Deliverable 5.4: Review of the accident causation pilot study in Task 5.2

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PU	Public	✓
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RE	Restricted to group specified by consortium (inc. Commission Services)	
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Transport
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Executive Summary

This deliverable presents the review of the methodological development process in task 5.2. Task 5.2 is utilising an existing accident investigation network to develop an in-depth accident causation database. The data are being collected through full-scale in-depth accident investigations at-scene. In total some 1000 investigations are being conducted over a 24 month period in six EU Member States. The task 5.2 methodology makes use of a relatively new procedure for determining accident causation factors and identifies the main risk factors leading to a crash. This methodology is entitled the SafetyNet Accident Causation System (SNACS). The analysis method SNACS (SafetyNet Accident Causation System) is a tool for analysing traffic accidents and incidents through a systematic and balanced description of the factors that can contribute to the development of an accident or incident scenario. The goal of the SNACS analysis is to create an understanding of accident scenarios which can function as a base for accident preventative work.

The task 5.2 includes seven sub-tasks, five of which are completed to date. The completed sub-tasks dealt with the methodology and database development, team training, and a pilot and review phase testing the procedures. After the training period of the data collection and case analysis procedures the pilot phase was performed. Each partner collected a minimum of five cases and inserted them into the database. During the review phase the pilot of each WP5 partner was examined. In order to be able to recognize what could be improved and what was working fine, a number of pilot cases were scrutinized by all six partners.

The examination of the pilot phase of each WP5 partner showed that each partner had succeeded to retrieve high quality data according to the requirement of the study. However, there were some problems how to interpret some variables. These problems have been discussed and resolved by more explicit definitions in the glossary. The assessment of the usability and effectiveness of the database is an ongoing activity and improvements will be made throughout the project. The amendments to the SNACS methodology resulting from the review meeting has been incorporated and further improvements will be performed throughout the project. The main data collection activities started May 2006 and will continue until February 2008.

Transport
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1 Introduction

This deliverable presents the review of the methodological development process in task 5.2. Work Package 5 is utilising an existing European data collection infrastructure to develop two main databases; a broad ranging, intermediate level, fatal accident database (task 5.1) and an in-depth accident causation database (task 5.2). The two databases will have similar characteristics although there will be an additional database element for task 5.2. Together, both databases will contribute a major advance of the knowledge of accidents and injuries at EU level.

WP 5.2 is utilising an existing accident investigation network to develop an in-depth accident causation database. The data are being collected through full-scale in-depth accident investigations at-scene. In total some 1000 investigations are being conducted over a 24 month period in six EU Member States. Independent teams with no interest in commercial attributes of the study outcomes will conduct the accident investigations. The teams are based in;

Sweden, Chalmers University of Technology (Chalmers)

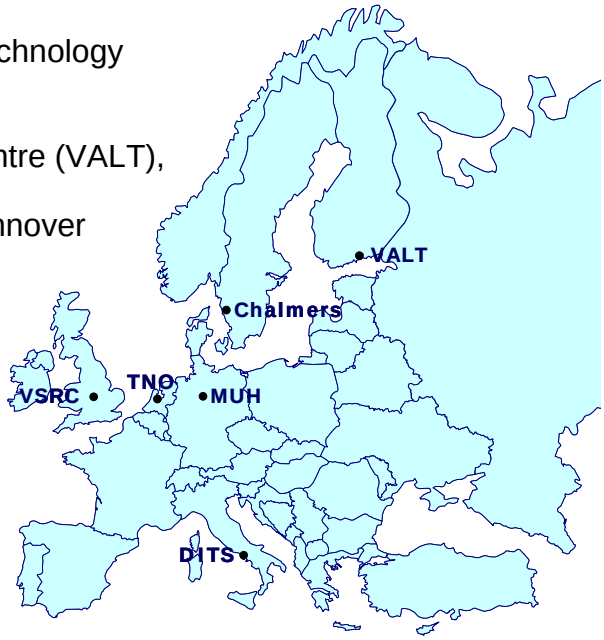
Finland, Finnish Motor Insurers' Centre (VALT),

Germany, Medical University of Hannover MUH)

