DaCoTA

Road Safety Data, Collection, Transfer and Analysis

Deliverable 2.5 Final Report on the Pan-European In-Depth Accident Investigation Network

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The DaCoTA partnership would like to acknowledge the contribution of SAFER who developed the predecessor to the online manual. This system was given to DaCoTA for modification and use in its in-depth investigation activities.

EXECUTIVE SUMMARY

Crash investigation has been established for some time as a method for gaining an understanding of the causes and consequences of crashes. In-depth accident investigations aim to reveal detailed and factual information from an independent perspective on what happens in a crash. This information is useful to all the stakeholders in the public and private sector including vehicle manufacturers; road and enforcement authorities; insurance and certification bodies; as well as legislators and policymakers. These investigations are conducted by trained experts from multiple disciplines to collect as much useful information as possible, to be of maximum benefit in answering current research questions and any that may arise in the future.

DaCoTA Work Package 2 (WP2) was tasked with building a functioning Pan-European In-Depth Accident Investigation Network. WP2 formulated a common methodology for research accident investigation and identifying and training new research teams across Europe. The main goal for WP2 was to harmonize in-depth crash investigation protocols and, at an EU level, identify and train crash investigation teams who will prepare for investigations according to these harmonized protocols.

The in-depth accident investigation process first requires investigators to make observations and gather information before going on to analyse the information to understand what happened and why. The methodology therefore covers both the collection of data and case analyses. Data collection involves a wide range of activities such as making notes, measurements, interviewing people, collecting injury details from hospitals, taking photographs and possibly making video recordings. Case analysis includes identifying and coding how and why events such as collisions between road users or injuries to road users occurred, and more specific analyses are involved, for example, to calculate vehicle speeds.

The Pan-European In-depth Accident Investigation Network (the “Network”) is made up of 22 investigating teams who are all based in 19 different European countries. A number of the teams now have the arrangements and infrastructure in place to continue investigations after the end of DaCoTA, which was very promising for the future of in-depth data collection in Europe. A training package was created and delivered by the DaCoTA partners to facilitate the training of investigation teams.

One of the tools provided to the Pan-European In-depth Accident Investigation Network teams is the DaCoTA crash investigation system. The DaCoTA crash investigation system is composed of two components, the database web application and the online manual.

The database web application has been developed in order to securely store in-depth accident data in a harmonized way; analyse and filter the accidents collected; facilitate the secure exchange of the data collected and the analysis results among the partners involved.

In the database, there is a direct link between each variable and the online manual in order to get more information about the variable, how to measure it in the field and how to code it in the database.

The online manual has been developed with the aims of providing a location for the DaCoTA in-depth road accident investigation methodology and informing the scope, characteristics and practical requirements of the methodology. Beside the information about the variables the online manual provides an overview of the DaCoTA

methodology, information on secure and safe data collection in the field and forms and documents for data collection.

A Europe-wide in-depth pilot study was conducted. This was the first time that 22 partners from 19 European countries collaborated on such a scale. Every team in the network investigated five accident cases and inputted the data on these cases into the database. The review process that followed was divided into two parts: a case review performed by the core experienced teams and a questionnaire to collect feedback from the teams after using the system. In total, 99 cases were investigated and 77 were entered into the database. On-scene investigations made up the majority of cases entered (46) while a smaller number of cases where investigated retrospectively (31). The results of this Pilot Study were used to further refine and improve the data collection methodology and make recommendations for future in depth investigation activities.

In conclusion, a comprehensive in-depth accident investigation methodology has been developed and tested as part of a full system ready for Europe-wide implementation. The participation and successful entry of cases by most of the team members is very encouraging for a future expanded network, especially after the feedback from this exercise was incorporated into the system.

Beyond this project, a vision for the whole network has developed with the following:

- Common methodology (achieved)
- Investigating team network (achieved)
- Key operational requirements (achieved)
- Business model (still pending)
- Up to date research objectives (on-going)

Once the business model is in place this will enable the continued collection of in-depth data that can answer key research questions for all stakeholders and help Europe maintain a lead in road transport safety.

1. INTRODUCTION

Crash investigation has been established for some time as a method for gaining an understanding of the causes and consequences of crashes. In-depth accident investigations aim to reveal detailed and factual information from an independent perspective on what happens in a crash. This information is useful to all the stakeholders in the Public and Private sector including vehicle manufacturers; road and enforcement authorities; insurance and certification bodies; as well as legislators and policymakers. These investigations are conducted by trained experts from multiple disciplines to collect as much useful information as possible, to be of maximum benefit in answering current research questions and any that may arise in the future.

Figure 1 Examples of crash investigation in progress

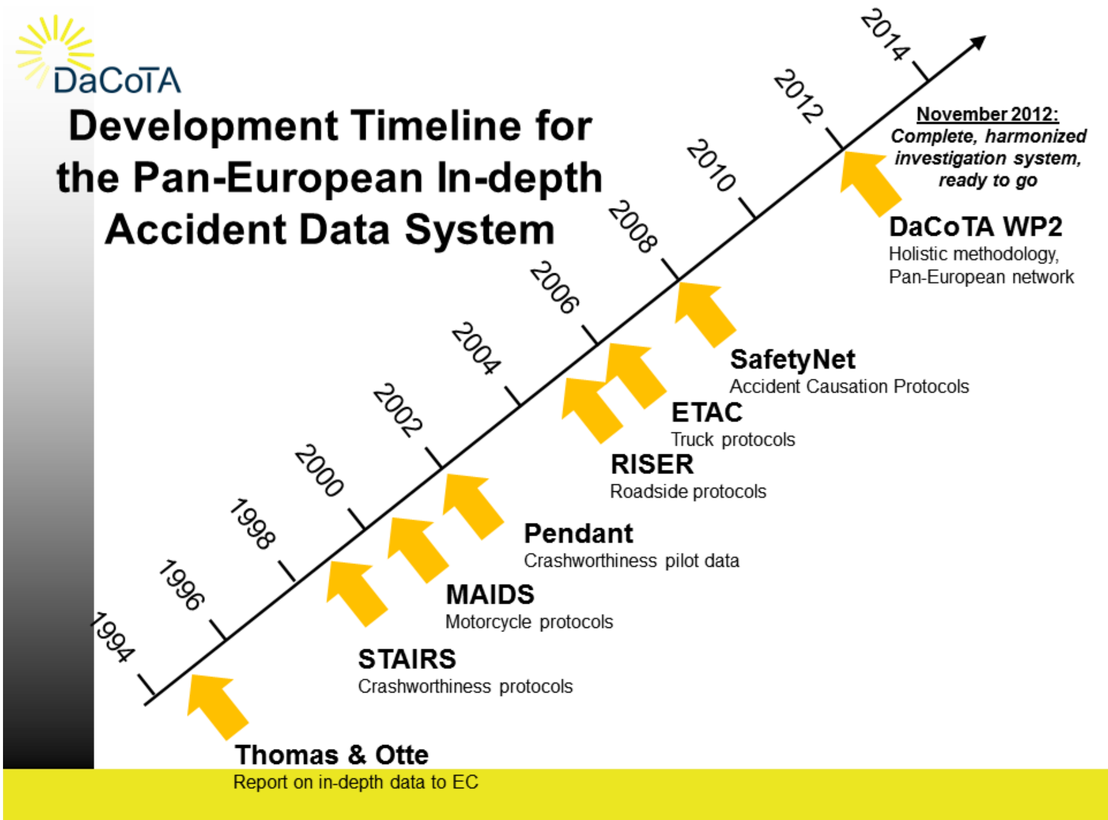

Figure 2 Key EU projects relating to in-depth data collection

DaCoTA Work Package 2 (WP2) was tasked with formulating a common methodology for research accident investigation and identifying and training new research teams across Europe. The main goal for WP2 was to harmonize in-depth crash investigation protocols and, at an EU level, identify and train crash investigation teams who will prepare for investigations according to these harmonized protocols. The DaCoTA project is a culmination of many EU projects on in-depth accident investigation methods and databases over the years. In particular, the projects STAIRS, Pendant and SafetyNet had the greatest contribution to the development of DaCoTA. A timeline of some key EU projects related to these developments is listed in figure 2. This list is by no means exhaustive but it merely serves to illustrate how long this research area has been the subject of project work, and what some of the key projects were.

