DaCoTA

Road Safety Data, Collection, Transfer and Analysis

Recommendations and Executive Summary

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RECOMMENDATIONS

DaCoTA recommendations for the transition of ERSO to become a fully functioning Observatory

The preparation and development work conducted by the DaCoTA team and the safetynet team before it have put in place the essential data specifications, collection methods, protocols and analysis methods to support a fully functioning ERSO. All of the methodologies have been validated through stakeholder consultations and pilot studies. While there are some types of data where further research is needed there are many that are now capable of being routinely implemented at EU level. Many of the data and policymaking tools developed in the two projects are now mature and are ready to form part of ERSO. To achieve this a number of key steps need to be taken to obtain the full value from the investment in previous accident data research studies, these steps are in respect of the institutional organisation of ERSO, implementation of routine data functions and integration with future EU road safety research.

The DaCoTA team makes the following recommendations.

Recommendations for Institutional arrangements for ERSO

1. **Establish terms of reference for the operation and future development of ERSO**
   These will ensure clarity over the objectives of ERSO and the manner in which it operates within the Commission and with external stakeholders. They will detail the participation of the Directorates-General of the EC, Member States, industry stakeholders and others and will embed the operational parameters of the Observatory.

2. **Establish an advisory body**
   The Observatory will rely on knowledge and data from Member States and other stakeholders to be fully effective. However it is also a service for road safety policymakers and it must continue to meet their needs. The Member States particularly are more than data providers and should have the opportunity to guide the future operation and development of ERSO.

   An advisory body is needed that will represent the body of stakeholders, it should include the Member States, perhaps with a link to the High Level Group on road safety, as well as industry and other stakeholders.

3. **Establish a funding stream for routine data collection**
   A routine funding stream is necessary for the future operation of ERSO, this will cover the costs of gathering and processing data, any special surveys that may be required, updating of the data tools and knowledge and maintaining the ERSO infrastructure. Precise costs have not been estimated since they depend heavily on the exact content of the Observatory but a similar activity in the US is budgeted at over $34m annually.

Priority data gap – in-depth accident data

4. The lack of European in-depth accident data is a major obstacle to a detailed understanding of the causes of accidents and injuries. A large-scale pilot study is now needed to implement regular collection of in-depth data across the EU, the teams established by DaCoTA in 18 countries provides the best platform available to achieve this.

Recommendations for implementation of routine data functions

5. Establish a procedure whereby the following data types and tools are updated annually

and made available on ERSO

- Exposure data – gathered by Eurostat + special surveys
- Safety Performance Indicators – gathered by special surveys
- Medium depth data on fatal accidents – gathered by enhancing national data
- Basic fact sheets
- Annual statistical report
- Country overviews
- Website – annual enhancement and updating

6. Establish a procedure whereby the following data types and tools are updated periodically and made available on ERSO
    - State of the art reviews – update and enhance every two years
    - Country forecasts – update every three years
7. Establish a road safety policy support structure to enable ERSO data to be presented in the most efficient and accessible form for policy-makers

Recommendations for integration with future safety research programmes

8. Establish a formal relationship between ERSO and the road safety research programme under H2020 to ensure the research programme to 2020 incorporates the needs of the developing Observatory.
9. Define a research programme in relation to ERSO to further develop road safety data tools and knowledge. Priority areas include
    a. The causes of accidents and injuries in the EU to car occupant casualties
    b. The causes of accidents and injuries to vulnerable road users in the EU
    c. The causes of accidents involving specific target groups (eg children, level-crossings, older road users, new model cars etc.)
    d. Data methods to assess the causes and social impacts of serious injuries
    e. Real-world evaluation of performance of new safety systems
    f. Impact of different road safety management strategies on casualty outcomes
    g. Driving culture and safety
    h. Development and implementation of a policy support framework for routine impact assessments
    i. Development and implementation of a policy support framework for routine cost benefit evaluations of measures
    j. Methodological improvements in naturalistic driving/riding (ND/NR) studies and FOTs
    k. Naturalistic studies & FOTs for VRUs
    l. Safety assessment of road infrastructures based on accident data

10. Ensure that results, reports, data and syntheses of <u>all</u> relevant H2020 research projects are made available in a suitable format to be incorporated within ERSO.

