CEDR Transnational Road Research Programme
Call 2012: Safety

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BRoWSER: Base-lining Road Works
Safety on European Roads

Input Data Definition Document for EuRoWCas

Deliverable No 2.1

<table>
<thead>
<tr>
<th>Transport Research Laboratory</th>
<th><a href="http://www.trl.co.uk">www.trl.co.uk</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Karlsruhe Institute of Technology</td>
<td><a href="http://www.ise.kit.edu">www.ise.kit.edu</a></td>
</tr>
<tr>
<td>Belgian Road Research Centre</td>
<td><a href="http://www.brrc.be">www.brrc.be</a></td>
</tr>
<tr>
<td>Trinity College Dublin</td>
<td><a href="http://www.tcd.ie">www.tcd.ie</a></td>
</tr>
<tr>
<td>Slovenian National Building and Civil Engineering Institute</td>
<td><a href="http://www.zag.si">www.zag.si</a></td>
</tr>
</tbody>
</table>
CEDR Call2012: Safety
BRoWSER: Base-lining Road Works Safety on European Roads

Input Data Definition Document for EuRoWCas

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Version: 1.0
1 Work Package 2: Establishment and definition of the input data requirements

The aim of this work package is to develop a harmonised data framework for:

A) The collection of data on worker injuries/near misses and

B) The collection of optimised road works layouts for safety.

Information on injury accidents (including fatalities) and near-misses relating to road workers needs to be gathered across Europe. This paper proposes a data framework which identifies the information required from European countries to enable systematic analysis of road worker safety. This framework facilitates collection of data for each country, incorporating parameters such as road characteristics and location details.

In summary, this paper provides a starting point for a road worker incident typology for Europe, including proposed input data requirements and definitions for the recording of road worker injuries/near misses for EuRoWCas.

For each accident or near miss, hereafter referred to collectively as incidents, it is envisaged that five different datasets are collected:

- Time, location and severity
- Overview of casualties, vehicles and equipment involved
- Carriageway characteristics
- Road work characteristics
- Environmental conditions

Within each of these datasets, a number of pieces of information would be systematically recorded.

In addition, for each vehicle involved in the incident and for each person involved in the incident, a further dataset would be systematically recorded.

An incident reference number would be recorded so that the vehicle and people details can be linked to the relevant incident details; similarly, a vehicle reference number would be recorded where appropriate to link the vehicle details to the people details.

The datasets proposed are detailed in the following pages. The variables proposed for inclusion are listed on the left hand side; a list of the suggested options for each variable and/or an explanation of what is required for each variable, is then identified alongside the variable concerned.

In order to get best value from the data, all the suggested fields would be collected. However, for situations where this is not possible, core fields have been identified below the main lists. All fields collected in addition to these core fields would greatly enhance the dataset.

1 Throughout this document, the word ‘vehicle’ means anything that has a driver - it includes e.g. road rollers.
### 1.1 Variables to be recorded for each incident – time and location

<table>
<thead>
<tr>
<th>Incident ID</th>
<th>• Unique reference for the incident, can be generated automatically</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>• BE, BG, CZ, DK, DE, EE, IE, EL, ES, FR, HR, IT, CY, LV, LT, LU, HU, MT, NL, AT, PL, PT, RO, SI, SK, FI, SE, UK</td>
</tr>
<tr>
<td>Road authority</td>
<td>• Road authority responsible for managing the road</td>
</tr>
<tr>
<td>Date</td>
<td>• Date on which the incident took place</td>
</tr>
<tr>
<td>Time</td>
<td>• Time of incident</td>
</tr>
<tr>
<td>Incident description</td>
<td>• Brief description of circumstances</td>
</tr>
<tr>
<td>Location and direction identifier</td>
<td>• To include road/route identification number, direction of travel and location along route e.g. kilometerage</td>
</tr>
<tr>
<td>Coordinates</td>
<td>• Latitude and Longitude of incident location</td>
</tr>
</tbody>
</table>
| Carriageway type | • Motorway  
• Other dual carriageway  
• Primary single carriageway  
• Other single carriageway |
| Incident Severity | • Derived from the highest severity casualty  
• Fatal (where the highest severity casualty was killed)  
• Major (where the highest severity casualty suffered a major injury)  
• Minor (where the highest severity casualty suffered a minor injury)  
• Damage only (where nobody sustained an injury but there was property damage)  
• High potential near miss (where property damage or personal injuries were only just avoided) |

Core fields from above:
- Road authority
- Date
- Time
- Location and direction identifier
- Carriageway type
1.2 Variables to be recorded for each incident – overview of casualties, vehicles and equipment involved

Core field from above:
- Incident type

- Number of road user vehicle(s) involved
- Number of road worker vehicle(s) involved
- Number of pieces of works equipment involved

