CEDR Working Group Road Safety

Conférence Européenne des Directeurs des Routes
Conference of European Directors of Roads

Sharing Knowledge on Road Safety
Workshop CEDR-DIRCAIBEA
Madrid, 4th October 2017

Herman Moning
Chairman. CEDR Working group Road Safety
CONTENT:
Introduction of CEDR
Introduction of the CEDR Working Group Road Safety
Research projects
Exchange of knowledge
Mission Statement
“CEDR is an organization of European national road administrations that promotes Excellence in the Management of Roads”

Vision Statement
CEDR consolidates its position as the platform for Road Directors and National Road Administrations that facilitates, reliably and effectively:

- Benchmarking and sharing of knowledge and best practices
- Collaborations and sharing of resources in joint projects
- Professional networking and competence building
Strategic Goals

• Help NRAs to keep ahead of the curve, anticipate future trends and prepare them to face new challenges
• Reinforce NRAs role as key providers of efficient and seamless mobility from an end user perspective within the transport system
• Facilitate and optimize the efficient use of resources, making the best use of existing infrastructures.
• Improve the safety and sustainability of roads, and reduce their environmental impact and carbon footprint.
Action Plan categories
- Focus Area 1 Digitilisation & Innovation
- Focus Area 2 Environment and Resilience
- Focus Area 3 Safety, Operations, Mobility and Performance
- Focus Area 4 Resources and Asset Management
- Focus Area 5 Regulation and Harmonization
CONTENT:

Introduction of CEDR

Introduction of the CEDR Working Group Road Safety

Research projects

Exchange of knowledge
INTRODUCTION OF THE CEDR WORKING GROUP ROAD SAFETY

Exists already from 2003 onwards

One of the most active Working Groups within CEDR

Now 25 members (ONLY EUROPE => EU- and not EU-countries)
INTRODUCTION OF THE CEDR WORKING GROUP ROAD SAFETY

Common research agenda based on challenges

The Challenges are:

1. IMPROVE SAFETY OF THE EXISTING ROAD INFRASTRUCTURE
2. SPEEDS IN HARMONY WITH ROAD INFRASTRUCTURE
3. IMPROVE SAFETY OF VULNERABLE ROAD USERS
4. EVALUATION AND DEPLOYMENT OF INTELLIGENT TRANSPORT SYSTEMS
INTRODUCTION OF THE CEDR WORKING GROUP ROAD SAFETY

Exchange of knowledge by reports, workshops, seminars

Exchange of views on road safety policy, about the future implications of the new EU Directive on Road Infrastructure Safety Management

Design and preparation of a road safety benchmark report containing relevant best practices from European NRA’s from 2019 onwards
CONTENT:

Introduction of CEDR

Introduction of the CEDR Working Group Road Safety

Research projects

Exchange of knowledge
RESEARCH - agenda
CEDR Call 2009 (former ERA-net)
CEDR Call 2012
CEDR Call 2013
CEDR Call 2016
CEDR Call 2019
RESEARCH - agenda

CEDR Call 2009 (former ERA-net)

ERASER

A prototype decision support tool for road safety authorities was developed and the functionality and usability tested among European road authorities. The tool was designed to help authorities assess the credibility ('self-explaining-ness') and safety ('forgivingness') of posted speed limits. WP 2 of the project provided insight into measures that can be categorised as accelerators and decelerators of speed.

In general road authorities were positive regarding the tool although some additional refinements and additional testing were recommended. Although the instrument has a sound theoretical basis, it needs to be tested for validity in practice. The tools' ability to be used as a pro-active tool for saving lives needs to be assessed.

4th October 2017
RESEARCH - agenda

CEDR Call 2009 (former ERA-net)

SPACE

Two main practical outputs were developed.
1) an overview of ‘self-explaining’ treatments (72 in total) that could be applied on road links, intersections, curves or transitions to reduce travelled speeds.
2) a technical note on different methodologies for assessing how self-explaining road designs are.

The project concluded that a hierarchical approach to treatments on curves in accordance with severity of curve would offer the greatest safety potential based on results from the simulator study and input from expert workshops. The methodology still requires refinement for it to be a tool with which to identify unsafe practices and to quantitatively assess the safety benefits if treatments are to be deployed.
RESEARCH - agenda

CEDR Call 2009 (former ERA-net)

RISMET

This project delivered two guidelines for use by practitioners and researchers:

- Guideline 1: Recommends a minimum set of data that can provide a basis for basic road safety assessments and lays the foundation for a basic set of road and traffic data needed for road authorities to support road safety engineering tools.
- Guideline 2: Provides a state-of-the-art reference document in which road safety management tools and application methodologies are described.
RESEARCH - agenda
CEDR Call 2009 (former ERA-net)
EuRSI

This project produced practical recommendations for Road Safety Inspection (RSI) through an automated data capture methodology, measurement and classification.

