3.1 European perspective

Provide as wide Member State analyses as possible and / or state the limitations.

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3.2 Prospective angle

- Predict traffic accident scenarios
- Predict safety functions and systems (including deployment, development of fleet penetration).
- Predict legislative requirements (either by making certain functions mandatory or by removing type approval barriers).
- User adaptation / risk compensation effects

3.3 User acceptance

- Incentives
- Education, training, campaigns
- Realistic description and marketing of safety systems
- Enforcement

3.3.1 Individual and Societal

Accident causation analysis has application outside the immediate road safety sphere and should also inform this research (e.g. , medical, biomechanical, psychological, sociological, etc..

Development of test procedures (regulation as well as consumer testing) will also need accidentology.

4. Links to other projects

A number of other projects and working groups have close correspondence with the work proposed by the e-Safety Accident Causation Analysis working group. Some of these projects are currently working in similar complementary analysis, for example : PENDANT, APROSYS, SAFETYNET.
Others will have questions to which the Accident Causation Analysis working group activity may help to find answers, for example : HMI, Heavy Duty Vehicles, PREVENT.

The links with these other projects and activities will need to be strengthened to obtain the maximum synergies.

Annex 3: Terms of Reference

Accident Causation Analysis WG

Terms of Reference – Accident Causation Analysis Working Group

Chair: Michael Hollingsworth, Director-Transport Policy, ACEA

Objectives

At the first plenary meeting of the eSafety Forum the accident causation analysis working group reported that it had identified four questions. These need answers or recommendations of how the answers can be provided to achieve the consistent accident causation analysis that Europe needs.

What information currently exists?
What can be done with this information in the short term?
What information do we really need?
What can be done in the longer term?

The Working Group has so far concentrated on the first two of these questions and intends to complete answers to all four questions by the end of 2004. The group intends to undertake some basic analysis but considers its primary function is best served by making recommendations about how the necessary work can most effectively be done.

Description

The working group believes that accident causation analysis **requires**:

- diagnosis of the safety issues and identification of the nature and magnitude of the problems at an EU level
- evaluation of the expected effectiveness of countermeasures
- evaluation of the observed effectiveness of the countermeasures.

The contribution of the Working Group to the above three requirements is to provide a way to answer the four questions in the objectives. This should address most of the first requirement and a proportion of the second. It is an essential enabler for the third requirement.

a) Existing Data Sources

The working group has collected information about a sample of twelve databases that already exist in Europe[2].

Many of these data sources are either private or commercial with significant access restrictions brought about by Intellectual Property Right issues. The group sees no prospect of overcoming these restrictions to make disaggregate data publicly available.

Nevertheless, real possibilities exist to share some aggregated data and analyses.

[2] Data exist outside Europe too but this has not yet been looked at in detail since it is not always completely relevant for European experience.

This conclusion has been reached as a result of the following qualitative analysis in which.
i) Aims and objectives have been developed for what available data might provide and what was being sought from them.

ii) Each database has been assessed, on the basis of four criteria[3] to see what are their essential characteristics and to what extent, on a scale of 1 to 5, they have potential to be used in conjunction with other sources. The results of this analysis are all given in the annex following.

The analysis confirms the hypothesis reported to the first eSafety Forum that although many information sources already exist they are not enough to provide Europe with the analysis that it needs.

The picture obtained is a mixed one (see tables 1 and 2 in the annex). Some databases are not appropriate for coordinated analysis because they deal mainly with passive safety issues; they were never designed for the purpose of coordinated analysis. Some others show a degree of potential for cooperative analysis and others show good potential.

This mixed canvass indicates to the working group that there is potential for gathering together the various stakeholders who have access to these various databases to seek to share analysis to answer, on a wider basis than is currently possible, a series of agreed questions. Despite some attempts in the past, unfortunately no formal EU multi-stakeholder mechanism currently exists to allow these discussions to take place between the database holders.

To see if an existing activity could be used for this purpose, the working group has invited presentations from groups either running or proposing to run projects in this area. The project presentations were informative and the work being undertaken in the projects is undoubtedly worthwhile. Despite some known proposals, the group does not currently feel that these existing or agreed EU projects will be able to undertake the work being proposed here.

b) Definition of the task
To achieve the task the following steps will be necessary

- Stakeholders need to be clearly identified and brought together;
- Data user requirements need to be identified (governments, road users, manufacturers, suppliers, insurance companies etc);
- Common definitions of accident causation among the stakeholders are required;
- Unambiguous common questions need to be developed (on accident causation);
- the interrogation of data sources can then be undertaken;
- stakeholders can then share and compare analytical results (data and interpretation) and report findings;
- Intellectual Property Right issues will need to be dealt with;

[3] As summarised in Annex 1

Qualitative description of accidents
Statistical overview
Evaluation
Case Studies

c) Shared Analysis Mechanisms

The variation in the potential of the sample databases for cooperative analysis indicated that the derivation of a more consistent and wider interpretation of the data is not easy. As a result work needs to be done to formulate the appropriate questions, allow the database holders to interrogate their sources and share the results of their analysis. This will take resources and time. In the opinion of the working group **the task is such that it cannot be done on a voluntary basis since the necessary time and resources do not exist.**

The working group is therefore seeking a way to enable this work to be carried out. Possibilities include: Network of Excellence, Integrated Project, SSA (Specific Support Action),CA (Coordination Action) and STREP (Specific Targeted REsearch Project)

Discussion in the group indicates that funding may not be available for such work in the near future. This would constitute a major obstacle.

Recommendations – for short term actions

It is the firm belief of the working group that existing data sources can help to give better EU information on accident causation. This is not a small task and cannot be done on a voluntary basis.

The group recommends:

1. That the definition of the task in section 2b be adopted as a basis for the necessary work.

2. That the task be carried out in the shortest time possible as a matter of urgency

3. That funding be put in place to have the task carried urgently so that final results can be expected within 2 years. This may cost around €1.5 million.

This work is an essential prerequisite measure for other eSafety work or initiatives outside eSafety that are already underway. It has also been identified as a key area of work by the eSafety R and D Working Group.

In the US, NHTSA spends approx. $28 million annually on accident data (this is ongoing work). The European Union is considerably larger and spends considerably less, often in a fragmentary way.

Impacts

If the above recommendations are acted upon, Europe can within two years

use existing data sources to obtain a much clearer understanding of accident causation than exists today. It will

- Establish a European network for accident analysis
- Be complementary to the proposed European Road safety Observatory
- Provide a more scientific basis for the identification and evaluation of effective safety functions
- Enable the confirmation of the relevant best tests and test procedures for safety, performance and ease of use
- Enable the evaluation of effective countermeasures.

5. Workplan and Longer term initiatives

The work plan of the accident causation analysis working group proposed to concentrate, within the long term context, on the short term priority to make better use of existing data sources in its first year. The Working Group will turn its attention to the longer term actions and needs in early 2004 so that work on these can begin in 2005. These include recommendations for a common European methodology and accident causation information system.