TRA TRANSPORT RESEARCH ARENA
6th European Transport Research Conference
MOVING FORWARD:
Innovative Solutions for Tomorrow's Mobility
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USE OF ACCIDENT PREDICTION MODELS IN ROAD SAFETY MANAGEMENT - AN INTERNATIONAL INQUIRY

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PROJECT INFORMATION

CEDR Transnational Road Research Programme
Call 2013: Safety

funded by Germany, Ireland, UK and Netherlands

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PRACT
Predicting Road ACcidents - a Transferable methodology across Europe

Università degli Studi Firenze DICEA
Technische Universität Berlin
Imperial College London

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TRB ANB25 Committee

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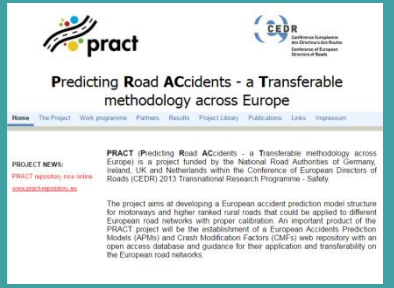

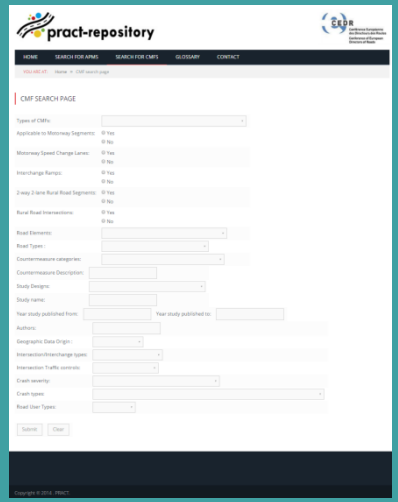

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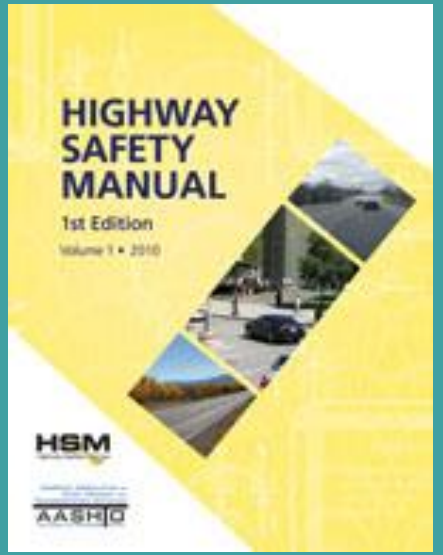
Presentation Structure

- Literature Review
  - Highway Safety Manual and Related Literature
  - Literature on APM development
  - Web-based CMF databases and Road Safety Toolkits
- Questionnaire Survey Methodology
- Questionnaire Survey Results
- Conclusions

Highway Safety Manual & Related Literature

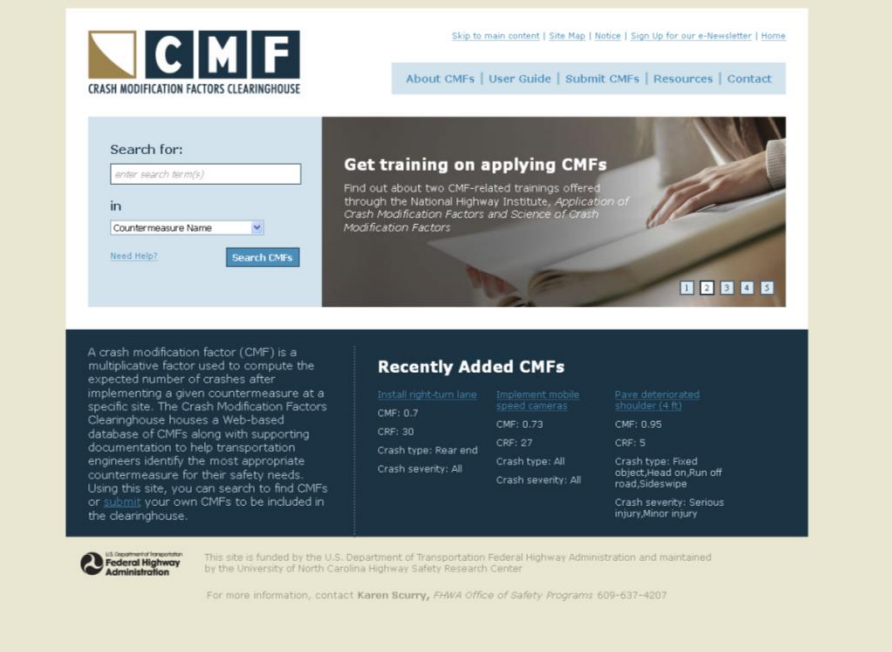
- Predictive method for estimating the expected average crash frequency.
- Safety Performance Functions (SPFs) developed for specific facility types and "base conditions“.
- Crash Modification Factors (CMFs) account for differences between the base conditions and local conditions of the considered site.
- Calibration Factor (C) accounts for differences between the road network for which the models were developed and the one for which the predictive method is applied.