Italy, University of Rome (DITS)

The Netherlands, Netherlands Organisation for Applied Scientific Research (TNO)

United Kingdom, Vehicle Safety Research Centre (VSRC)



Since it is difficult to specify a sampling framework for data collection because of an ‘at-scene’ approach used by the teams in task 5.2, close scrutiny of the data will be undertaken at the end of data collection period and weighting factors applied (if appropriate) to ensure representativity. The independent in-depth accident causation database will have major applications in the areas of new technology development and active safety systems as well as the more traditional area of infrastructure and road safety. The task 5.2 methodology makes use of a relatively new procedure for determining accident causation factors and identifies the main risk factors leading to a crash. This is entitled the SafetyNet Accident Causation System (SNACS) based on a technique developed by Chalmers University in Sweden which is known as DREAM (Driving Reliability and Error Analysis Method). The DREAM method has a

Human-Technology-Organisation perspective, which implies that accidents happen when the dynamic interaction between people, technologies and organisations fails in one way or another, and that there are a variety of interacting causes creating the accident [1]. The latter part particularly stresses one of the most important issues of the WP5.2 project; to be able to survey the causes of the accidents without focusing on blame.

1.1 Project Outline

The task 5.2 includes seven sub-tasks, five of which are completed to date.

5.2.1 Needs of data users, including workshop (completed)

Data requirements for the in-depth accident causation database were considered and evaluated. A workshop was held in Loughborough, UK, in October 2004 where for example road safety experts, vehicle safety engineers, human factors specialists and policy makers took part in the discussions.

5.2.2 Protocols, forms and database (completed)

Development of a variable list for general variables as well as for accident causation variables was conducted. A glossary with definition of the variables and a manual for the SNACS analysis was developed. An accident database was developed to be used in both task 5.1 and task 5.2 with a special module for SNACS case analysis. A SNACS manual was developed which provides hands on support to the accident analysts within accident causation data collection. The SNACS manual will be updated throughout the project and will be publicly released as a Deliverable (5.6) in October 2007.

5.2.3 Infrastructure and team training (completed)

Implementation of local infrastructures with links to police and other national authorities have been established. A training course for data gathering and case analysis has been undertaken.

Deliverable 5.2: In-depth Accident Causation Data Study Methodology

In November 2005 the Deliverable 5.2 was submitted to the EC outlining the draft procedures to be used in the pilot phase including a list of general variables selected, background on the SNACS methodology and information on the database. The deliverable also includes a description of the team's sampling areas and their accident investigation procedures.

5.2.4 Pilot phase (completed)

A small number of accidents were investigated in all aspects by each team. (Presented in this document)

5.2.5 Review (completed)

Cases collected in the pilot phase were reviewed and discussed among partners. (Presented in this document)

5.2.6 Crash investigations (active)

Each team has started full data collection and will continue to collect data over a 24-month period. A combination of “on the scene” and “nearly on the scene” methods are being used by the partners in this study. Multidisciplinary teams will follow up crash notifications by site visits, vehicle inspections, interviews with crash participants and wherever possible, full reconstructions to gather specific accident causation data.

5.2.7 Data analysis and final report (not yet commenced)

Upon complete data collection, data analysis and reporting will take place in accordance with the designated plan of action developed inline with EC priorities. Plans for the data analysis will be formulated ahead of the completion of data collection and analysis discussions will take place in May 2007. There will also be close liaison with the partners in WP7 who are expected to offer guidance and support for the data analysis activities. The WP7 partners will also examine early representativeness of the data during the first year of data collection.

1.2 Background of the SNACS methodology

The analysis method SNACS (SafetyNet Accident Causation System) is a tool for analysing traffic accidents and incidents through a systematic and balanced description of the factors that can contribute to the development of an accident or incident scenario. The goal of the SNACS analysis is to create an understanding of accident scenarios which can function as a base for accident preventative work.

SNACS is based on the existing method DREAM. DREAM, in turn, is an adaptation to the area of vehicle safety of a model called CREAM [2]. The DREAM method has a Human-Technology-Organisation perspective, which implies that accidents happen when the dynamic interaction between people, technologies and organisations fails in one way or another, and that there is a variety of interacting causes creating the accident. The latter part particularly stresses one of the most important issues of the WP5.2 project; to be able to survey the causes of the accidents.

