


**Session 6**  
**Improving our Understanding of Crashes**

Friday 23<sup>rd</sup> November 2012

Julian Hill, Loughborough University



Directorate-General  
for Mobility  
and Transport

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



**Agenda for Session 6**

*Improving our Understanding of Crashes*

1. The Pan-European In-depth Accident Investigation Network
2. Panel Session on Future Plans to Investigate the Causes of Injuries and Accidents
  - Points of view from the panel
  - Discussion



# DaCoTA

## The Pan-European In-depth Accident Investigation Network

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



CENTRO DI RICERCA PER IL TRASPORTO E LA LOGISTICA



SAPIENZA UNIVERSITÀ DI ROMA



Loughborough University



CHALMERS



IFSTAR



National Technical University of Athens



IBSR-BIVV



SWOV  
INSTITUTE FOR ROAD SAFETY RESEARCH



MINISTERIO DEL INTERIOR  
DGT  
Dirección General de Tráfico



MTH AccidentResearchUnit  
Hannover Medical School



**DaCoTA  
In-depth Team**

*Developing The New  
Pan-European  
In-Depth Accident  
Investigation Network*



## The Aim of the DaCoTA In-depth Team

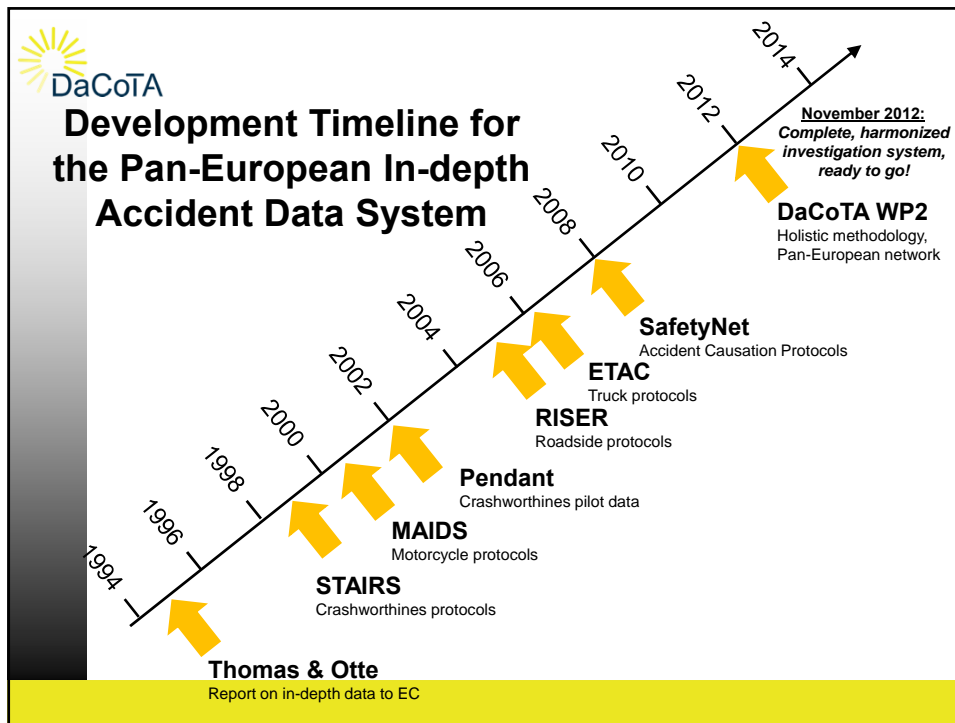
*To "harmonize in-depth crash investigation protocols and at an EU level, identify and train crash investigation teams who will prepare for investigations according to these harmonized protocols"*




## What are In-depth Accident Investigations?

- Detailed and factual information from independent investigations
- Conducted by trained experts using a multi-disciplinary approach