Three prototype software applications were developed and data from three separate road surveys were tested and reported. One of these has since been further developed into a smartphone application called Ubipix which collects geo-referenced video and speed data for RSI from the survey vehicle. Questions regarding the benefits of the EuRSI data collection and analysis techniques can be raised. It is a novel and new technique but competes with many already well applied systems and its merits should be established by reviewing strengths and weaknesses of the systems. This also applies to the developed Risk Index scoring technique which needs validation and comparison.
RESEARCH - agenda
CEDR Call 2009 (former ERA-net)
IRDES

Two practical outputs were delivered:
- A practical and uniform guideline that allows the road designer to improve the forgivingness of the roadside
- A practical tool for assessing (in a quantitative manner) the effectiveness of applying a given roadside treatment
CEDR Work Group Road Safety
Sharing knowledge on road safety

RESEARCH - agenda
CEDR Call 2009
IRDES

IRDES: Improving Roadside Design to Forgive Human Errors

Forgiving roadsides design guide
Guide de conception des abords de chaussée qui pardonneren
CEDR Work Group Road Safety
Sharing knowledge on road safety

RESEARCH - agenda
CEDR Call 2009
IRDES

BARRIERS TERMINALS

UNPROTECTED ......

..... Vs. CRASHWORTHY
RESEARCH - agenda

CEDR Call 2012

The three projects covered by the 2012 Research Call on Safety were:

• ASAP - Appropriate Speed saves All People - which focuses on recommending the best methods of controlling speeding through roadwork zones

• BRoWSER - Baselining Roadworks Safety on European Roads - which considers two aspects, improving data collection on worker injuries and near misses, and understanding the optimum roadworks layouts that enable road users to approach, travel through and exit works without causing injury to workers and others

• SAVeRS - Selection of Appropriate Vehicle Restraint Systems - which has developed a guidance document for NRAs for the design, selection and installation of VRSs.
RESEARCH - agenda

CEDR Call 2013

- **Accident Prediction Model** – An overview of existing APM models and the concepts behind them, identifying missing Crash Modification Factors and prioritizing research to fill these gaps and guidance on how to implement these at a national level in the context of European Motorways and higher ranked urban roads.

<table>
<thead>
<tr>
<th>Countermeasure - CMF</th>
<th>NEED</th>
<th>AVAILABILITY</th>
<th>TRANSFERABILITY</th>
<th>Need*Avail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadside features - presence of a barrier</td>
<td>80%</td>
<td>69%</td>
<td>73%</td>
<td>55%</td>
</tr>
<tr>
<td>Light distance and light obstruction</td>
<td>79%</td>
<td>63%</td>
<td>55%</td>
<td>48%</td>
</tr>
<tr>
<td>Roadside features - use of positively safe structures (tested according to EN 12767)</td>
<td>79%</td>
<td>63%</td>
<td>73%</td>
<td>52%</td>
</tr>
<tr>
<td>Shoulder Type (paved/unpaved)</td>
<td>79%</td>
<td>67%</td>
<td>56%</td>
<td>52%</td>
</tr>
<tr>
<td>Shoulder Width</td>
<td>77%</td>
<td>64%</td>
<td>56%</td>
<td>49%</td>
</tr>
<tr>
<td>Workzones</td>
<td>75%</td>
<td>60%</td>
<td>63%</td>
<td>60%</td>
</tr>
<tr>
<td>Roundabouts</td>
<td>73%</td>
<td>64%</td>
<td>70%</td>
<td>51%</td>
</tr>
<tr>
<td>Realignment (of road segments)</td>
<td>73%</td>
<td>63%</td>
<td>73%</td>
<td>44%</td>
</tr>
<tr>
<td>Lane width</td>
<td>71%</td>
<td>67%</td>
<td>60%</td>
<td>48%</td>
</tr>
<tr>
<td>Intersection Left-turn lanes</td>
<td>71%</td>
<td>64%</td>
<td>64%</td>
<td>45%</td>
</tr>
<tr>
<td>High friction treatments (include anti-skid/slip)</td>
<td>69%</td>
<td>70%</td>
<td>67%</td>
<td>48%</td>
</tr>
<tr>
<td>Curve</td>
<td>69%</td>
<td>64%</td>
<td>56%</td>
<td>44%</td>
</tr>
<tr>
<td>Effect of traffic (volume/capacity - % trucks &amp; buses)</td>
<td>69%</td>
<td>83%</td>
<td>33%</td>
<td>57%</td>
</tr>
<tr>
<td>Roadside features - replacement of barriers terminals with crashworthy terminals</td>
<td>69%</td>
<td>83%</td>
<td>55%</td>
<td>57%</td>
</tr>
<tr>
<td>Rumble strips</td>
<td>69%</td>
<td>67%</td>
<td>64%</td>
<td>48%</td>
</tr>
<tr>
<td>Audible road markings</td>
<td>67%</td>
<td>64%</td>
<td>70%</td>
<td>42%</td>
</tr>
<tr>
<td>Roadside features - barrier class</td>
<td>67%</td>
<td>80%</td>
<td>67%</td>
<td>53%</td>
</tr>
<tr>
<td>Longitudinal grade</td>
<td>64%</td>
<td>73%</td>
<td>60%</td>
<td>47%</td>
</tr>
<tr>
<td>Intersection Lighting</td>
<td>64%</td>
<td>71%</td>
<td>60%</td>
<td>45%</td>
</tr>
<tr>
<td>Driveway density (Frequency of accesses)</td>
<td>63%</td>
<td>75%</td>
<td>55%</td>
<td>47%</td>
</tr>
<tr>
<td>Passing Lanes (overtaking lanes)</td>
<td>60%</td>
<td>64%</td>
<td>67%</td>
<td>38%</td>
</tr>
<tr>
<td>Friction (in general)</td>
<td>58%</td>
<td>78%</td>
<td>63%</td>
<td>45%</td>
</tr>
<tr>
<td>Advanced warning devices/signals/beacons</td>
<td>57%</td>
<td>73%</td>
<td>40%</td>
<td>43%</td>
</tr>
<tr>
<td>Raised islands and pedestrian refuge islands</td>
<td>57%</td>
<td>78%</td>
<td>63%</td>
<td>44%</td>
</tr>
</tbody>
</table>