Setting up the network; training the teams within the network to a similar standard; and developing an appropriate methodology for data collection and entry – including conducting a pilot study – were all requirements of this project. These are described in more detail in the following chapters. The full details are available online on the project website: http://www.dacota-project.eu/.

2. THE NEED FOR IN-DEPTH DATA

2.1. European commitment to improving road safety

The European Commission have continued their commitment to reducing road casualties by renewing the target of reducing fatalities on European Union roads by 50% between 2011 and 2022[1]. Real world accident data will be required to provide evidence based information in support of achieving this new EU safety target as outlined in the Road Safety Action Programme[2] (RSAP).

Macroscopic accident data provided by national accident reporting systems and collated on a European level in databases such as the CARE database[3] have large accident numbers at a general level of detail, which can indicate problem areas. However this cannot address the detailed circumstances of accidents. Therefore there is a need for more detailed data that can assist in evidence-based policy making by providing the necessary information for the generation of countermeasures as shown in Figure 3 below.

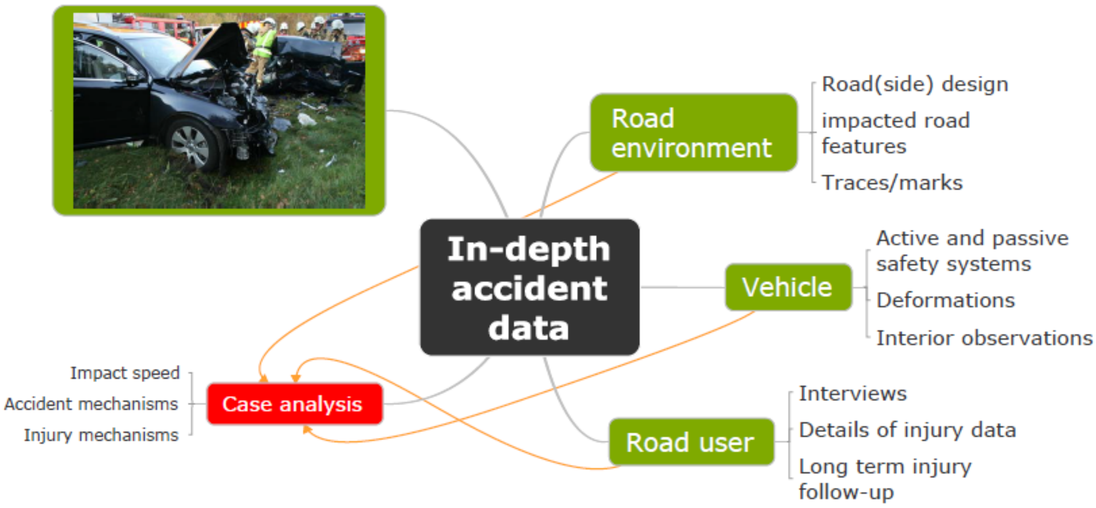

Figure 3: In-depth accident data uses

In-depth accident data provides detailed information on all aspects of the accident:

- the road environment e.g. road features involved in the collision and traces/marks;
- the vehicle e.g. deformation, safety system performance;

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[1] EUROPEAN COMMISSION, 2010. *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Towards a European road safety area: policy orientations on road safety 2011-2020*.

[2] EUROPEAN COMMISSION, 2003. *Saving 20 000 lives on our roads – A shared responsibility*. [online]. Office for Official Publications of the European Communities, London. [viewed 7/12/2012]. ISBN 92-894-5893-3. Available from: http://ec.europa.eu/transport/road_safety/observatory/doc/rsap_en.pdf

[3] EUROPEAN COMMISSION, 2011. *EU – Road safety – Statistics- accidents data*. [online]. European Commission [viewed 7/12/2012]. Available from: http://ec.europa.eu/transport/road_safety/specialist/statistics/index_en.htm

- the road user e.g. interviews and detailed injury data.

In addition the data collected for each accident is analysed to calculate factors such as impact speed, injury mechanisms and causation information.

In depth accident data has been and continues to be used in a variety of different ways, for example for policy making; monitoring; consumer testing; setting standards; and research and development. More specifically, in depth accident data has been utilised in research focused on accident prevention as, for example, it allows the factors contributing to an accident to be identified as well as providing real world input to driving simulator studies. In addition, research into injury prevention relies on in-depth data to identify injury outcomes in different impact scenarios, including vulnerable road users, and how the interaction between different vehicle types affects injury outcome. Data from in-depth accident investigations has also been utilised in the area of development as a tool to identify ideas for new products and to evaluate the expected effectiveness of new safety systems.

2.2. Data Requirements by Stakeholders

A number of consultations with key stakeholders (European Community, industry, national administrations and the research community) were conducted to understand current and future data needs. The aim of this activity was to ensure the proposed methodology would be of use to the stakeholders for research purposes, policy formulation and improving road safety. This provided input on what should be the minimum requirement for a case, the disciplines required as part of the investigation and the basic skill-set required by an investigation team.

The consultation with the stakeholders provided support for continued in-depth data collection and its requirement for the future. A number of key research areas were identified covering driver behaviour, driving under the influence of alcohol or substances, intelligent vehicle technologies and road infrastructure design. Identifying causes of accidents especially focussing on countries with high road fatality rates and comparing them with other countries for ways to improve road safety was a common theme in the consultations. The consultation with the national administrations reported a strong willingness to work with the DaCoTA project to establish new teams across Europe in the different member states.

The partners of WP2 produced a matrix of research questions that were rated due to their complexity and the type of data required to answer. These were then prioritised by the partnership into questions of current and future interest, giving a list of 30 research questions/topics of which 80% could be answered with robust conclusion by in-depth data. The remaining 20% of the questions could mainly be answered by in-depth data but to achieve robust conclusions a multifaceted approach would be needed, for example including laboratory testing to verify results from real world data with repeatable tests.

The work done in WP2 has identified a number of benefits that in-depth investigations provide such as an increased knowledge of the causes of accidents, injury prevention and countermeasure evaluation to name a few. This type of data has been invaluable to many member states across Europe for the past few decades and to open this market to the wider European member states will only increase the knowledge base and transfer between EU countries. This will help facilitate the development of effective countermeasures and help to make Europe a competitive force on a global level for industry and road safety strategies.