The purpose of SNACS is to make it possible to systematically describe and store what is known about the reasons for an accident. SNACS in itself cannot tell us why the accident happened. What SNACS does is provide a structured way to sort out the reasons for the accident, and classify them as belonging to a set of categories developed from previous research. SNACS is an organiser of explanations, not a provider.

A coding manual for the SNACS methodology has been developed in the project and will be publicly released in October 2007.

2 Pilot Phase

After a training period of the data collection and case analysis strategies the pilot phase started in November 2005 and was scheduled for three month. Each partner should collect a minimum of five cases and insert them into the database. A pre-review was performed after half of the collection time to be able to start any major changes to the database if necessary.

The aim for the first 24 months of the WP 5 Task 2 project was to develop the methodologies and commence protocols for an in-depth accident causation system, to support new technology development for active safety systems. The aim of the pilot phase was to test the developed procedures [3] on the field by accident investigations.

2.1 Objective

A minimum of five cases were collected by each partner in order to:

- technically evaluate the data collection variables
- check the definition of each variable
- technically evaluate the database
- produce feedback on the use of the database so improvements can be made
- technically evaluate the SNACS methodology
- check that the teams had access to necessary information
- estimate the time needed for each case

2.2 Result

All partners involved collected and inserted two cases into the database by the midpoint of the pilot phase. The definitions in the glossary and the database were commented on in this stage to be able to start any major changes needed for the database. Some partners experienced that some of the variables used in task 5.1 (fatal database) and not selected as a general variable in task 5.2 (causation data) could be useful to add into the task 5.2 general variable list as well. Some minor changes, mostly clarifications, to the glossary were needed. Concerning the database some changes had to be made to better understand the course of event for the vehicles/road users involved. An event scheme was proposed in the vehicle section to have the possibility to follow the course of the accident more easily. For the same purpose it was decided that the “accident summary” field was going to be compulsory.

The SNACS methodology was to be evaluated more in-depth during the review phase. However, some comments were made in terms of missing links in the manual and database. During the remaining pilot all partners collected another three cases to be used in the review phase. No major problem

concerning data collection was experienced but some partners had some difficulties to interview all the road users involved in the accidents.

3 Review of the Pilot Phase

During the review phase the pilot of each WP5 partner was examined. In order to be able to recognize what could be improved and what was working fine, a number of pilot cases were scrutinized by all six partners. The review was performed during February 2006 and was finalized with a review meeting where all issues arisen were discussed.

3.1 Aims of the Review

The aims were to:

- examine the pilot of each WP5 partner in terms of whether each had successfully managed to retrieve high quality data according to the requirements of the study
- continue the assessment of the usability and effectiveness of the database, as initiated and largely completed in the pilot phase
- propose further amendments that needed to be made to the SNACS methodology
- assess proposed data gathering practises and reach a milestone before the main data collection phase started

3.2 Review Process

When the cases collected in the pilot phase were reviewed a certain scheme was followed. Table 1 describes how the exchanging of cases between the partners was performed. The partners sent the feedback they had on the variables and database to the relevant task leader, and copies of their completed databases, which contained the minimum of 5 cases, to the appropriate exchange partners.

Table 1. Review of 5.2 cases

Partner X This partner sent their completed 5.2 database to Partner Y		**Partner Y** This partner received and reviewed the completed 5.2 database from Partner X
VALT		VSRC
VSRC		MUH
MUH		DITS
DITS		TNO
TNO		Chalmers
Chalmers		VALT

Of all the cases in the database the reviewing partners (Partners Y) selected one case that was going to be presented in the review meeting. The partners being reviewed (Partners X) had to provide the reviewer with the associated documentation, e.g. police report, photos, sketches etc., translated where necessary for this case. The reviewing partners performed a full case analysis on the selected case. Any discrepancies of opinion between Partners Y and

Partner X were dealt with prior to the review meeting so that partners were able to present fully on the accident case.