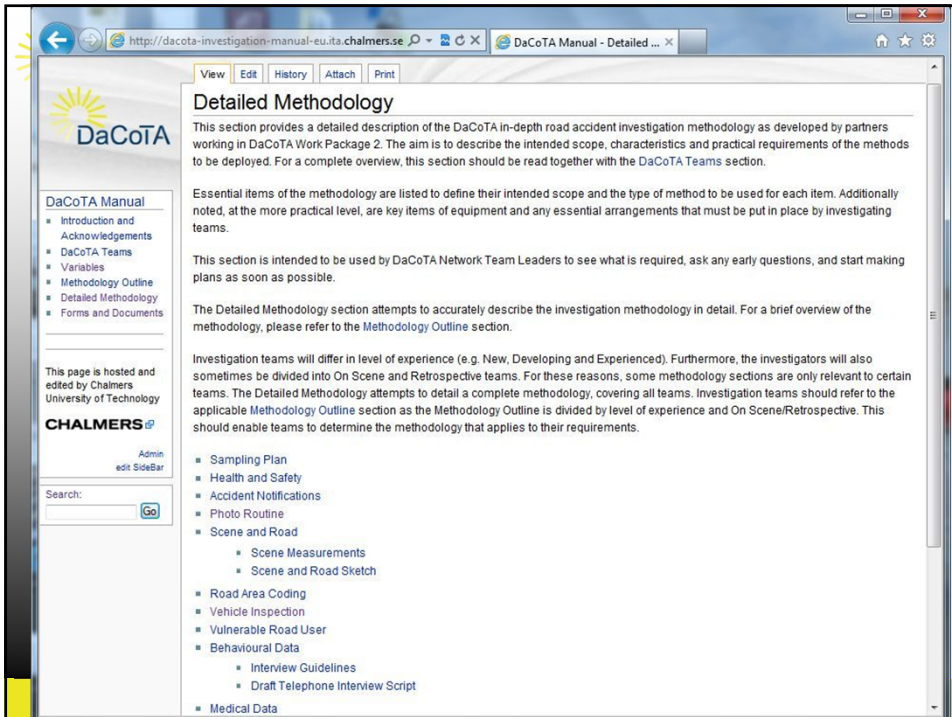
 **DaCoTA**      **Our Presentation Today**

1. Introduction
2. What are in-depth investigations and why?
3. Development of the investigation network
4. The pilot study
5. The DaCoTA Crash Investigation System
6. Conclusions



**Helen Fagerlind**

**SAFER**  
**Vehicle and Traffic Safety Centre**  
**Chalmers University of Technology**



http://dacota-investigation-manual-eu.ita.chalmers.se

DaCoTA Manual - Detailed ...

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**Detailed Methodology**

This section provides a detailed description of the DaCoTA in-depth road accident investigation methodology as developed by partners working in DaCoTA Work Package 2. The aim is to describe the intended scope, characteristics and practical requirements of the methods to be deployed. For a complete overview, this section should be read together with the DaCoTA Teams section.

Essential items of the methodology are listed to define their intended scope and the type of method to be used for each item. Additionally noted, at the more practical level, are key items of equipment and any essential arrangements that must be put in place by investigating teams.

This section is intended to be used by DaCoTA Network Team Leaders to see what is required, ask any early questions, and start making plans as soon as possible.

The Detailed Methodology section attempts to accurately describe the investigation methodology in detail. For a brief overview of the methodology, please refer to the Methodology Outline section.

Investigation teams will differ in level of experience (e.g. New, Developing and Experienced). Furthermore, the investigators will also sometimes be divided into On Scene and Retrospective teams. For these reasons, some methodology sections are only relevant to certain teams. The Detailed Methodology attempts to detail a complete methodology, covering all teams. Investigation teams should refer to the applicable Methodology Outline section as the Methodology Outline is divided by level of experience and On Scene/Retrospective. This should enable teams to determine the methodology that applies to their requirements.

- Sampling Plan
- Health and Safety
- Accident Notifications
- Photo Routine
- Scene and Road
  - Scene Measurements
  - Scene and Road Sketch
- Road Area Coding
- Vehicle Inspection
- Vulnerable Road User
- Behavioural Data
  - Interview Guidelines
  - Draft Telephone Interview Script
- Medical Data

DaCoTA Manual

- Introduction and Acknowledgements
- DaCoTA Teams
- Variables
- Methodology Outline
- Detailed Methodology
- Forms and Documents