The WP2 partners were also questioned about their top research priorities in the Pilot Study. Many of these priorities were common between partners and were also to be found in the consultations with stakeholders conducted earlier. Key research priorities include Vulnerable Road Users; Accident Causation – Mechanisms and Analysis; and evaluating the effectiveness of new safety systems.

By establishing the level of data required to answer current and future research questions the WP2 partnership is recommending that all teams follow an on-scene data collection methodology, attending the scene soon after the accident but certainly within 1 hour of its occurrence. Although new teams will be able to follow a retrospective methodology whilst training to build the desired skill set for the investigators and to overcome any obstacles. This will ensure the network as a whole will be collecting data to a similar advanced level within a short time of beginning operations.

3. THE NEW INVESTIGATION NETWORK

The Pan-European In-depth Accident Investigation Network (the “Network”) is made up of investigating teams who are all based in a number of different European countries. Some teams have many years experience in in depth accident investigations, some have only been established for a short while so are still developing their skills and some are new teams that were created as part of the DaCoTA project. Each investigating team has a Team Leader and investigators. The DaCoTA network, methodology development and training were organised by the core Teams who are the partners in DaCoTA Work Package 2. Core Team member organisations also investigate accidents in their local areas and assisted less experienced (new and developing) teams in their activities through a pairing process. A list of the teams and a map of most of the participating teams are provided below.

Austria (KFV)	Denmark (VD)	France (IFSTTAR, LAB)	Iceland (ICE)	The Netherlands (SWOV)	Slovenia (STSA)	United Kingdom (TSRC)
Belgium (IBSR)	Estonia (EST)	Germany (MUH)	Italy (CTL)	Norway (NPRA)	Spain (CIDAUT, INSIA, IDIADA)	
Czech Republic (CZIDIADA)	Finland (VALT)	Greece (CERTH)	Malta (ITSD)	Poland (MTI)	Sweden (SAFER)	

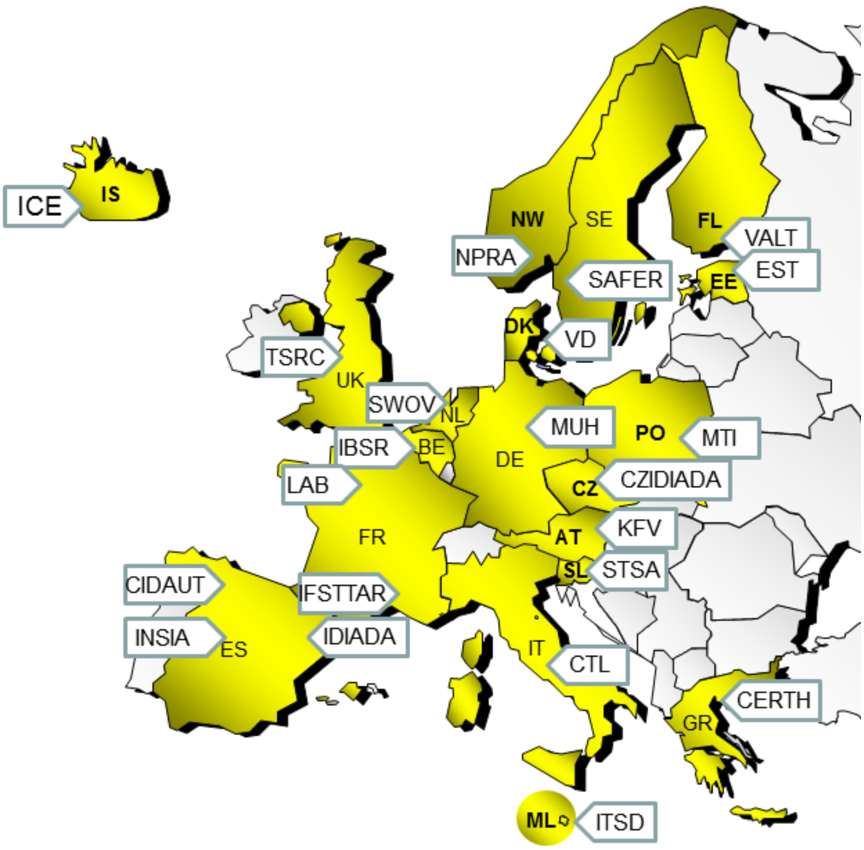

Figure 4 Map of participating team locations

Each Network team was asked to investigate 5 road accidents according to the DaCoTA methodology as part of a pilot study. The in-depth accident investigation process first requires investigators to make observations and gather information before going on to analyse the information to understand what happened and why. The methodology therefore covers both the collection of data and case analyses. Data collection involves a wide range of activities such as making notes, measurements, interviewing people, collecting injury details from hospitals, taking photographs and possibly making video recordings.

Case analysis includes identifying and coding how and why events such as collisions between road users or injuries to road users occurred, and more specific analyses are involved, for example, to calculate vehicle speeds.

As part of the Pilot Study, teams uploaded the data, photographs and analysis results into the DaCoTA online database system. The system provides approximately 1500 variables (or fields) for data entry per case. However, it must be noted that only a sub-set of available fields is relevant to any individual case (for example, variables defined for trucks will not be needed when there are only passenger cars involved in an accident). As an approximate guide, normally around 200 variables are need to be collected to describe the overall accident and road characteristics. In addition, around 200 to 300 variables are completed for each vehicle involved. When it comes to the humans involved, a further 100 to 200 variables are required.

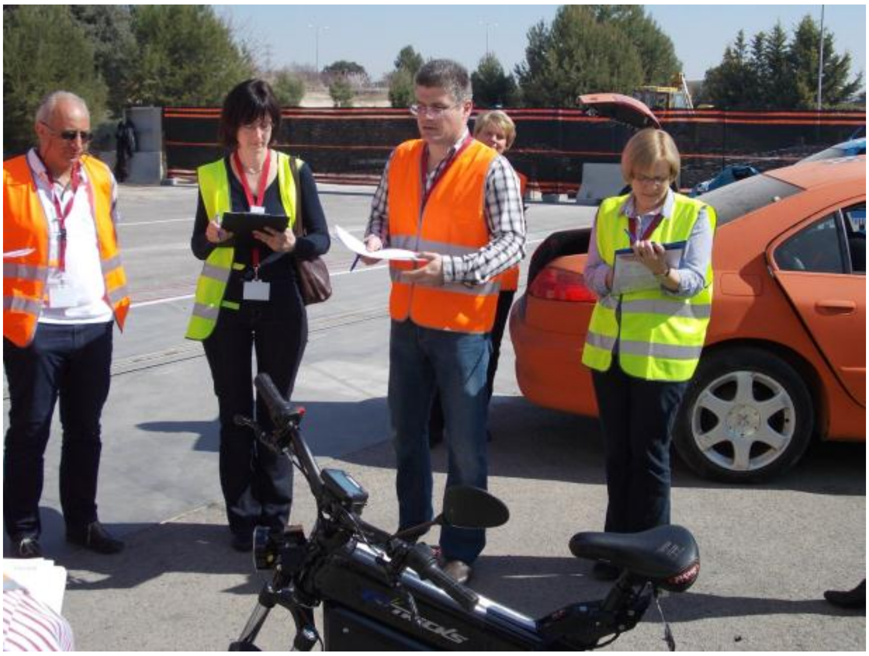

Figure 5 Teams undergoing training in Spain

The teams attended a week long training course held at the IDIADA complex in Santa Oliva (Spain) between 12th-16th March 2012. Both practical and theory sessions were used to train teams to conduct in depth accident investigations according to the DaCoTA methodology and to use the DaCoTA database as the data entry tool (see Chapter 4).