The remaining cases in the database were examined and checked for inconsistencies with respect to content. The level of detail about the accident in the database should enable the reviewing partner to be able to "tell the story" of the accident back to the originating partner, in order to demonstrate understanding and to check the quality, consistency and level of detail that the originating partner had provided. It was important to examine all cases submitted by Partner X for each task so that common mistakes, errors, interpretations etc. were picked up by Partner Y.

3.3 Results Review Meeting

The WP 5.2 was scheduled for one day and a half and the focus was on the SNACS methodology, however, some issues regarding the general variables were also raised and discussed.

3.3.1 Presentations by the Partners

All partners had prepared a summary presentation on the selected case from each respective exchange partner. The presentations included:

1. Telling the story about what happened in the selected accident
2. Outlining any differences in opinion between Partner X and Partner Y i.e. differences in answers on any general variable for the four levels in the database (accident-, vehicle-, road- and road user level) or the SNACS case analysis.
3. Explaining the reasons and the background for these differing opinions
4. Explaining how the final decision on the variable of discrepancy was agreed on or not
5. Presenting this to the partners for discussion in order to reach a consensus
6. Presenting any ideas for changes or additions that needed to be made to the glossary for improved understanding of the variables and which data to input for each variable

Three examples of these reviews are presented below.

VALT case reviewed by VSRC

It was a single vehicle accident on a 50 km/h road (undivided single carriageway) where the driver lost control over the vehicle which ran of the road nearside in a right bend and impacted a lighting pole with its left side. The car was driven in high speed because of a race situation with another vehicle. The driver was a 22 years old male and had two passengers in the car. One male, 20 years old, positioned in the front seat, and one female, 22 years old, positioned in the back seat, most likely to the right side.

Accident Level

A good description of the accident need to be added for all cases in the database to be able to get a good understanding of the accident.

Vehicle Level

State what the vehicle variant was and add any extra information which would help to give a better picture of the accident.

Roadway Level

To demonstrate the need for sketch plans VSRC made one sketch that was drawn from the information in the database (see Figure 1).

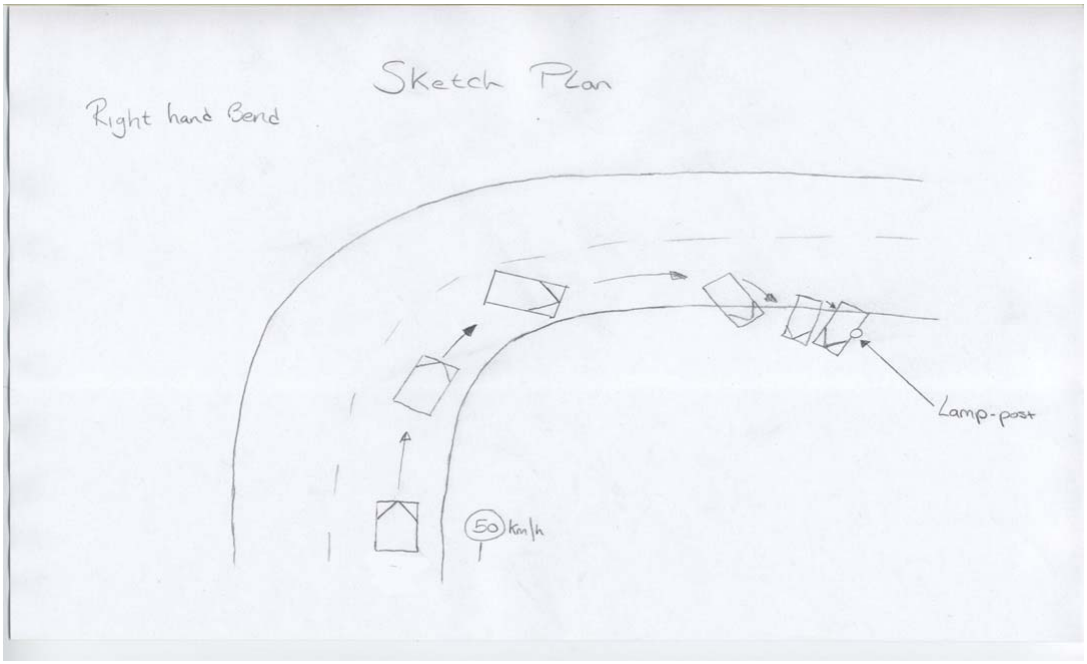


Figure 1. First sketch plan made by the VSRC.