4th October 2017
RESEARCH - agenda
CEDR Call 2013

• **Stopping Sight Distance** – A detailed examination of the subject of Stopping Sight Distance and its role and impact on highway geometric design.

• **Safety Review** – The development of a tool to collect and assess geometric data to assist road administrations in carrying out safety reviews of existing road sections.
CEDR Work Group Road Safety
Sharing knowledge on road safety

RESEARCH - agenda
CEDR Call 2016

• A: Safety for both Road Worker and Road Users - reduce incursions in to work zones
• B: Driver Distraction – (Digital) Billboards
• C: Guidance for Safe road sides
• D: Self-explaining systems for VRU safety in non-urban areas
CONTENT:
Introduction of CEDR
Introduction of the CEDR Working Group Road Safety
Research projects
Exchange of knowledge
EXCHANGE OF KNOWLEDGE

Report: Cost effective measures

1. INTRODUCTION

2. ABOUT COST EFFECTIVENESS ASSESSMENT OF ROAD SAFETY INVESTMENTS

3. REVIEW OF ROAD SAFETY INVESTMENTS

4. SELECTION OF MOST PROMISING INVESTMENTS

5. IN-DEPTH ANALYSIS OF MOST PROMISING ROAD SAFETY INVESTMENTS

6. PROPOSAL OF BEST PRACTICES

REFERENCES

4th October 2017
### Table 5.6: Junction layouts - summary of findings

<table>
<thead>
<tr>
<th>Investment: junction layouts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network: rural / urban</td>
</tr>
<tr>
<td>Sub-investments:</td>
</tr>
<tr>
<td>- converting junctions to roundabouts</td>
</tr>
<tr>
<td>- redesigning junctions</td>
</tr>
<tr>
<td>- changing the junction angle, staggered junctions, reducing gradients on approach, increasing sight triangles (mainly rural areas)</td>
</tr>
<tr>
<td>- junction channelisation</td>
</tr>
</tbody>
</table>

**Maximum safety effect:**
- converting junctions to roundabouts (-88%)
- changing the junction angle (-50%)
- channelisation at 4-leg junctions (-67%)
- the more extensive the channelisation, the highest the safety effect

**Minimum (or negative) safety effect:**
- channelisation at T-junctions (+16%)
- reducing gradients on approach (-17%)
- staggered junctions (low traffic on minor road)

**Max. C-B ratio:**
- converting junctions to roundabouts: 2:1 to 3:1
- redesigning junctions: 3:1
- junction channelisation: 2.5:1 (refers to minor channelisation)

**Min. C-B ratio:**
- high cost redesigning junctions
- high cost channelisation

**Implementation costs per unit:**
- converting junctions to roundabouts: €450,000 - 1,300,000
- redesigning junctions: from €1,100,000
- staggered junctions: €130,000 - 1,300,000
- junction channelisation: €25,000 - 1,650,000
- development of mini roundabout: €12,000

**Other effects:**
- improved mobility (except left-right staggered junctions, for channelisation only when traffic is high)
- effects on noise and emissions
- in some cases the total junction area increases

**Strengths:**
- well-documented effect for all types and particular cases of treatments

**Weaknesses:**
- rapid decrease in cost-effectiveness for more extensive treatments, due to increase in implementation costs
- difficult to establish general rules due to the high number of case-specific situations

---

**EXCHANGE OF KNOWLEDGE**

Report: Cost effective measures

4th October 2017
EXCHANGE OF KNOWLEDGE

During our meetings but also outside the meetings many questions and answers were exchanged between the NRA’s.

For instance:

- Ghost drivers
- Motorcycles
- Windmills
- Right turn on red light
- Mobile phones

Seminars & Workshops
EXCHANGE OF KNOWLEDGE

Seminars/Workshops:

- 2016: EU Directive RISM
  - Road safety impact assessment
  - Road safety audits
  - Road safety inspections
  - Road safety management

- 2017: Cycling
  - Cycling in urban areas (Netherlands)
  - Cycling in Denmark and Germany

- FUTURE Workshops
  - 2018:
    - Speed management on rural roads
    - Safety on Motorways
  - 2019:
    - Road safety implications of Work zones and best practices

4th October 2017
THANK YOU VERY MUCH FOR YOUR ATTENTION