The teams were questioned about their current in-depth investigation activities and sources of funding, as well as their ability to continue with investigations after the DaCoTA project. The partners were asked before and after the Pilot Study and the results were very encouraging. The responses given before the Pilot Study are shown in Figure 6 below, while the results from after the Pilot Study are illustrated in Figure 7 and Figure 8.

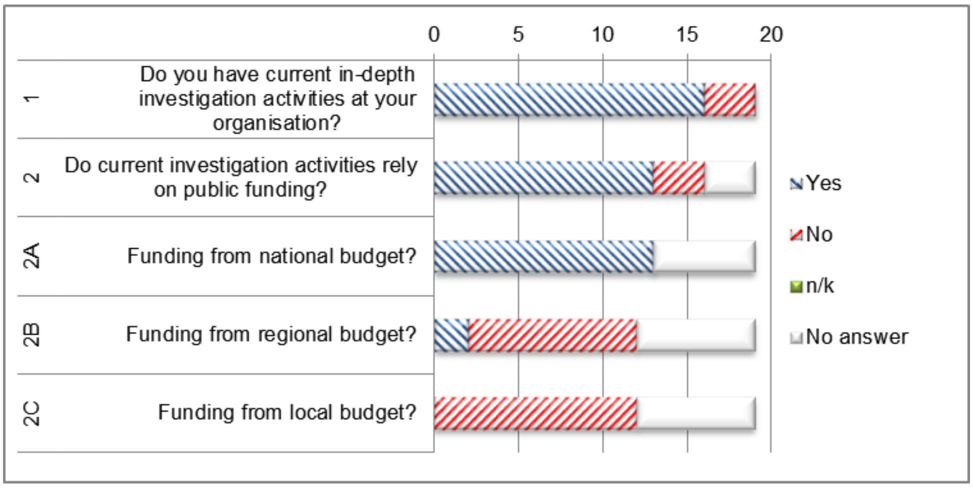

Figure 6 Responses to current budget and investigation activities from teams before the Pilot study

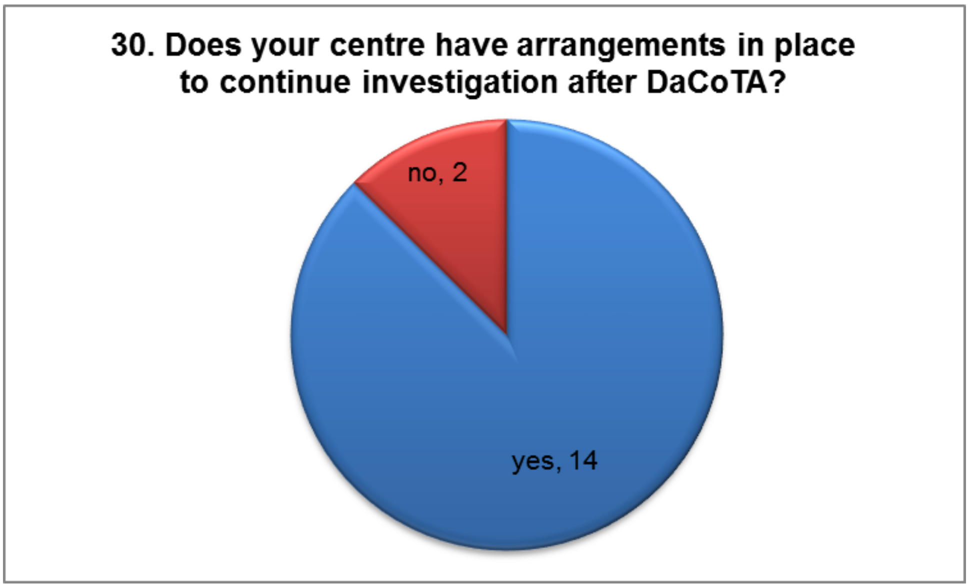

Figure 7 The number of respondents able to continue investigations after DaCoTA

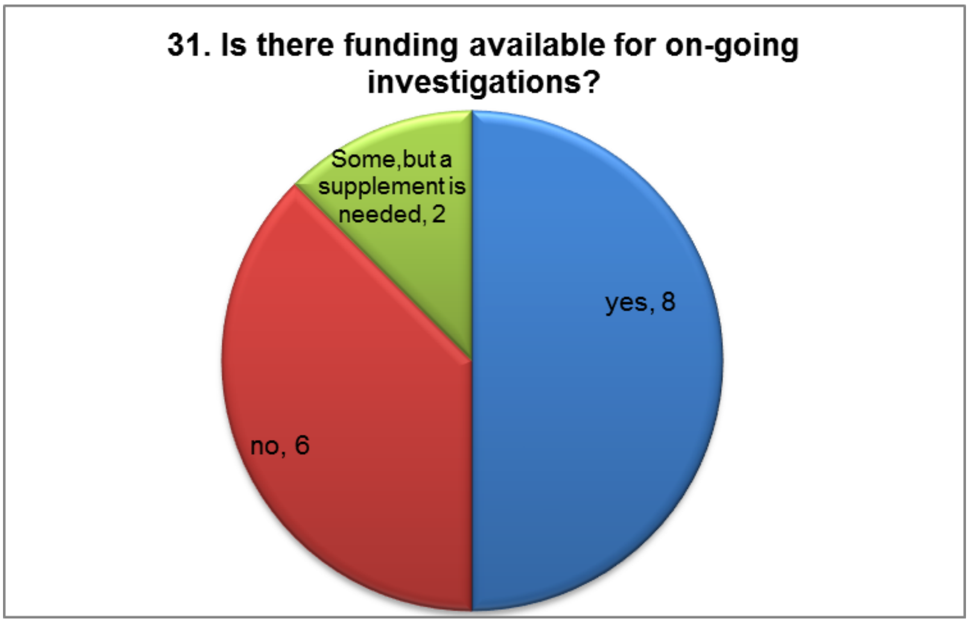

Figure 8 Availability of funding for on-going investigations

A majority of the partners had existing in-depth investigation activities with some public funding in place before the Pilot Study. After the Pilot Study, most of the teams had the arrangements and infrastructure in place to continue investigations after the end of DaCoTA, which was very promising for the future of in-depth data collection in Europe.

4. THE DACOTA SYSTEM

4.1. Introduction

The components that make up the DaCoTA system are described briefly in this chapter. The DaCoTA system was developed starting from the System developed by the SAFER consortium for the Swedish in-depth investigation activities. The SAFER consortium made available its system for free. The System was then updated and improved according to the DaCoTA WP2 needs and indications by CTL (University of Rome). The design of the system is such that it may be deployed and housed centrally with all the data entry and retrieval being performed over the internet, or a local database or hub can be installed if it is important to keep the data locally. This local hub can also interface with a central server if required.