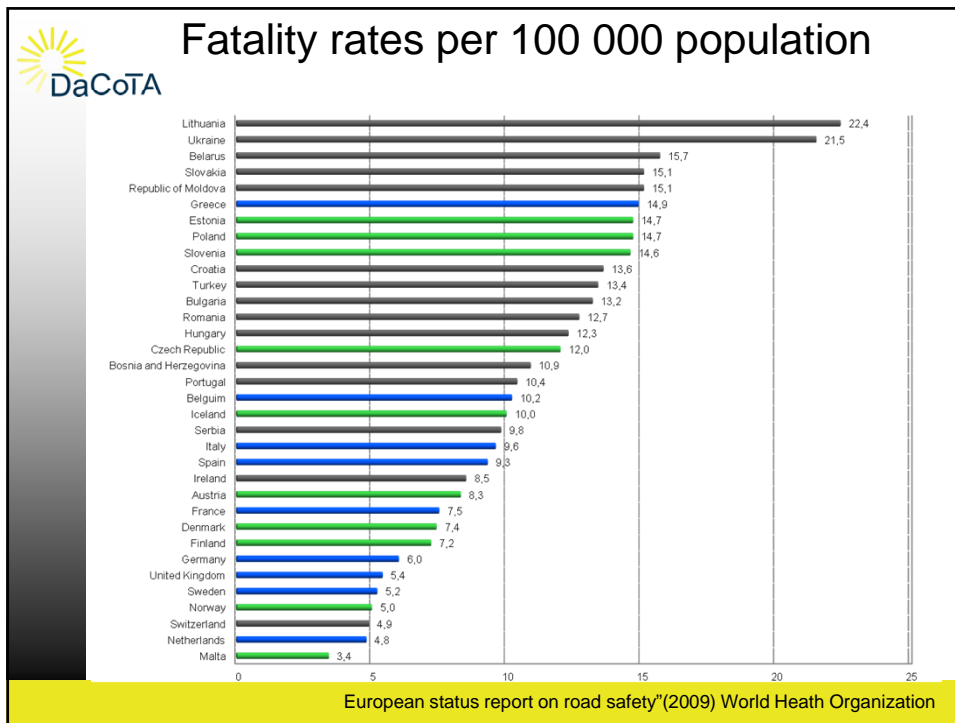
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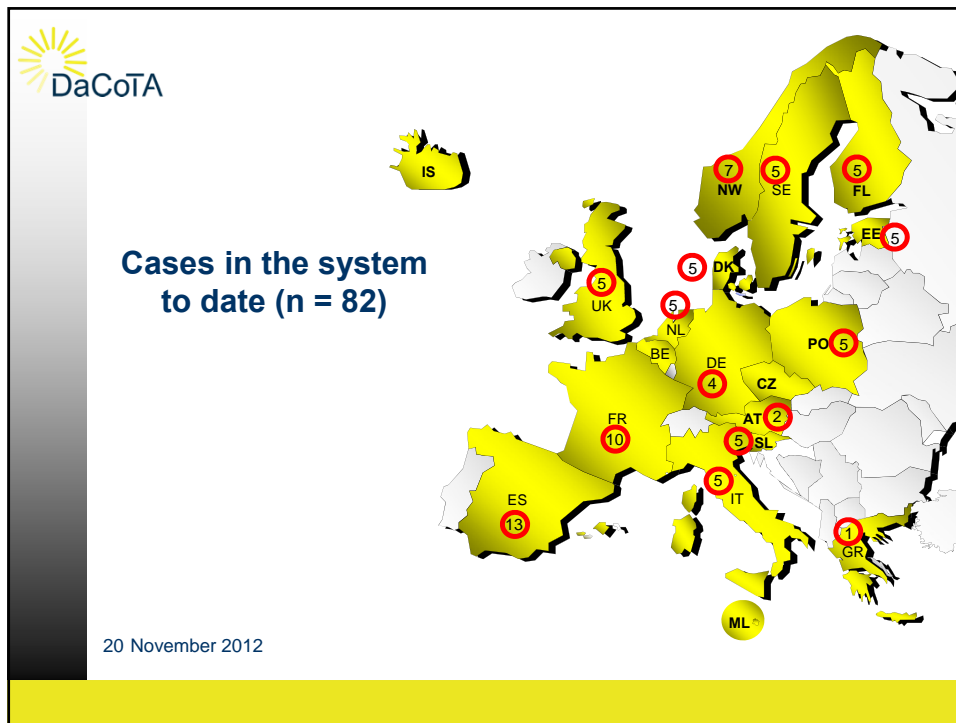
### Team Training in March 2012



### Team Training in March 2012








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### Pilot Study Conclusions

- Network functions well
  - Training, support and mentoring
  - > 80 cases investigated to date
- Methodology effective
- DaCoTA crash investigation system works well




**Some Recommendations after the Pilot Study**

- Detailed team training must be on-going
- A core data-set would be more manageable for some teams
- Some teams to further develop capability to capture:
  - Long term injury consequences
  - Human behavioural data
- Many teams would like the network to continue



**Gabriele Giustiniani**

**CTL “Sapienza” University of Rome**



## The DaCoTA Crash Investigation System

In order to support the Pan European in-depth network the DaCoTA crash investigation system has been developed:

- The database web application;
- The On-line Manual.