Incident type:
- Determines which other fields need to be completed
- Road worker impact (or near impact) with road user vehicle
- Road worker impact (or near impact) with road works vehicle
- Road worker impact (or near impact) with road works equipment
- Road works vehicle impact (or near impact) with road user vehicle
- Road works vehicle impact (or near impact) with road works vehicle
- Road works vehicle impact (or near impact) with road works equipment
- Other
1.3 Variables to be recorded for each incident – carriageway characteristics

<table>
<thead>
<tr>
<th>Hard shoulder usage</th>
<th>Standard number of lanes on carriageway</th>
<th>Junction detail</th>
<th>Permanent speed limit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Hard shoulder present but closed to road users at incident location (For example, hard shoulder closed due to road works, or a temporary or permanent barrier in place to prevent access by road users)</td>
<td>• Standard number of lanes on carriageway of incident</td>
<td>• 130kph</td>
</tr>
<tr>
<td></td>
<td>• Hard shoulder present for emergency use only</td>
<td>• Not at or within 20 metres of a junction</td>
<td>• 110kph (70mph)</td>
</tr>
<tr>
<td></td>
<td>• Hard shoulder open for use as a running lane</td>
<td>• At / on a slip road</td>
<td>• 100kph (60mph)</td>
</tr>
<tr>
<td></td>
<td>• No hard shoulder present</td>
<td>• At / on a roundabout / mini roundabout</td>
<td>• 80kph (50mph)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• T Junction</td>
<td>• 60kph (40mph)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Crossroads</td>
<td>• 50kph (30mph)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Other junction</td>
<td></td>
</tr>
</tbody>
</table>

Core field from above:
- Permanent speed limit
- Hard shoulder usage
1.4 **Variables to be recorded for each incident – road work characteristics**

- **Temporary speed limit type**
  - Advisory
  - Mandatory (compulsory)

- **Temporary speed limit**
  - 130kph
  - 110kph (70mph)
  - 100kph (60mph)
  - 80kph (50mph)
  - 60kph (40mph)
  - 50kph (30mph)
  - 40kph
  - 30kph (20mph)
  - 25kph
  - 20kph (15mph)
  - 15kph (10mph)
  - N/A

- **Lanes configuration on incident carriageway**
  - Please select one of the following for each lane (including the hard shoulder) at the time of the road worker incident
    - O = open to traffic, normal direction of flow
    - OCF = open to traffic – opposite direction of flow, i.e. this is a contraflow lane
    - C = Closed for works
    - N = Not present, e.g. there is no hard shoulder, or there is no lane 4

- **Type of roadworks**
  - Static - Short daytime (i.e. up to 8 hours)
  - Static - Short night time (i.e. up to 8 hours)
  - Static - Medium/long (i.e. more than 8 hours)
  - Mobile works
  - Emergency / incident support

- **Works activity**
  - During installation of roadworks.
  - During works period.
  - During removal of roadworks.

- **Advanced signing present?**
  - Were there signs alerting drivers that they were approaching roadworks?
    - Yes (hard signs only)
    - Yes (light emitting signs only)
    - Yes (combination of hard signs and light emitting signs)
    - No

- **Length of works zone**
  - How long was the works zone (metres)
Core fields from above:

- Temporary speed limit type
- Temporary speed limit
- Lane configuration on incident carriageway
- Type of roadworks
- Works activity
- Incident location in roadworks
- Incident location adjacent to:
## 1.5 Variables to be recorded for each incident – environmental conditions

<table>
<thead>
<tr>
<th>Core fields from above:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
</tr>
<tr>
<td>Weather</td>
</tr>
<tr>
<td>Visibility</td>
</tr>
</tbody>
</table>

### Day/night
- Daylight
- Darkness
- Dawn/dusk

### Lighting
- Works lights
- Street lights only - on
- Street lights only - off
- No lights present

### Weather
- Fine
- Rain / Snow
- Fog or mist (if affecting visibility)

### Visibility
- Good visibility
- Visibility affected by object or vegetation blocking view (e.g. stationary or parked car, building)
- Visibility affected by road layout (e.g. bend, hill crest)
- Visibility affected by low sun
- Visibility affected by weather
- Visibility affected by spray from vehicles

### Road surface condition
- Dry
- Wet / damp
- Snow
- Frost / ice
- Flood (surface water over 3cm deep)
### 1.6 Variables to be recorded for each person involved

- **Incident ID**
  - As per incident details, so people involved can be linked to their incidents

- **Person ID**
  - Unique reference for person within incident

- **Vehicle ID**
  - If the person is in or on a vehicle, that vehicle’s ID
  - If the person was outside of a vehicle, the ID of the vehicle which impacted them