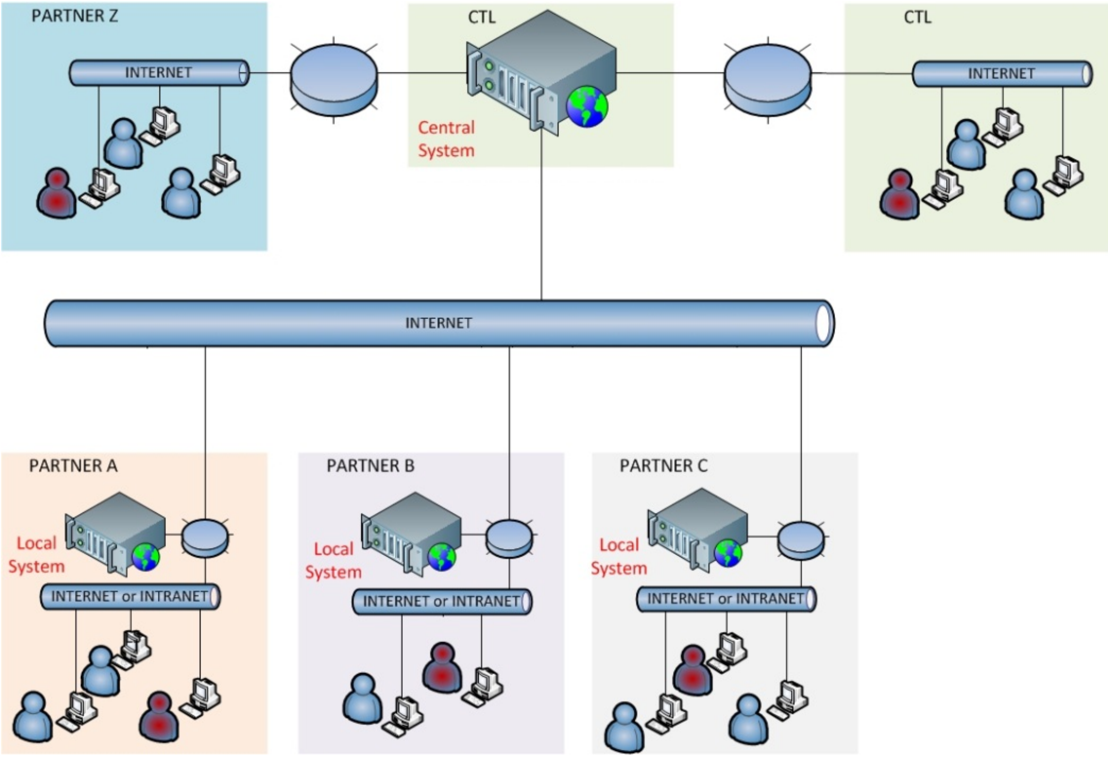

Figure 9 Diagram showing the two different methods of setting up and accessing the system

4.2. The Database and Online Manual

One of the tools provided to the Pan-European In-depth Accident Investigation Network teams is the DaCoTA crash investigation system. The DaCoTA crash investigation system is composed of two components:

- The database web application;
- The online manual.

The database web application has been developed in order to:

- Store in a harmonized way in-depth accident data;
- Analyse and filter the accidents collected;

- Secure exchange of the data collected and the analysis results among the partners involved.

Each team has been provided with one or more logins to the database and is able to insert data related to the accident investigated according to the DaCoTA protocol. For each accident the database also allows the insertion of pictures, files and movies and to store the results of analysis on accident causation using DREAM[4] methodology, accident reconstruction and injury mechanisms.

The data of the accident are organized in four different levels. Accident level refers to general data about the accident including the accident summary. All the data about infrastructure conditions and geometry are stored in the road environment level. Element level refers to the different vehicles involved in the accident (pedestrians included) and road user's level is where data about road users involved, including consequences of the accident, are stored. For each accident the database allows storage of up to 1,500 variables. For each level it is also possible to store in an organised way pictures, movies and files. Finally the database also allows the results of the case analysis for each accident to be stored. An overview of the database data structure is reported in the figure below.

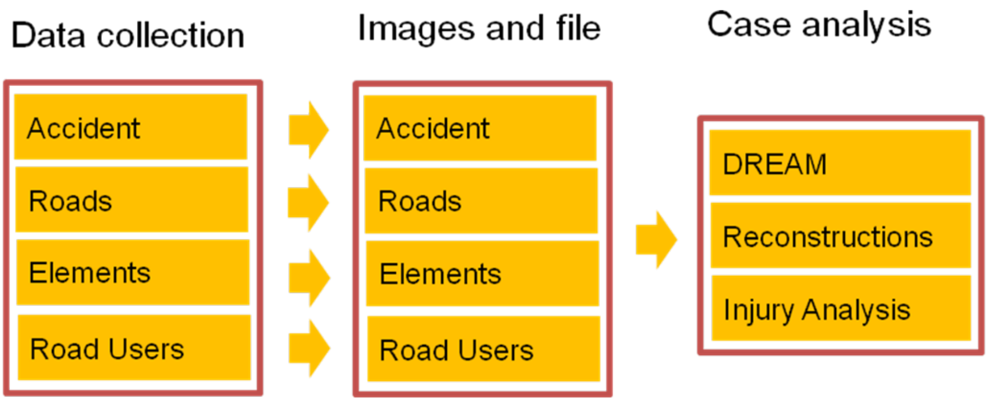

Figure 10 The database data structure

The database is not a simple application but it is a Rich Internet Application (RIA) and needs the use of the right set of technologies to provide the service (for more details see DaCoTA Deliverable 2.2[5]). The main characteristics of the database are:

- Accessible over the internet;
- All frameworks and tools are open source;
- Server cross-platform architecture: Windows, Linux, Unix;
- Client interface is any web browser that supports Adobe Flash and runs on any Operating System with internet access.
- Central or local housing of the data is possible depending on the requirements

From the design point of view the database has been implemented to be as user friendly as possible, intuitive and easy to use (a snapshot of a database screen shot is shown in the figure below).

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[4] H. WALLÉN WARNER, M. LJUNG AUST, J. SANDIN, E. JOHANSSON & G. BJÖRKLUND, 2010. *Manual for DREAM 3.0*. [online]. Chalmers University of Technology, Gothenburg. [viewed 11/12/2012] Available from: http://www.dreamwiki.eu/

[5] Available from the project website: http://www.dacota-project.eu/

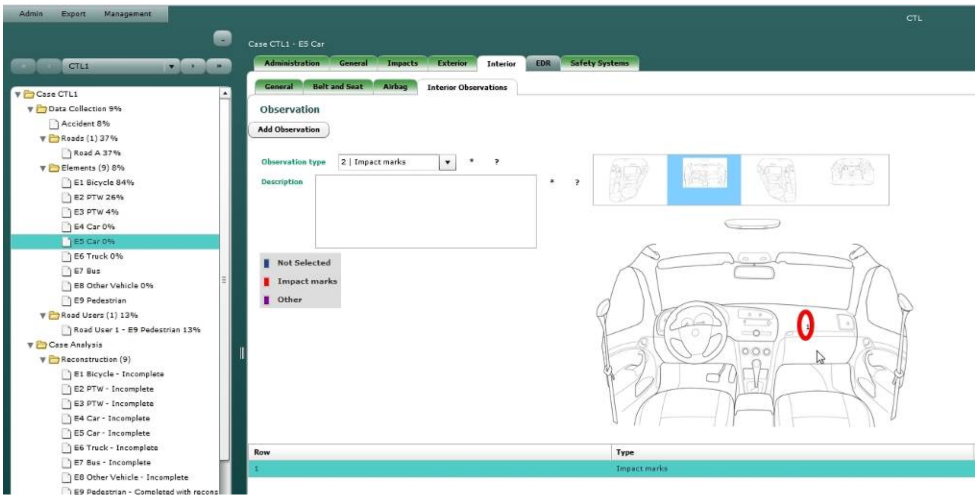

Figure 11 A view of the database

In the database, there is a direct link between each variable and the online manual in order to get more information about the variable, how to measure it in the field and how to code it in the database.