This tool has been developed starting from the INTACT system developed by SAFER in Sweden for Swedish in-depth investigation activities.



## 1) The Database Web Application



## DaCoTA The Database Web Application

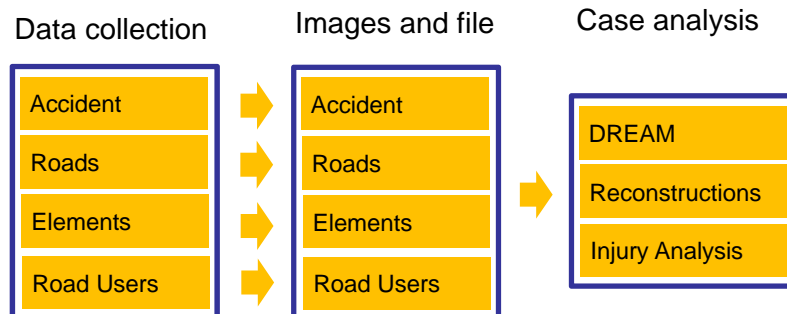
The database web application is a platform developed to:

- Store in harmonized way in-depth accident data;
- Analyze and filter the accidents collected;
- Secure exchange of the data collected and the analysis results among the partners involved.




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## Database Web Application Structure and Numbers

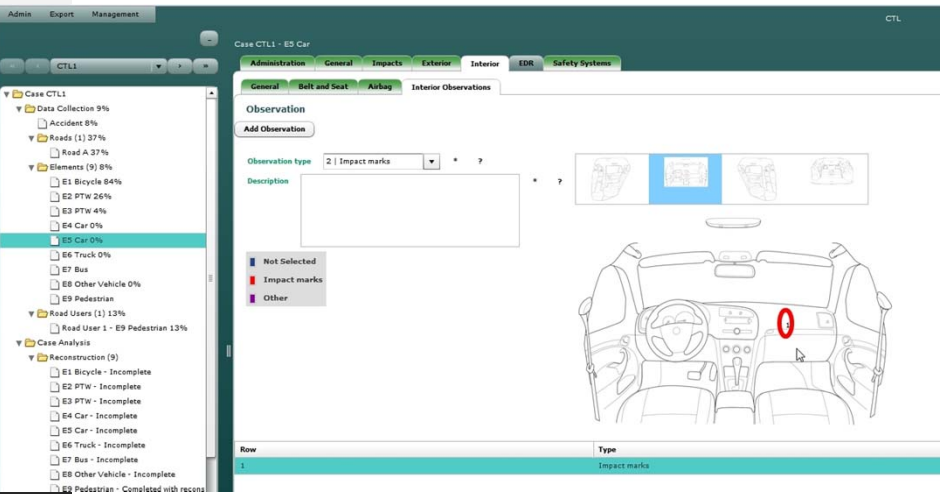


1,500 variables are available per accident.


**Database Web Application  
Main Characteristics**

- 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 OS.


**The Database Web Application  
A Snapshot**



Row	Type
1	Impact marks

**DaCoTA The Database Web Application A Snapshot**

Admin Export Management CTL Logged in as: g.giustiniati Logout

Case MUH1

- Case MUH1
  - Data Collection 93%
  - Accident 57%
  - Roads (1) 99%
    - Road A 99%
      - Elements (2) 100%
        - E1 Car
        - E2 Bicycle 100%
      - Road Users (2) 95%
        - Road User 1 - E1 - 1
        - Road User 2 - E2 - N
  - Case Analysis
    - Reconstruction (2)
      - E1 Car - Completed
      - E2 Bicycle - Comple
    - DREAM (2)
      - E1 Car - Completed
      - E2 Bicycle - Comple
    - Injury Analysis (2)
      - Road User 1 - E1 - 1
      - Road User 2 - E2 - N
  - Images and Files
    - Files (0)
    - Images
      - Uncategorized (0)
      - Accident (1)
        - Sketch (3)
      - Elements (0)

Design order	Type	Subtype	Width	Junction travel direction	Maintained marking	Active	
1	RoadSide	Not applicable	N/A	N/A	N/A	No	View
2	RoadLane	All directions	9	Not applicable	N/A	Yes	View
3	RoadSide	Not applicable	N/A	N/A	N/A	No	View
4	RoadSide	Not applicable	N/A	N/A	N/A	No	View

Case Status: Published

**DaCoTA 2) The On-line Manual**

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### Methodology Outline

This section provides a brief overview of the DaCoTA in-depth road accident investigation methodology as developed by partners working in DaCoTA Work Package 2. The aim is to briefly indicate the intended scope, essential characteristics and practical requirements of the methods to be deployed. For a complete overview, this section should be read together with the section on DaCoTA Teams.