LITERATURE ON APM DEVELOPMENT

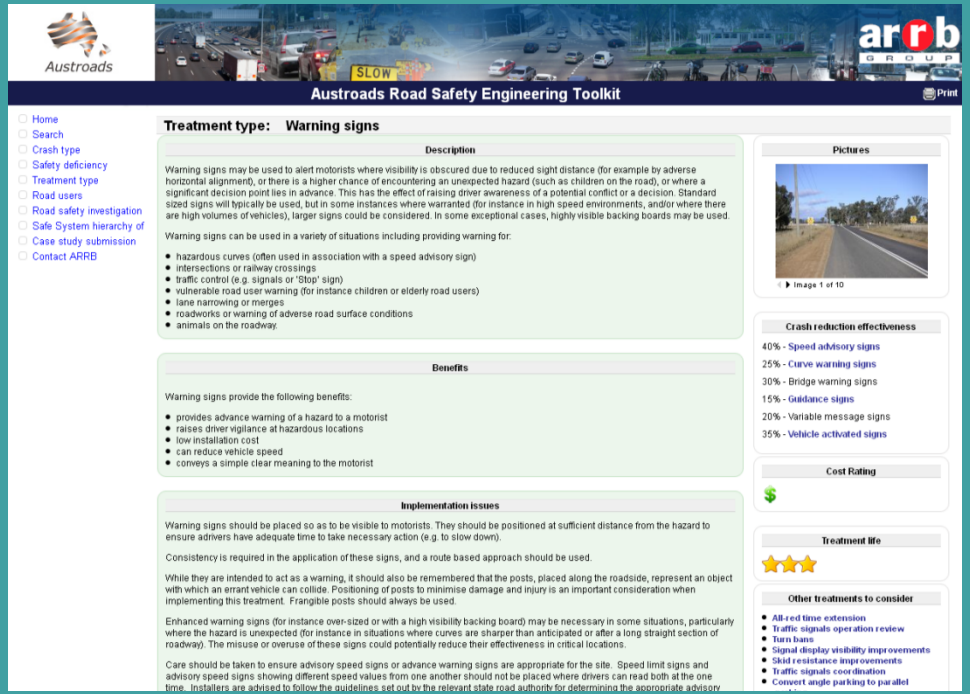
- **RIPCORD-iSEREST Research Project (2005-2008)**
  - APMs for 2-lane 2-way rural roads,
- **RISMET Research Project (2011)**
  - APMs for rural intersections,
- Turner et al. (2012): 2-lane 2-way rural roads in New Zealand,
- Caliendo et al. (2007): four-lane motorways in Italy,
- Montella et al. (2008): motorways in Italy,
- Cafiso et al. (2010): 2-lane 2-way rural roads in Italy, etc.