The online manual (see Figure 12), the other component of the DaCoTA Crash Investigation System, has been developed with the aims of:

- Providing a location for the DaCoTA in-depth road accident investigation methodology.
- Informing the scope, characteristics and practical requirements of the methodology.

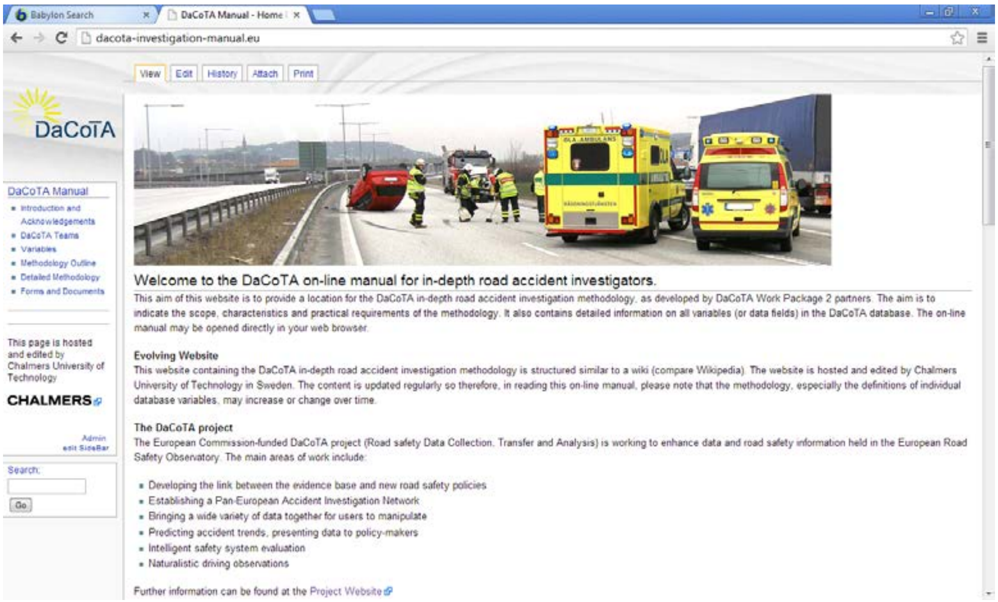

Figure 12 The first page of the online manual

Beside the information about the variables the online manual provides an overview of the DaCoTA methodology, information on secure and safe data collection in the field and forms and documents for data collection. The contents of the online manual are divided into six parts:

- Introduction and Acknowledgements

- DaCoTA teams
- Methodology outline
- Variables
- Detailed methodology
- Forms and documents.

The online manual is publically available online at http://dacota-investigation-manual.eu.

4.3. Selection of Accident Causation Method

One of the key tasks in developing the European method for accident investigations was to choose a method for accident causation analysis. The methods Driving Reliability and Error Analysis Method (DREAM), Accident Causation Analysis System (ACAS) and Human Functional Failure (HFF) are used by the partners in other projects and were the possible candidates. A list of important considerations for the selection of a method was set up and is presented in the list below. The HFF manual was translated from French into English.

- Good inter-coder reliability
- Possibility to make single case analyses and automated aggregated analyses
- Have a theoretically established background
- The method should contain enough and relevant causation factors
- Clearly describe contribution factors/causes
- A manual should exist and include examples and recommended applications
- It is desirable that the method has a clear start and end
- Identify the users of the data
- Be able to use the result to suggest countermeasures
- The method should be possible to implement into a database
- The method should consider all involved road users
- It is desirable that the method includes some kind of time sequence

During a period of about six month the WP2 partners compared the methodologies by:

1. Coding five example cases: Most partners had previous experience from using at least one of the methods. To get familiar with the other methods and be able to code the cases a coding exercise was set up.
2. Filling in questionnaire: After completing the exercise each coder was asked to respond to a questionnaire evaluating their experience of each method.
3. Voting: After presentation and discussion of the results of the coding and questionnaire all partners were asked to rank the coding systems according to which they would preferred to be used in DaCoTA. It was also possible to suggest changes to the preferred method.

All three steps in the process showed a small advantage for the DREAM method. Considering that DREAM was developed in SafetyNet and is supported as the European method by the Commission and that DREAM is already built into the existing database meant that DREAM was chosen for DaCoTA.

4.3.1. Compatibility of DREAM with the ACAS method

However as it is important for a pan European Database to allow for the possibility to transfer data to and from other (existing) databases, an additional study was conducted to evaluate the transferability of causation data from DaCoTA with the DREAM method to one of the other systems used in Europe: ACAS, as used in the GIDAS project in Germany[6].

In summary the analysis of the available causation data in the DaCoTA WP2 Database has shown that it is possible to conduct an analysis of the causes of traffic accidents based on the ACAS accident causation methodology. DaCoTA is able to provide comprehensive details on human behaviour and failures together with information on contributing influence factors. The principle source of causation information is the data recorded by the DREAM method. While in most cases it was possible to convert the causation information directly from DREAM to ACAS, in some cases a sharp and distinct conversion was difficult and extra information from pictures or other sources of information (e.g. the accident type) was used. Even though the cases that were collected from various different partners with different levels of experience in the DaCoTA database are far from being representative of anything, the distribution of causation factors for example over the main categories of human failures showed a realistic characteristic. The most failures were related to human failures like problems with seeing or identifying the available relevant information, only little errors occur when it comes to operating the vehicle.

The full compatibility report and ACAS methodology are available upon request[7]

4.4. Training

Figure 13 Teams undergoing training in Spain

[6] More information can be found at the study website: http://www.gidas.org

[7] Please see the internal report for DaCoTA Work Package 2, available from Jaensch.Michael@mh-hannover.de or j.r.hill@lboro.ac.uk

A training package was created by the DaCoTA partners to facilitate the training of investigation teams who are members of the Pan-European In-depth Accident Investigation Network. This training package was initially delivered during the DaCoTA training week that was held in March 2012 in Santa Oliva, Spain. The following topics were included in the training:

- Preparing an Investigation Team
- Scene Examination and recording visual evidence about the crash scene
- Vehicle Examination
- Vulnerable Road Users
- Collecting Road User Data
- Medical information
- Case Analysis

A copy of the materials used in the training can be found in the document *DaCoTA training manual and draft protocols for in-depth road accident investigations in Europe* [8] These training materials can be used in the training of any future teams in the area of in depth accident data collection alongside the online manual.