Essential items, or building blocks, of the methodology are listed to briefly define their intended scope and the type of method to be used for each item. Additionally noted, at the more practical level, are key items of equipment and any essential arrangements that must be put in place by investigating teams.

For the pilot study, which will run over April to June 2012, investigating teams will start with different levels of experience and their ability to complete the methodology will therefore vary. Items of methodology are defined for four levels of team experience; new, developing, experienced retrospective and experience on-scene teams.

This section, together with the section on DaCoTA Teams, is intended to be used by DaCoTA Network Team Leaders, as brief-outline to see what is required, ask any early questions, and start making plans as soon as possible.

This section is not intended to provide a detailed description of the methodology. Please refer to the Detailed Methodology section for further information.

- Sampling Plan
- Health and Safety
- Accident Notifications
- Scene and Road
- Vehicle Inspection
- Vulnerable Road User
- Behavioural Data
- Medical Data
- Accident Causation
- Accident Reconstruction
- Case Delivery

DaCoTA Manual

- Introduction and Acknowledgements
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## The DaCoTA On-line Manual Introduction


- The aims of the DaCoTA On-line Manual are:
  - to provide a location for the DaCoTA in-depth road accident investigation methodology.
  - to inform on scope, characteristics and practical requirements of the methodology.
- Contains detailed information on all variables (and fields) in the DaCoTA system.
- Each input field in the DaCoTA system is linked to the On-line Manual



## Structure of the DaCoTA On-line Manual

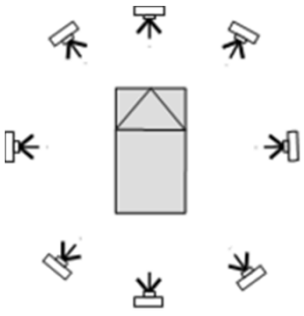
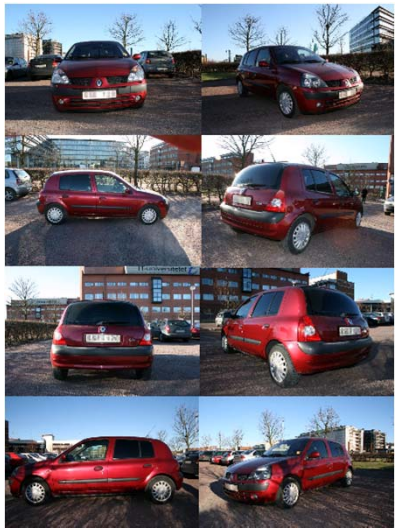
The manual contents are divided into 6 parts:


- Introduction and Acknowledgments
- DaCoTA teams
- Methodology outline
- Variables
- Detailed methodology
- Forms and documents

 **Example: Photo Routine**

**2.1 Car**

**2.1.1 Exterior photos car**  
Take eight photos around the car from the angles shown in the photo below. Also try to take a photo on the car from above to see deformations of the roof, if any.

 **The DaCoTA Crash Investigation System Summary**

- These tools will be made freely available to help expand the use of harmonized in-depth investigations methods
- On-line Manual can be found at: <http://dacota-investigation-manual.eu/>
- They set up a common reference standards at European and International level



 DaCoTA

## The Vision beyond 2012 (beyond DaCoTA)


- A comprehensive, pan-European network
- A large scale, on-going accident investigation programme



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## What do we need for on-going pan-European investigations?