FHWA CMF CLEARINGHOUSE



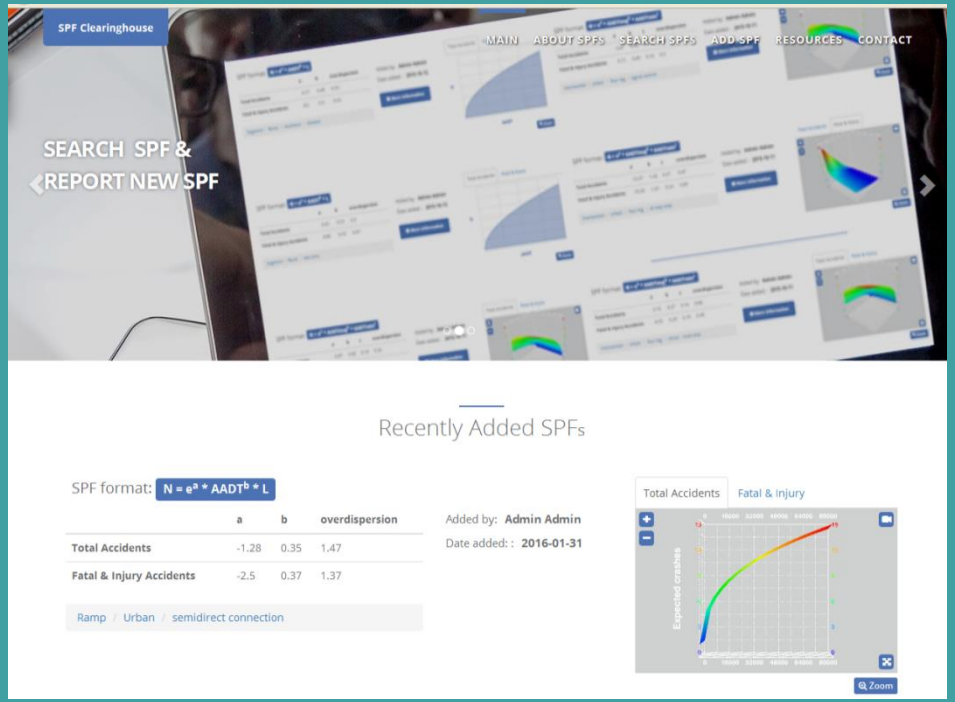
- http://www.cmfclearinghouse.org
- Includes 5,378 CMFs
- Directly related to the Highway Safety Manual (AASHTO, 2010)
- Detailed background information on presented CMFs is available

AustRoads Road Safety Engineering Toolkit



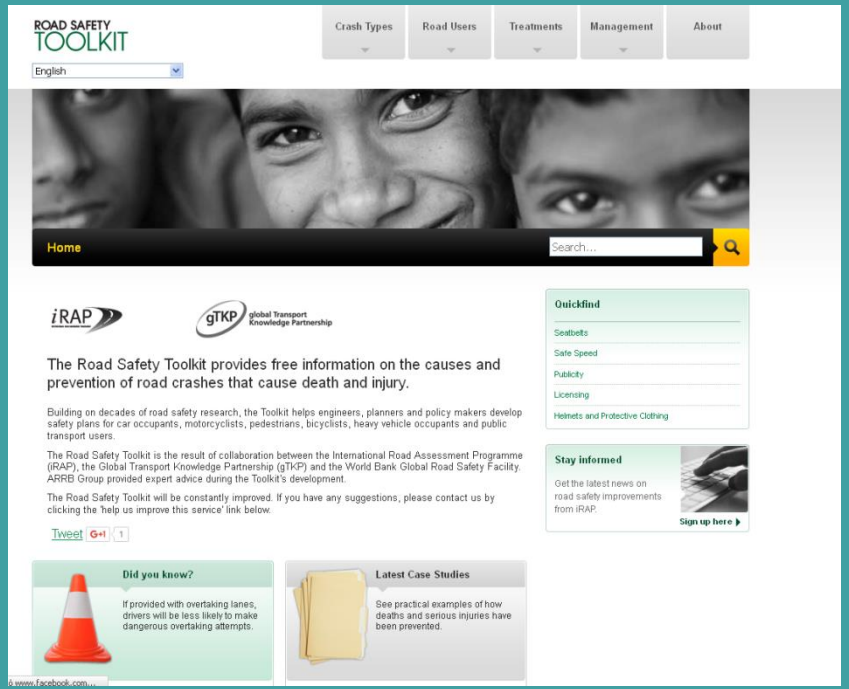
- http://www.engtoolkit.com.au
- 67 treatments are included
- Searchable database according to:
  - Treatment type/ name,
  - Crash type,
  - Safety issue,
  - Road user group
- Detailed background information on included CMFs generally not available