EXECUTIVE SUMMARY

Background and purpose of DaCoTA

The European Road Safety Observatory was established European Commission and first announced in the 2001 Transport White Paper[1]. It was further developed in the 2003 Road Safety Action Plan [2] where the Commission announced it was to establish a new European Road Safety Observatory (ERSO) to "co-ordinate all Community activities in the fields of road accident and injury data collection and analysis". The framework of ERSO was established within the EU FP 6 funded project SafetyNet (2004 – 2008) which developed and validated standard protocols for core data and knowledge tools. At the completion of the project the data and knowledge developed by SafetyNet ERSO had been incorporated within the website of DG-MOVE. The DaCoTA project has been established with the support of DG-MOVE to further develop the content of the Observatory with additional data types and output tools. There are six areas of work which are summarised below.

Policy-making and safety management processes

Road safety management is the process by which road safety policies are generated, implemented and monitored. They include institutional actions, implementation of measures and monitoring of intermediate and final outcomes. The institutional structures involved include national and local government, infrastructure operators, vehicle regulators, traffic enforcement, training agencies and other stakeholders. There is a variation in approach across the EU 27 yet there is little information that characterises the key aspects of the approach not quantitative information linking these characteristics to road safety outcomes.

The DaCoTA team has systematically gathered information from a selection of 14 EU Member States using a specially designed questionnaire based on a model of road safety. Analysis of the results showed that there was no one single “good practise” model of road safety management that could be related to road safety outcomes. It was considered this was a result of the similarities between the countries evaluated and the comparison of the “snapshot” of the census and the decade of casualty reduction totals. It was however possible to identify a relationship between certain characteristics of road safety management and road safety performance indicators – the operational conditions of road safety. This is in accordance with the Sunflower model that assumes the policy context and input will first affect intermediate outcomes.

The evidence base is a key factor in ERSO and for road safety policymaking and the DaCoTA team also reviewed the data needs of key stakeholder groups. A web-based questionnaire was completed by over 500 road safety stakeholders who were asked to identify the nature and availability of the most important types of safety data. The highest priority data needs were:-

1. Information on crash causation factors (high priority for 67% of respondents)
2. Information on road users' behaviour and attitudes (63%),
3. A common definition of a fatality (60%),
4. Information on the costs and benefits of road safety measures (56%)
5. Serious injury counts, in addition to fatality counts (55%),

[1] European Commission 2001, European transport policy for 2010: time to decide COM(2001) 370 final. Brussels, 12.9.2001

[2] European Commission 2003. European Road Safety Action Programme: Halving the number of road accident victims in the European Union by 2010: A shared responsibility. COM (2003) 311 final. Brussels, 2.6.2003

6. Methods to evaluate the safety impacts of road safety measures (54%)
7. Information on the safety impacts of combined measures (54%),
8. Common methods to perform evaluations of road safety measures (52%)

Pan-European in-depth accident investigation network

The review of policymakers data needs identified a major gap in availability of in-depth data that describes the causes of accidents and injuries. This data is typically gathered by attending the crash scene in time where specialist teams take measurements of the crash scene, interview participants and witnesses and inspect vehicles. Such data is heavily used by vehicle manufacturers, highway operators and increasingly the insurance industry. It directly impacts on automotive regulations and consumer rating systems such as EuroNCAP.

Each investigation may involve several thousand data items to be completed and so the numbers of cases gathered are considerably fewer than in national accident databases. In-depth data is gathered by a small group of countries including the UK, Germany and Sweden however the data gathered even by only these three countries is incompatible and does not reflect the EU situation. Two main barriers to representative data concern the lack of a harmonised protocol and the absence of suitable crash investigation teams.

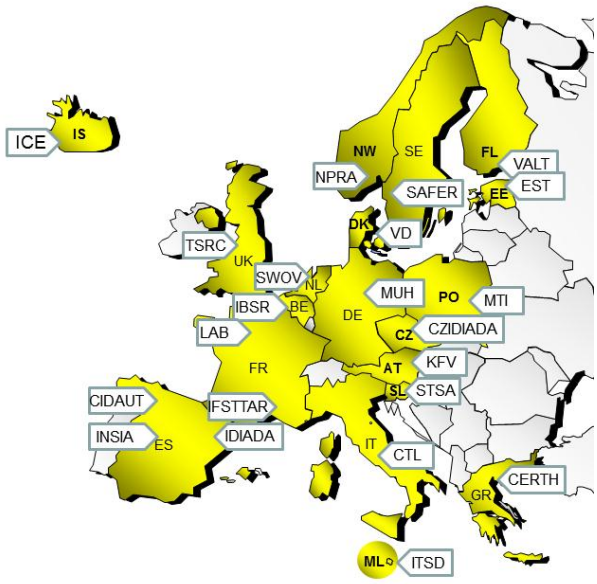
The DaCoTA team has addressed these obstacles and Europe is now ready to conduct systematic in-depth investigations of accident and injury causation. The main outputs are listed below.