[8] Available from the project website: http://www.dacota-project.eu/ (Deliverable 2.3)

5. THE PILOT STUDY & REVIEW

This chapter describes a pioneering Europe-wide In-Depth Pilot Study that primarily ran during the second half of 2012 and the feedback from that study. This was the first time that 22 partners from 19 European countries collaborated on such a scale. There is no in-depth data available to describe the causes of accidents and injuries for Europe as a whole although earlier studies have conducted pilot investigations to develop protocols. DaCoTA has built upon previous work that identified teams and their research priorities to establish the infrastructure for a future investigation system that can be deployed beyond the completion of the project.

Every team in the network was tasked to investigate five accident cases and enter the data on these cases into the database. The review process that followed was divided into two parts: a case review performed by the core experienced teams and a questionnaire to collect feedback from the teams after using the system.

The results of this Pilot Study were used to further refine and improve the data collection methodology. Some of the results are presented here in brief while the majority of the recommendations are detailed in Chapter 6.

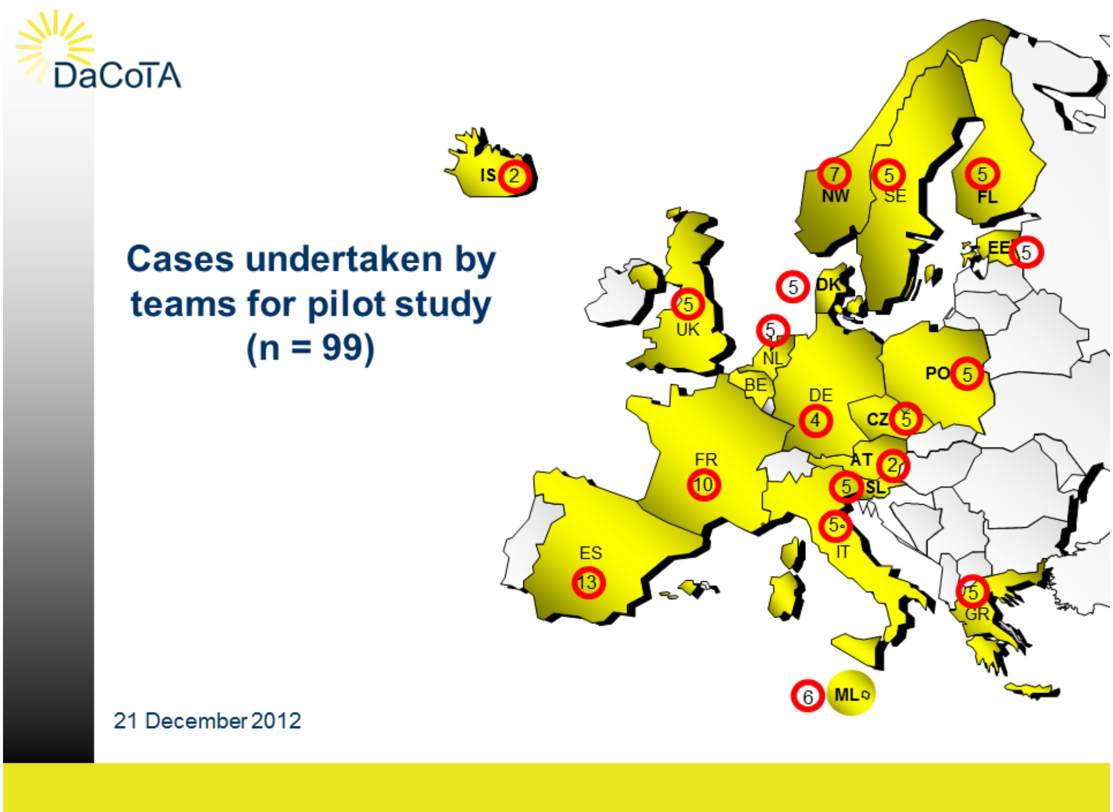

Figure 14 Cases collected by teams during the Pilot Study

In total, 99 cases were investigated by the teams across Europe as shown in the map above. Of these cases, 77 were entered into the database. On-scene investigations made up the majority of cases entered (46) while a smaller number of cases were investigated retrospectively (31).

The feedback obtained from the participating teams was encouraging and a testament to the viability of the methods developed in this project. Some challenges were still evident but these were common to work conducted in the area of safety. As shown below, the majority of teams in the Pilot Study were self-funded governmental and non-governmental organisations. A minority of organisations relied on DaCoTA (EU Project) funding, while some combined their resources with DaCoTA resources. Only 1 participating team was funded by the automotive industry.

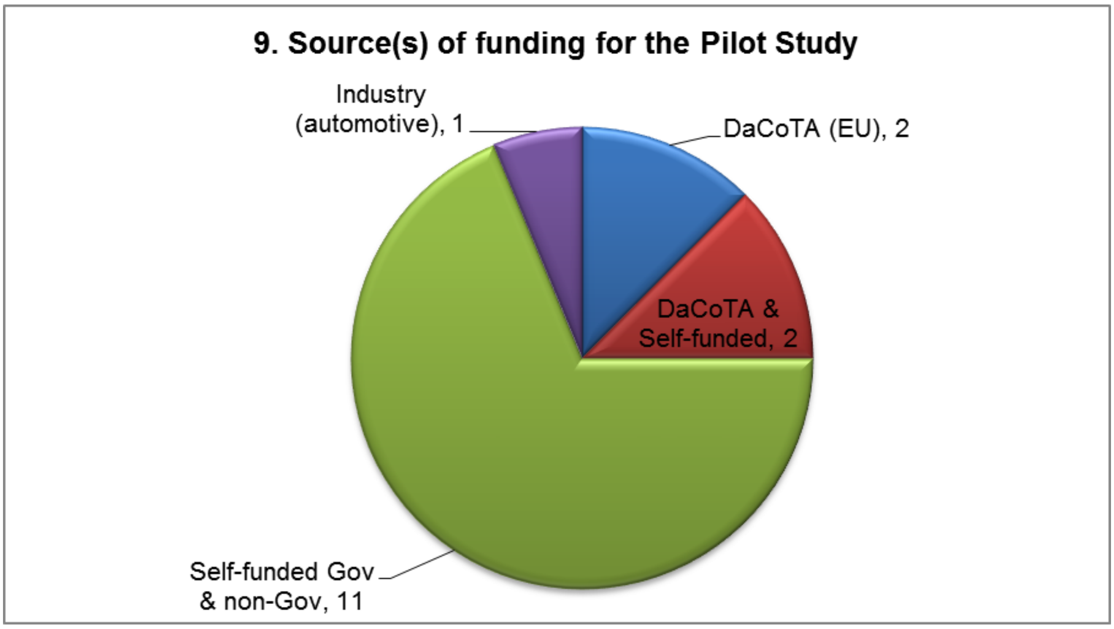

Figure 15 Sources of funding for the Pilot Study (n=16)

When asked whether they found difficulty in obtaining funding, 12 of 15 respondents indicated they found no difficulty, with only 3 partners finding difficulty in obtaining funding for this activity.

When it came to Case Analysis, about two thirds of the respondents were successful in completing the accident reconstruction section for their cases, but only about half were successful in completing accident causation and DREAM coding. It is worth noting that the difficulties encountered were rarely attributed to the DaCoTA system. Some of the perceived difficulty with the causation section was a result of the unfamiliarity of some teams with the process or the lack of appropriate software to assist in this task. Injury analysis was attempted and completed successfully by approximately a third of the teams (6/16), mainly due to a lack of access to medical data or experts in this area who can code it correctly.