Figure 2 illustrates the sketch plan which was drawn from the additional information, sent in addition to the database, by VALT.

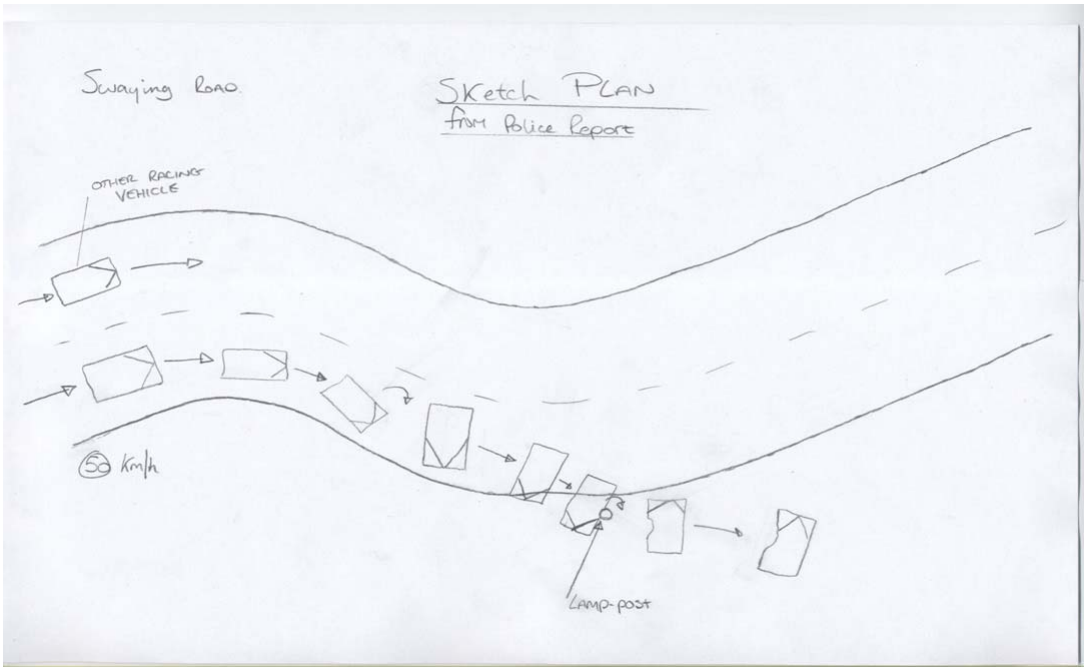


Figure 2. Second sketch plan made by the VSRC.

SNACS case analysis

To be able to find the differences between the different investigation teams a SNACS case analysis was performed by the reviewing partner before looking at the analysis made by the investigating team.

Figure 3 illustrates the SNACS case analysis performed by VSRC before looking at the SNACS case analysis performed by VALT (Figure 4).