1. A validated protocol covering all aspects of data collection including data specifications, case sampling and crash investigation methods. This includes the definitions of over 1,500 variables that can be completed for each crash.

2. A Wiki-based glossary of the data openly available at http://dacota-investigation-manual.eu/

3. An open-access database system to the data protocol ready for users to populate with their own data.

4. A network of teams in 19 EU Member States, each trained and having implemented the local infrastructure necessary for pilot investigations. Many of these teams have national support for future data gathering.



5. A set of pilot cases gathered by the teams to demonstrate the capability to investigate collisions.

The next step to initiate investigations of accident and injury causation at European-scale is to identify a suitable funding mechanism from a routine or research budget to support the teams.

Data Warehouse

A validated set of data protocols for accident data (CARE database), exposure data and safety performance indicators has been established in the previous SafetyNet project. Nevertheless there is still an absence of data in an available structured manner that needs to be urgently addressed. Furthermore there are other types of data that have not been previously addressed including health indicators, accident causation data, and information such as programmes, measures, legislation etc. The Data Warehouse has therefore been developed to structure these data into a format permitting regular access through a dedicated website (http://safetyknowsys.swov.nl/). With the support of the European Commission and the Member States through the CARE experts group this wide range of data has been gathered together in the form of Master Data Tables and used to develop a series of road safety analyses and syntheses.

The Master Tables contain the following data:

1. Road accident data derived from the CARE database covering 73 road accident elements from all EU countries
2. Risk exposure data comprising 97 elements for EU countries
3. Safety Performance Indicators for
   - Alcohol and drugs
   - Speed
   - Protection systems
   - Daytime running lights
   - Vehicle safety
   - Enforcement outputs
   - Accident causation
   - Health data
4. Under-reporting of crashes
5. Country characteristics
6. Traffic rules
7. Road safety programmes
8. Road safety measures
9. Road safety management
10. Road user behaviour

This data was used to develop a series of outputs continuing and extending Annual Statistical Reports, a road safety management profile for each country and Basic Factsheets covering

- Main figures
- Children (aged<15)
- Young people (aged 18-24)
- The Elderly (aged>64)
- Pedestrians
- Cyclists
- Motorcycles & mopeds
- Car occupants
- Heavy Goods Vehicles and Buses
- Motorways
- Junctions
- Urban areas
- Youngsters (age 15-17)
- Roads outside urban areas
- Seasonality
- Single vehicle accidents
- Gender
- Accident Causation

Decision support

The DaCoTA project aimed at providing policy makers with adequate data, information and tools for performing evidence-based policy making. In earlier and current EU projects, a rich variety of data, information and methods has been gathered and will continue to be gathered. In this context, the goal of Work Package the Decision Support Work Package was to make this stock of knowledge accessible and directly useable for the development of road safety policy and decision making. Decision Support therefore: (1) exploited the data

available for analysis by providing forecast of the road safety situation in the different member states and (2) worked on the development of ready-to-use instruments. Tools that were well-appreciated in the past, such as overview fact sheets, or web-texts were up-dated and standardised. The use of standard methods was complemented by research activities to generate new tools like the national forecasts or the composite road safety index. All these activities were conducted in close communication with the user-group itself, the policy makers or those who directly support them.

An extensive range of outputs was generated following a detailed consultation and evaluation of policymakers needs and based on the data gathered in the Data Warehouse

1. Forecasts of traffic fatalities for each EU Member State for the period to 2020 based on advanced statistical procedures. Summary sheets and full reports were produced for each country.