In conclusion, a comprehensive, in-depth accident investigation methodology has been developed and tested as part of a full system ready for Europe-wide implementation. The participation and successful entry of cases by most of the team members is very encouraging for a future expanded network, especially after the feedback from this exercise was incorporated into the system.

6. RECOMMENDATIONS & CONCLUSIONS

DaCoTA Work Package 2's final product was to harmonize in-depth crash investigation protocols and develop tools to support the identified Pan-European Network of crash investigation teams who would prepare for investigations according to these harmonized protocols.

To achieve this a number of steps were taken. Research priorities and investigation teams cross Europe were identified as described in Chapters 2 and 3. The protocols were harmonised and presented as a methodology in an online manual [http://dacota-investigation-manual.eu]. A computer web application for input, storage and export of data was developed[9]. The online manual containing the methodology and the web application were linked and integrated into the "DaCoTA Crash Investigation System". A training package was developed and the Pan European Network met for a week of training in order to harmonize procedures. The procedures were tested during a pilot data collection where each team investigated five accidents. The final part of the work was to review the results from the pilot study in order to find topics for further improvement.

The review was comprised of a case review by the core teams and a questionnaire concerning the experience all teams had during the pilot study. The results from the review and questionnaire were analysed and many issues were resolved within the project. Some issues are still open though and are presented below in brief.

6.1. General Recommendations

During the development of the Pan-European network, training week and pilot study important issues were noted.

- The support organisation around the methodology and the web application was very much appreciated and is essential to enhance data quality, receive case feed-back and act on it.
- The evaluation of the training package was well received with a mixture of theory and practice.
- New/inexperienced teams would benefit from training sessions provided by experienced teams.
- More exercises were required in drawing a scaled sketch of the crash. The information from the sketch is very important information when analysing the crash and for subsequent analysis.
- More focus should be directed to collecting human behavioural data.
- The link between the web-application and the online manual (where each variable has a direct link to the manual) has speeded up data entry considerably.
- Lengthy process to obtain medical and injury information – this should be anticipated for future studies.
- Not many teams have the ability to retrieve information on long term injury consequences but it will remain as an optional part in the methodology.
- Data protection is a delicate issue and it should be highlighted in the planning of any new activity. How data can be provided and distributed from all

[9] Full description available from the project website: http://www.dacota-project.eu/ (Deliverable 2.2)

teams/countries should be clear. Many solutions exist to this problem and can be applied.
    - Date: only code year and season (e.g. Dec-Feb, Mar-May, Jun-Aug, Sep-Nov)
    - Time: only code intervals (e.g. 06-09, 09-12, 12-15, 15-18, etc.)
    - Geographical area: avoid use of city/area names or GPS coordinates.
    - Road environment: Never use any road names or numbers
- A thorough identification of priorities from research, policy and industry is important before data collection begins based on the identified priorities.
- Even if a joint data collection activity in Europe is not running it has proven important to continue the collaboration between the investigation teams. All teams learn from each other and the data ultimately improves.

6.2. Essential Improvements

Essential improvements include issues that need to be resolved before any new data collection activity based on this methodology starts. These issues were identified during the development and/or during the review but have not been resolved within the timeframe and/or resources of the project.

6.2.1. Methodology and Online Manual

- The online manual needs streamlining to ensure data quality.
- Road area: how to interpret and code the road area needs further development.
- Event type: the explanation in the manual needs to be extended to include which event should be coded and in which order.
- Core variables (those that need to be filled by all teams) need to be reviewed and fitted to the purpose of any new study.
- DREAM (see section 4.3): The web application needs to be updated to DREAM 3.2. The method for coding contributing factors to the crash was updated to version DREAM 3.2 during the project. The updated version was not implemented into the web application therefore DREAM 3.0 was used during the pilot.
- AIS injury coding: It is important for all teams to have trained personnel that use the same version of the AIS codebook (here AIS 2005).

6.2.2. Variables

- There are a number of variables options that are missing and need reviewing.
- Accident summary: all teams need to follow instructions on how to write informative summaries. The summary together with the sketch are two of the most important variables to quickly get an understanding of the crash.
- Some values available in the web application and the definition in the manual are not the same

6.2.3. Web Application

- Generally there were some issues in the application concerning the response from the server and the system was slow. During the pilot some parts of the application were still under construction and therefore slower than expected. When starting a data collection activity it is recommended that the storage system is thoroughly tested for best results.
- Guidance in the web-application: the web-application either need its own instructions on how to fill in specific variables e.g. “right click to add element” or requires a section in the online manual.

- Powered Two Wheelers: add option to input impacts
- Graphical User Interface (GUI): The “grids” (tables) that are built up in the web application when adding impacts, road components etc. should either be at the top of the page or the first row must always be automatically selected for viewing.
- Images and files: need to improve the access speed and incorporate the ability to view and download separate files.

6.3. Further Improvements

Desirable improvements are issues that would improve the DaCoTA Crash Investigation System but are not essential to use the tools developed.

6.3.1. Methodology and Online Manual

- Exterior images of the vehicle: It must be clearer which images (in which order) are essential for a case.
- Reconstruction: include guidance to use kinematic reconstruction and option in the coding of the crash.
- Vehicle crash profile measurements for calculating crash energy and speed change at impact (“C1-C6 measures”): suggest more detailed guidance on how to measure different deformation patterns.
- A draft telephone interview script was developed as part of the project but this requires optimisation.

6.3.2. Variables

- To explain how to code certain variables, examples may be added in the manual.
- It is worth considering if more variables could be automatically filled in due to another response of a previous variable to increase the automatic consistency checks for data quality.
- Date and time: due to data protection the exact date and time can be changed to seasons during the year instead and intervals during the day. Hours and minutes should be separated in the system to allow “unknown” to be coded.
- Traffic flow at accident time: Suggest changing the input from a numerical field to a list of choices that can be estimated at the scene (such as no traffic, moderate, heavy, saturated, unknown)
- Child Restraint Systems: should be automatically disabled in case of an adult person.
- More values should be added (such as novel vehicles), if needed, in the Sections “Vehicle type”, “Other vehicle.

6.3.3. Web Application

- Add percentage of progress indicator.
- Drop down lists: Should consider if the whole row of the short description needs to be available when viewing a case.
- Adding a spell checking facility to text fields could improve readability
- Adding a text search option would be useful to analysts.
- Sketching tool: an improved application can be sought and implemented (as long as it is open source software in keeping with the rest of the program).
- Text clarity: once a case is published, greyed-out text in some fields becomes hard to read.

- Length of text entries: some selected options are very long and cannot be viewed without referring to the online manual.

6.4. Conclusions

All the basic components for setting up the Pan-European Accident Investigation Network have been described in this document and a large scale trial of the system was presented along with the results of that trial and the positive feedback from participants. Beyond this project, a vision for the whole network has developed with the following:

- Common methodology (achieved)
- Investigating team network (achieved)
- Key operational requirements (achieved)
- Business model (still pending)
- Up to date research objectives (on-going)

Once the business model is in place this will enable the continued collection of in-depth data that can answer key research questions for all stakeholders and help Europe maintain a lead in road transport safety.