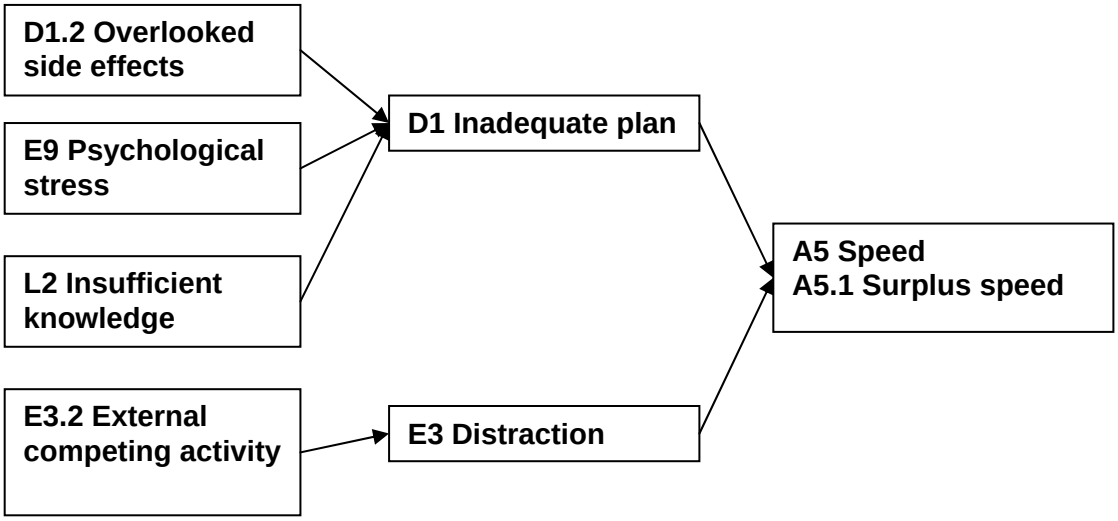


Figure 3. SNACS case analysis made by VSRC

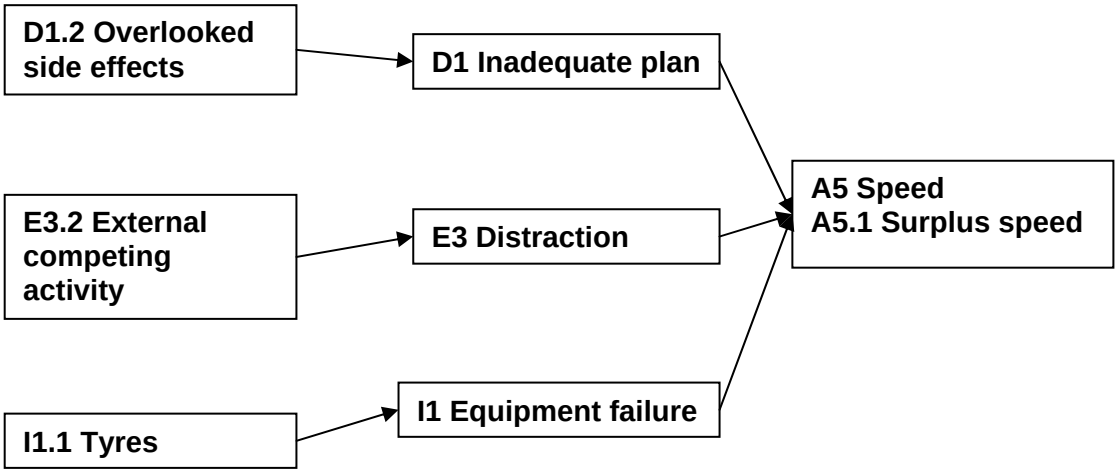


Figure 4. SNACS case analysis made by VALT

The differences in the analyses were:

- VALT - I1.1 Equipment failure, tyre damaged in collision
- VSRC - E9 Psychological stress if racing
- VSRC - L2 Lack of experience due to age of driver

It can be seen that the analyses are matching in general but some small differences appear which can be expected since these were the first cases performed with the SNACS methodology.

The general comments concerning the case were:

- A detailed accident scenario allows better understanding of the case overall
- Free text comments need to be used as much as possible to best describe each case
- Reconstruction data (e.g. measurements, calculated speeds) help to clarify what is meant by terms such as fast or slow
- Photos and scene plans/sketches are invaluable for understanding any case

MUH case reviewed by DITS

It was a collision between a passenger car and a motorcycle in a junction in urban area during darkness. The car was going to turn left in the junction and the motorcycle came from the left (from car driver point of view) on a priority road. Both roads were undivided single carriageways and the car driver started to enter the motorcycle's lane but stopped when the driver observed the motorcycle's lights. The motorcycle rider did not have time to steer around the vehicle and collided with the front left side of the vehicle.

Accident Level

General discussion concerning if a motorcycle overturn/rollover should be considered as an event or not.

Roadway Level

General discussion concerning if cycle facilities should be coded as present or not when there is no involvement of a bicycle.