- **Person class**
  - Driver of vehicle (including works vehicle)
  - Non-driver inside vehicle (including works vehicle)
  - Non-driver on rear of vehicle (including works vehicle)
  - Person outside of vehicle

- **Role**
  - Road worker
  - Road user / member of the public
  - Other (e.g. emergency services, vehicle recovery)

- **Activity (road workers only)**
  - Installing / removing temporary traffic management
  - Conducting works / inspection
  - Vehicle recovery
  - Other

- **Person location**
  - In central reservation
  - Off carriageway (e.g. verge)
  - On hard shoulder
  - On live carriageway (i.e. open to traffic)
  - Within works (behind vehicle restraint system)
  - Within works (behind cones)

- **Impact type**
  - Struck by vehicle (Including if injured within vehicle)
  - Struck by equipment
  - Struck ground

- **Person’s sex**
  - Male
  - Female
  - Unknown

- **Person’s age**
  - Age of casualty at time of incident

- **Injury level**
  - Killed = died within 30 days of accident
  - Major injury = hospitalisation / seven or more consecutive days off work
  - Minor injury = treated at scene / less than seven consecutive days off work
  - No injury sustained
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Core fields:

- Person class
- Role
- Activity (road workers only)
- Person location
- Injury level

Object hit:

- Permanent road feature
- Temporary sign
- Temporary barrier (i.e. temporary vehicle restraint)
- Delineator (e.g. cones)
- Works lighting
- Works tools or equipment
- Construction materials
- N/A
1.7 Variables to be recorded for each vehicle\textsuperscript{2} involved

- **Incident ID**: As per incident details, so vehicles can be linked to their incidents
- **Vehicle ID**: Unique ID for vehicle within incident
- **Vehicle class**: Works vehicle / equipment (equipped with crash cushion)  
- **Vehicle type**: Works vehicle / equipment (not equipped with crash cushion)  
- **Non-works vehicle**
- **Vehicle type**: PTW  
- **Bus / Coach**  
- **Car (inc. minibus?)**  
- **Light goods (<3.5 tonnes)**  
- **Heavy goods**  
- **Non motorised (e.g. digger, road roller, compactor)**  
- **Other motorised**
- **Driver/operator role**: Road authority employee  
- **Sub contracted worker**  
- **Road user / member of the public**  
- **Other**
- **Driver/operator sex**: Male  
- **Female**  
- **Unknown**
- **Driver/operator age**: Age of driver at time of incident
- **Intended manoeuvre**: Reversing  
- **Parked**  
- **Slowing or stopping**  
- **Moving off**  
- **Turning**  
- **Changing lane / overtaking**  
- **Going ahead**  
- **Other**
- **Object hit**: Permanent road feature  
- **Temporary sign**  
- **Temporary barrier (i.e. temporary vehicle restraint)**  
- **Delineator (e.g. cones)**  
- **Works lighting**  
- **Works tools or equipment**  
- **Construction materials**  
- **N/A**

\textsuperscript{2} Throughout this document, the word ‘vehicle’ means anything that has a driver - it includes e.g. road rollers
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Core fields from above:

- Vehicle class
- Vehicle type
2 CEDR - National Comparisons

Aim: Identify national differences in crashes at road works and so determine potential improvements in road works safety.

2.1 Process steps

1. Identify core data required
2. Locate core data required to enable comparisons to be made
   a. Crash data set
   b. Road works location and type information
3. Identify themes
   a. Frequency by type of works, location, time of day, etc.
4. Compare data sets between countries, especially at border regions
5. Compare standards and manuals of high- and low-performing works
6. Contrast contributory factors against manuals and standards
7. Identify possible shortfalls and therefore potential improvements
8. Determine and define best practices to reduce crashes at road works, improving safety for road users and road workers

2.2 Minimum Data Requirements

To enable comparisons between the crash rates at road works in different countries it will be necessary to locate two data sets:

- Road works information
  o Type of works
  o Location
  o Date and time of start and end of works
  o Link flow
- Accident information
  o Location
  o Date and time of accident
  o Number of vehicles involved
  o Types of vehicles involved
o Nature and severity of accident
o Number of casualties
o Contributory factors related to each accident, identifying both those which implicate / do not implicate road works

2.3 Process

Creating a relationship between the three data sets should allow identification of the contributory factors, if any, regularly associated with accidents at particular types of road works in each country.

It will then be necessary to locate the standards and manuals relating to the design and management of road works within the individual countries, then undertake an analysis to determine whether national differences in accident rates might be related to the application of principles given in the standards and manuals.

2.4 Outputs

- Identification of road works crash information contributory factors, by works type
- Comparison of road works crash frequency, by works type (STARS categories)
- Identification of contributory factors for crashes at road works
- Comparison of contributory factors against national standards and manuals
- Identify possible shortfalls and therefore potential improvements