- Common methodology
- Investigating team network
- Key operational requirements
- Business model
- Up-to-date research objectives




## What do we need for on-going pan-European investigations?

- ✓ • Common methodology
- ✓ • Investigating team network
- ✓ • Key operational requirements
  - Business model
- (✓) • Up-to-date research objectives



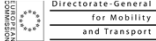
## In Conclusion

- **Current position:**
  - A common method, manual and database web application built and validated (available on-line)  
*<http://dacota-investigation-manual.eu/>*
  - An early functioning network of in-depth teams across Europe
- **Future objectives:**
  - To sustain the new data collection system and network beyond 2012
  - To build an on-going, systematic research activity
  - To best support stakeholder needs for pan-European in-depth knowledge about the causes of accidents, injuries and potential solutions




## Panel Session

*Future Plans to Investigate the Causes of Injuries and Accidents*



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



## Your Panel

<b>Julian Hill (Moderator)</b> DaCoTA Partner Loughborough University	
<b>Helen Fagerlind</b> DaCoTA Partner Chalmers University	<b>Daryl Lloyd</b> Department for Transport, UK
<b>Gabriele Giustiniani</b> DaCoTA Partner University of Rome	<b>Joerg Bakker</b> Daimler
	<b>Konstandinos Diamandouros</b> European Road Federation



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**Daryl Lloyd**

UK Department for Transport

*The Government Point of View*



DaCoTA

**Joerg Bakker**

**Daimler**

*A car manufacturer's point of view*

# In-Depth Accident Data and Product Development

European Conference on Road Safety Data and  
Knowledge-based Policy-making  
2012-11-23, Athens

Daimler AG, Jörg Bakker



## Brief History of In-Depth Accident Data at Mercedes

- Since 1968: Mercedes internal accident database DBCars
  - Current Mercedes car models
  - Southern Germany
- Since 1999: GIDAS (German In-Depth Accident Study)
  - Representative with respect to German national statistic
  - Two spots: Hanover, Dresden
- Since 2011: iGLAD project
  - Goal is the harmonization of in-depth data from different countries, building a common database
  - European countries, USA, India, OECD national data
  - Based on already available data. no new data is generated. close co-operation with DaCoTA

There is a need for continuously collected data with a broadened focus (e.g. more international, more aspects covered like pre-crash phase) for Mercedes accident research activities.

## iGLAD - Pilot Study Conducted with Eight Countries

USA, India, Germany, Sweden, France, Spain, Austria, Poland provided five cases each, recoded to iGLAD common data scheme.



3 In-Depth Accident Data and Product Development | Daimler AG, Bakker | 2012-11-23

Mercedes-Benz

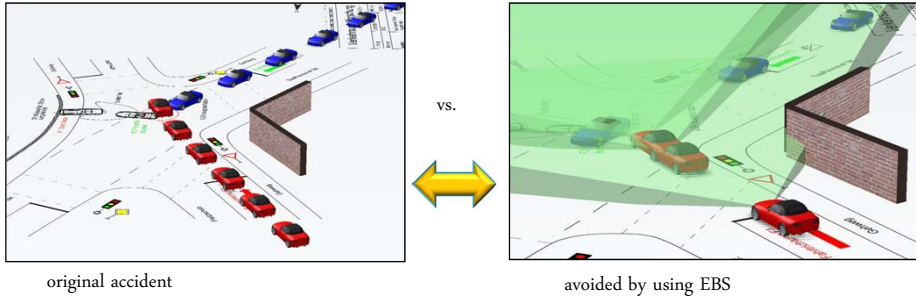
## Accident Data Usage in Product Development

- Development of safety systems
  - Monitor and improve existing systems
  - Identify most relevant accident scenarios and design appropriate systems
  - Design realistic scenarios for driving simulator
  - Sensor and actuator demands / specification
- Benefit assessment of safety systems
  - Virtual testing of safety systems with real world accident scenarios (simulation)
  - Communication (e.g. ESC introduction in model year 2000)
  - Ratings (e.g. EuroNCAP Advanced Dossier)
- Testing of safety systems
  - Design of crash tests (e.g. new propulsion technology)
  - Test procedures for active safety systems