SNACS Analysis

DITS and MUH made an agreement for the SNACS analysis concerning the passenger car (see Figure 5). There was no SNACS analysis performed on the motorcycle because the rider was not interviewed. However, it is important that all involved participants in an accident are analysed with SNACS so that the risk factors for specific accidents can be found.

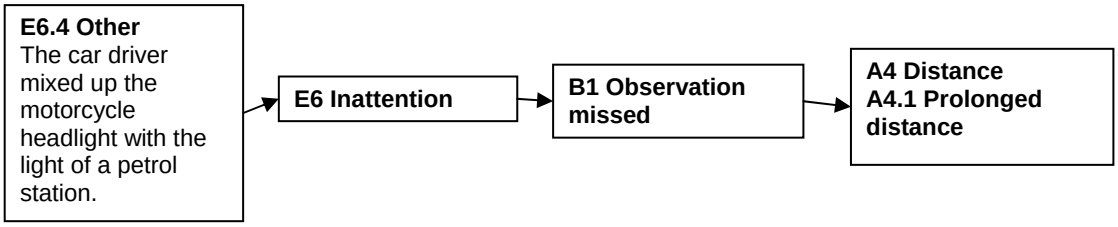


Figure 5. SNACS case analysis of the MUH case

VSRC case reviewed by MUH

It was a rear end collision involving three passenger cars; Vehicle 1 impacted Vehicle 2 in the rear which was shunted into the rear of Vehicle 3. The accident happened on a 40 mph road (undivided single carriageway) during heavy traffic. The Vehicle 1 driver stated in the interview that he thought that he had been yawning and therefore took his eyes off the road for a short while.

SNACS Analysis

The SNACS case analysis performed by VSRC for Vehicle 1 is illustrated in Figure 6. MUH thought that the bottom chain was unnecessary because it was covered in the internal competing activity.

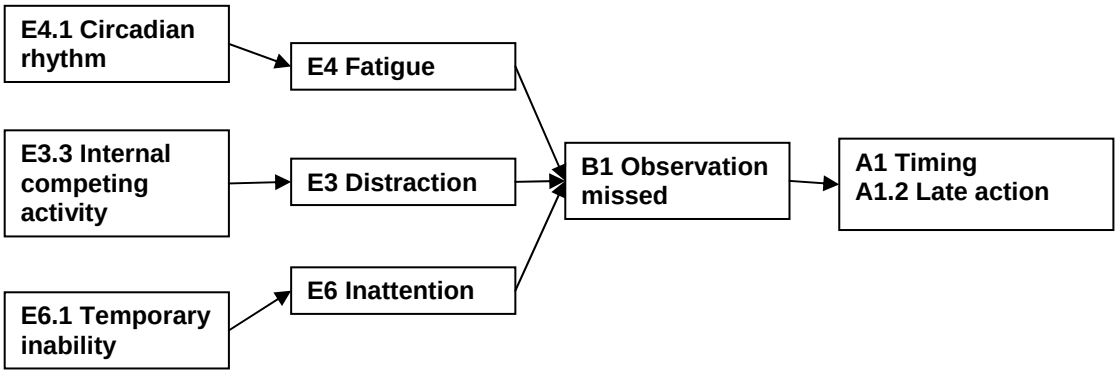


Figure 6. SNACS case analysis of Vehicle 1 made by VSRC

Figure 7 illustrates the Vehicle 2 analysis performed by VSRC. MUH however thought that the decision error more likely was cause by shock (Figure 8) because the driver would not have time to build up fear.

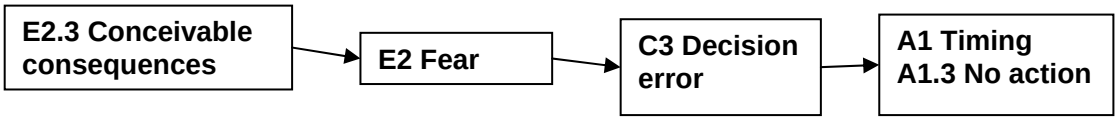


Figure 7. SNACS case analysis of Vehicle 2 made by VSRC

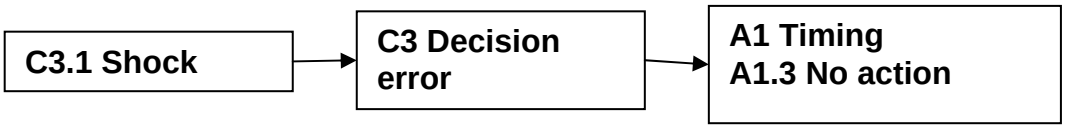


Figure 8. SNACS case analysis of Vehicle 2 made by MUH

Vehicle 3 was only coded with a critical event of Timing – no action.