2. State of the art reviews on key road safety topics were written by expert authors under the supervision of a peer group to ensure quality. Previous reviews developed within the SafetyNet project were updated and new reviews produced. The topics that are covered by the web texts are:

   Age groups
   - Children
   - Novice drivers
   - Older drivers

   Road users
   - Pedestrians and cyclists
   - Powered two wheelers

   Hazardous behaviour
   - Driver distraction
   - Cell phone use while driving
   - Fatigue
   - Alcohol/drugs
   - Speed and speed management
   - Work-related road safety

   Post-crash
   - Post impact care
   - E-safety

   Road safety measures
   - Roads
   - Speed enforcement
   - Vehicle safety

   Policy issues
   - Quantitative targets
   - Cost-benefit analysis
   - Safety ratings
   - Road safety management
   - Integration of Road Safety in other policy areas

3. Country overviews of road safety presenting the key characteristics of road safety in each of the 27 Member States in considerable detail including structure and culture, safety measures and programmes, safety performance indicators, final outcomes and social costs.
4. Research was conducted to develop a single composite performance index that would characterise road safety in each country, a partial success was achieved in the face of considerable methodological challenges.

Safety and eSafety

The rapid development of new sensing, communications and on-vehicle processing capabilities is opening up a host of new opportunities to improve casualty reduction. Technologies such as enhanced braking, stability control, lane keeping, driver status and others offer the capability to prevent or mitigate collisions. New autonomous systems, such as emergency braking are considered to have a great potential to improve casualty reduction. Nevertheless the capabilities to quantitively assess the benefits of the new systems has not yet matched the technological progress in the development of the systems. Furthermore it is not always clear how the functionality of the systems corresponds to the priorities for crash avoidance or mitigation or that the systems are addressing a key shortfall of drivers. The challenges for technology developers are to develop methods to predict the impact of a safety system before it is in widespread use, methods to measure the impact

once it is in widespread use, methods to identify the major driver deficiencies that the technologies are to address.

In support of these objectives the DaCoTA team has developed new resources that can assist the identification of key functionalities and also propose suitable methods both to assess t**h**e safety impact of a system both in advance and when in production.

A general framework of assessment is presented that seeks to combine the assessment process within the wider context of evaluating and developing road safety. This framework addresses:-

- data collection methods
- data analysis methods
- socio-economic methods
- pitfalls and difficulties.

An analysis of drivers needs based on 445 in-depth accident cases has been used to assess the functionality of active safety systems against the errors made by the drivers. Conclusions are given on the appropriateness of individual safety measures to address the needs.

An evaluation of the key factors involved in deriving new vehicle test procedures to evaluate the performance and outcomes of new safety systems. One limiting condition is the lack of a central resource that defines the specific safety systems found on each car involved in a collision. The proposed modification of the Periodic testing (Directive 2009/40/EC) to include the assessment of the continued function of electronic safety systems is considered to possibly be a mechanism to develop such a centralised resource.

The future development of active, integrated and cooperative safety systems relies on the availability at European level of suitable detailed data on the causes of accidents.

Driver behaviour monitoring through naturalistic observations

The advent of low-cost data collection system that can be fitted to a vehicle and will record details of the vehicle usage now presents a new opportunity for driver behaviour data with greater detail and precision than has previously been available. By equipping cars with suitable instrumentation it is possible to continuously monitor how the vehicle is used and therefore certain aspects of the driver behaviour. Such equipment can measure location, speed, braking and the operation of vehicle systems through the CANBUS. More advanced equipment with video recording can record a continuous visual image of the driver and the external traffic environment. The 100 car study, conducted by the Virginia Tech Transport Institute has shown the power of such data in improving the understanding of the role and nuances of driver behaviour in respect of driving performance. The key characteristics of these so-called naturalistic driving observations is that the data should represent the true driving behaviour by being conducted in an unobtrusive manner so that behaviour is unaffected by measurement.

The DaCoTA team have evaluated the potential of naturalistic driving data to derive new measurements of exposure and safety performance indicators that would reinforce the data available from other survey methods.

The use of video, while very valuable at a research level, was considered not to be appropriate for the measurement of exposure or safety indicators since due to the major analytic effort required to review and code the video data. Furthermore to represent the spectrum of behaviours in a country it would be necessary to conduct large-scale studies where the costs of analysis of video data would be prohibitive. The team concluded that valuable low-level data could be gathered by a data acquisition system (DAS) comprising

GPS, accelerometers, and potentially further CANBUS data. Further context data describing the driver characteristics would be gathered by questionnaires.

The team prepared a specification of the requirements for a future large-scale naturalistic driving study that comprised instrumentation, study design, the risk-exposure and performance indicators that would be derived, the analytic methods and the manner of meeting legal and ethical requirements. The methods were validated using a series of small-scale naturalistic driving pilot studies conducted in Israel and Austria.

The outcomes of the work were a detailed specification of the requirements for a future large-scale naturalistic driving study.

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