44 In-Depth Accident Data and Product Development | Daimler AG, Bakker | 2012-11-23

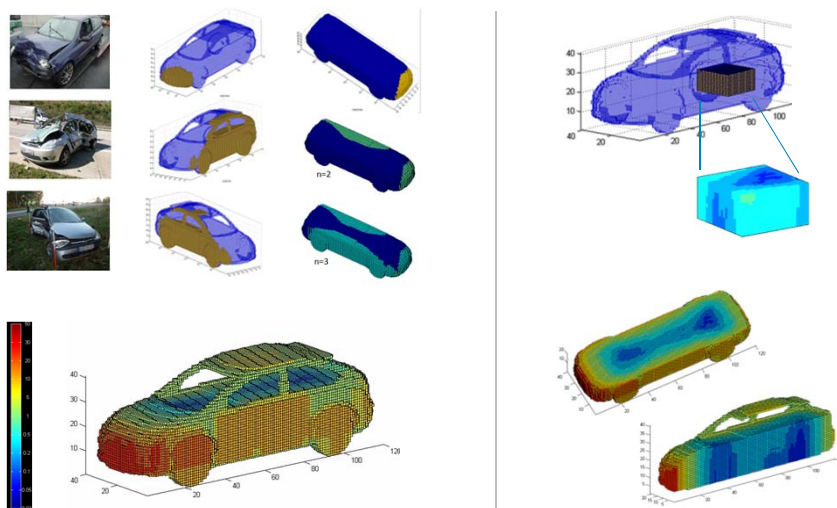
Mercedes-Benz


## Pre-Crash Simulation of Accidents



- Step 1
 Benefit of the system using a single accident
  
- Step 2
 Benefit of the system using the whole GIDAS database (all available accidents)

## Deformation Patterns and Components





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**Konstandinos Diamandouros**

**European Road Federation**

*A view from the road sector*



European Union Road Federation

***Improving our understanding of Crashes***

***Konstandinos Diamandouros***

***Head of Office***





### The European Union Road Federation (ERF):

- Brussels based non-profit organisation
- Defends the road infrastructure sector
- More than 50 members from 15 European countries



### ERF Programmes:

- **Road Safety**
- Sustainability
- Intelligent Roads and Financing



## The need for in-depth statistics The RISER project

- Road Infrastructure for SafEr Roads
- Co-financed by European Commission (FP5)
- Duration: 2003 – 2006
- 10 partners including ERF and VSRC



## The need for in-depth statistics The RISER project

- **Objective:** to develop set of best practices that will improve the state of road side safety in Europe
- Research could not have been carried out the availability of in-depth statistics



## The need for in-depth statistics The RISER project

Table 1. Number of cases from each contributor to RISER Statistical Database

Country	Participant	Number of accidents
Austria	TUG	17 000
Finland	HUT	5 000
France	CETE	52 000
Spain	CIDAUT	68 000
Sweden	Chalmers	11 000
The Netherlands	TNO	87 000
The United Kingdom	VSRC	24 000
<b>Total number of accidents</b>		<b>264 000</b>



## The need for in-depth statistics The RISER project

### Criteria for data

- Only single vehicle accidents
- No pedestrians
- Years 1999 – 2002
- Fatal, Serious and Non-injury accidents
- Minor roads excluded
- Urban Roads excluded



## The need for in-depth statistics The RISER project

### Data Variables

- 14 variables related to accident, vehicle and road environment
- 6 variables related to the road user



## The need for in-depth statistics The RISER project

### Crash Data

- Date
- Time
- Road Type
- Carriageway Type
- Road Condition
- Weather
- Speed Limit
- Light
- No Of Vehicle Occupants
- Accident Type
- Road Alignment
- Hit Object
- Vehicle Type
- Deformation Location

### Casualty Data

- Person Class
- Age
- Gender
- Alcohol
- Injury Severity
- Seatbelt Usage



## The need for better statistics Challenges ahead

- DACOTA has definitely improved the data available to policymakers
- Yet, there is a need for **both** more harmonisation of data and more in depth data



## White Roads Project What it tells about stats?

- **Objective:** to identify sections of the TEN-T in EU 27 where no fatal accident have occurred over 5 year period
- Relatively straightforward task?



## White Roads Project Questionnaire

- Graphic Table 1

Number	Road	Location	Date	Type of road	Killed	Serious injuries	Type vehicle involved (heavy, car, motorcyclist, cyclist, pedestrian, etc)	Existing infrastructure and equipment placed in the spot where the accident occurred  (lighting, barriers, vertical signs, road markings, state of surface, etc)
1	N-340	Km 17.4	3/7/2008 11:10 am	Single carriageway	1	3	Light vehicle Motorcycle	Safety barrier Road marking



## White Roads Project Questionnaire

- **Almost 85,000 km and 250,000 accident analysed**



## White Roads Project Problems

- Most of the countries **do not have an official list** of Trans European Road Network
- Some countries **do not provide accident data** for analysis (although all privacy concerns are respected). This is the situation of Germany



## White Roads Project Problems

- Some countries **do not have information about type of vehicle involved** in accidents, which introduces difficulties in the analysis for road safety purposes. In Belgium, difference between regions
- Countries like United Kingdom, Finland, Ireland, Sweden and Czech Republic refer the accidents in **coordinates "x-y", which do not correspond to the road network** (classified in name of road and kilometre). This circumstance makes the analysis more complicated and the necessity to locate accidents using a special software