3.4 Outcome

This section outlines the issues that were brought up explicitly during the review meeting. Some were decided on and settled during the meeting and some were left unresolved for further discussion.

A number of decisions were made on different issues. Some of these issues were to be solved immediately while others were to be solved before the release of the next database version.

3.4.1 Immediate actions (completed to date)

- Accident description – it was considered very important to describe the accident in as much detail as possible. The definition on how extensively this should be done was: “The description should make it possible for a reviewing partner to tell the story of the accident.”
- Sketch plan - partners should make a sketch of the accident scene and store it along with the pictures of the accident.
- Database variables in general – when an option for a variable has not been entered into the database, it should be highlighted in order to make it easier for the person entering the data, to see which variables have not been filled in.
- Making the text field “Accident description” on the Accident Details level compulsory, just like all the text fields relating to the SNACS part of the database. Also, whenever the option “Other” is chosen for a general variable in the database, on any level, the relating text field should be compulsory to fill in.
- Under the accident description, on the Accident Details level, there should be a text field added. In this text field there should be an

indication on how the information was retrieved, e.g. who the information came from (driver, passenger, police, witness, etc), way of collecting the information (interview face to face, telephone interview, etc) and, if it was an interview of some sort, how long it took.

- Roundabouts should be coded along the lines of a junction when it comes to the variable “Accident type classification (GDV number)”. This makes it very important to code the fact that it is a roundabout in the variable ”Junction” at the Roadway Details level.
- In the vehicle details - adding the option BAS (Brake Assist System) to the “eSafety issues” variable.
- In the road user details – enable the variable ”Impairment” which is collected in WP 5.1, and therefore already existing in the database, for 5.2 too.
- In the SNACS details – a number of links was suggested to be included into the SNACS analysis and Chalmers agreed to review and revise the SNACS coding, and the new coding can be found in the latest version of the SNACS manual, v1.1 (not published).
- In the SNACS details - for each completed link within the SNACS linking system there should be an indication on the quality of that particular linking chain. Three different quality levels were introduced; ”High level of confidence”, ”Reasonable level of confidence”, ”Low level of confidence”.

3.4.2 Ongoing activities

- Database management form - the issue regarding completed cases was discussed and different suggestions for how to indicate completion of a case were made, for instance by adding a tick box into the management form of the database.
- In the roadway details - there was a suggestion made to enable the variable “cycle lanes” even if there is no cyclist involved in the accident, since a cycle facility might have an influence on the situation. It was noted that some changes were needed to be made in the glossary, so that the variables “cycle facilities” and “pedestrian facilities” have the same sort of definition.
- Glossary issue – redefining the general variable “Number of lanes”, on the Roadway Details level, to include, for instance, turning lanes and bus lanes, so the complexity is made a little bit clearer to those using the glossary.
- It was decided that 10% of the cases should be reviewed by partners during the course of the full data collection which means approximately 16 cases each.
- The SNACS manual shall be published as a deliverable in month 42 (October 2007) of the project. There was also a suggestion to perform

an interim analysis by this time, in order to explore potential output from the database.

4 Conclusion

The examination of the pilot phase of each WP5 partner showed that each partner had succeeded to retrieve high quality data according to the requirement of the study. However, there were some problems how to interpret some variables. These problems have been discussed and resolved by more explicit definitions in the glossary. The assessment of the usability and effectiveness of the database is an ongoing activity and improvements will be made throughout the project. The amendments to the SNACS methodology resulting from the review meeting has been incorporated and further improvements will be performed throughout the project. The main data collection activities started May 2006 and will continue until February 2008.

5 References

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