## White Roads Project Problems

- Some countries provide accident data in road sections of 1 km long without specifying the exact point where the accident happened. Thus, this introduces a different analysis for these countries (Italy and Denmark)
- Information related to traffic flow or vehicles involved in the accident is not available in many countries



## White Roads Project Problems

- The lack of clear information, statistics and correlation between accidents and road sections is extremely negative for road safety analysis from the infrastructure point of view. Not only for the WhiteRoads Project, but also for black spot management works or other research studies





## White Roads Project Problems

- We had initially foreseen 6 months
- In the end, 18 months!



## Other Stats challenges

- More specific information related to roadside equipments (barriers, markings etc)
- How to use data collected through ITS for safety for evidence-based policymaking?



## FOTsis Project

- a large-scale field testing of the road infrastructure management systems needed for the operation of seven close-to-market cooperative I2V, V2I & I2I technologies
- in order to assess in detail both 1) their effectiveness and 2) their potential for a full-scale deployment in European roads.



## FOTsis Project Services

- S1: Emergency Management
- S2: Safety Incident Management
- S3: Intelligent Congestion Control
- S4: Dynamic Route Planning
- S5: Special Vehicle Tracking
- S6: Advanced Enforcement
- S7: Infrastructure Safety Assessment



## FOTsis Project Evaluation

- After the completion of the FOT's, an evaluation will be carried out to assess impact on safety and mobility.



## Issue linked to data from ITS

- Privacy
- Minimum standards for classification



Thank you for your attention

[www.erf.be](http://www.erf.be)

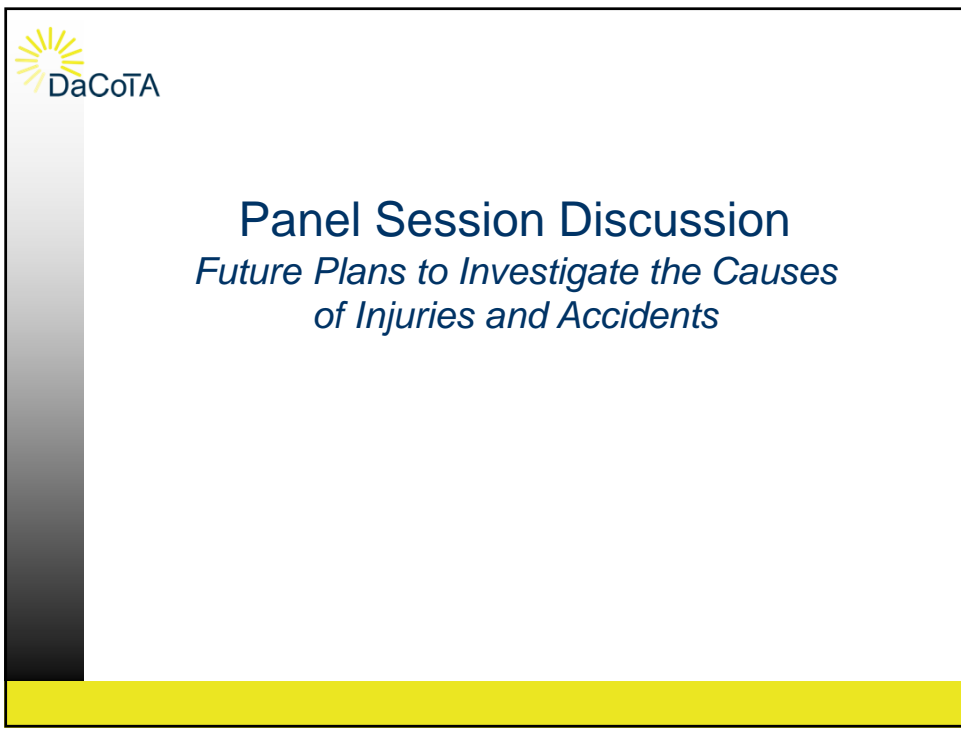
[www.whiteroads.eu](http://www.whiteroads.eu)


[www.fotsis.com](http://www.fotsis.com)

[k.diamandouros@erf.be](mailto:k.diamandouros@erf.be)



Panel Session Discussion  
*Future Plans to Investigate the Causes  
of Injuries and Accidents*





DaCoTA

*Thank you for your attention  
and contributions!*