SPF CLEARINGHOUSE



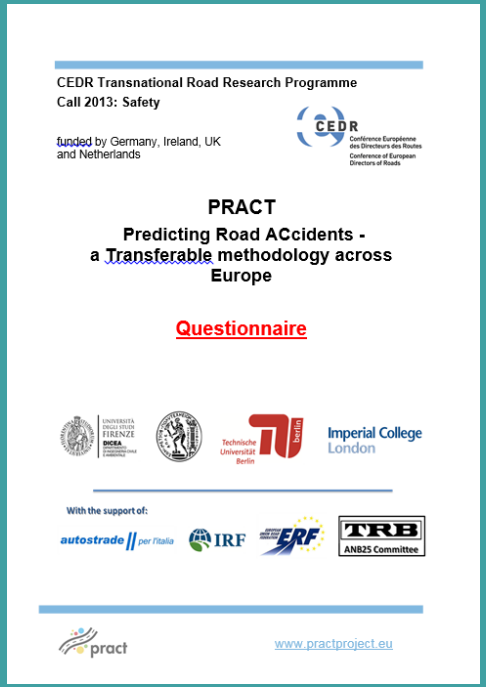
- http://www.spfclearinghouse.org
- Data gathered primarily on a voluntarily basis from users
- Detailed background information on included SPFs (sample size, study citation, statistical methodology etc.) generally not available

iRAP Road Safety Toolkit



- http://toolkit.irap.org/
- Includes 58 treatments (infrastructure, vehicle & user related)
- No CMFs included
- Rough assessment of each treatment's effectiveness using a four scale system (0-10%, 10-25%, 25-40%, 60% or more)

PRACT QUESTIONNAIRE CONTENTS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Questionnaire

With the support of:

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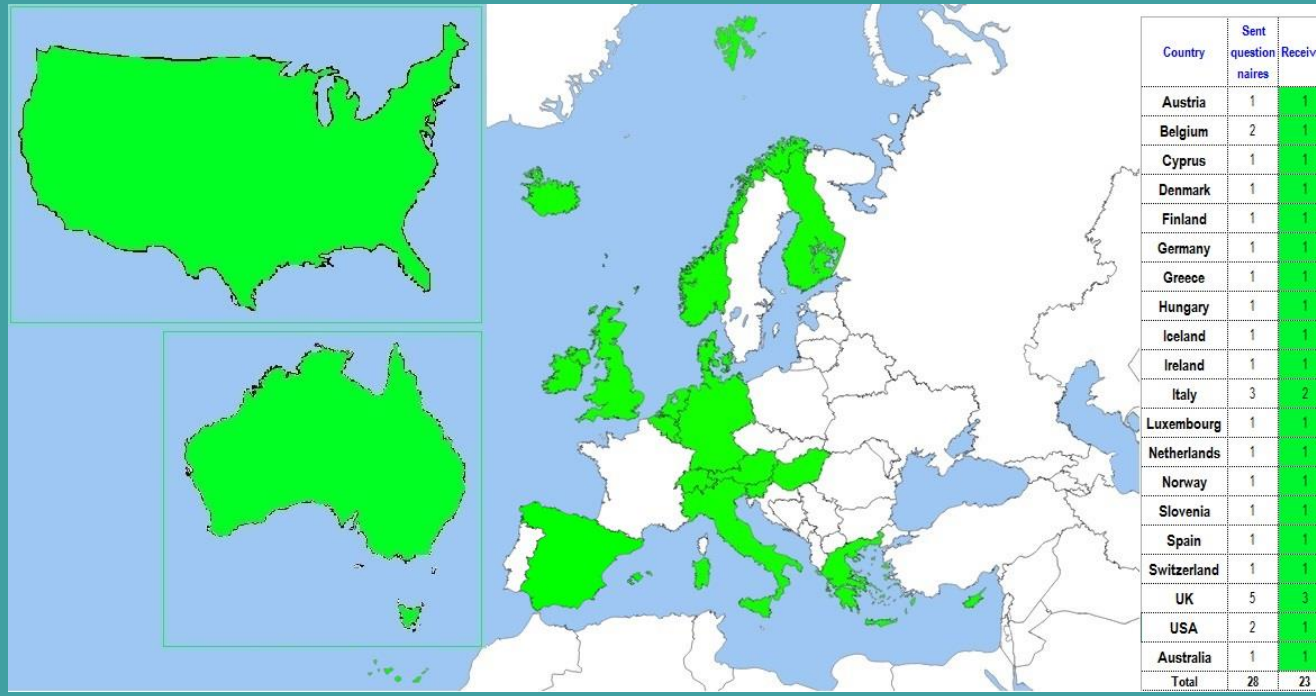
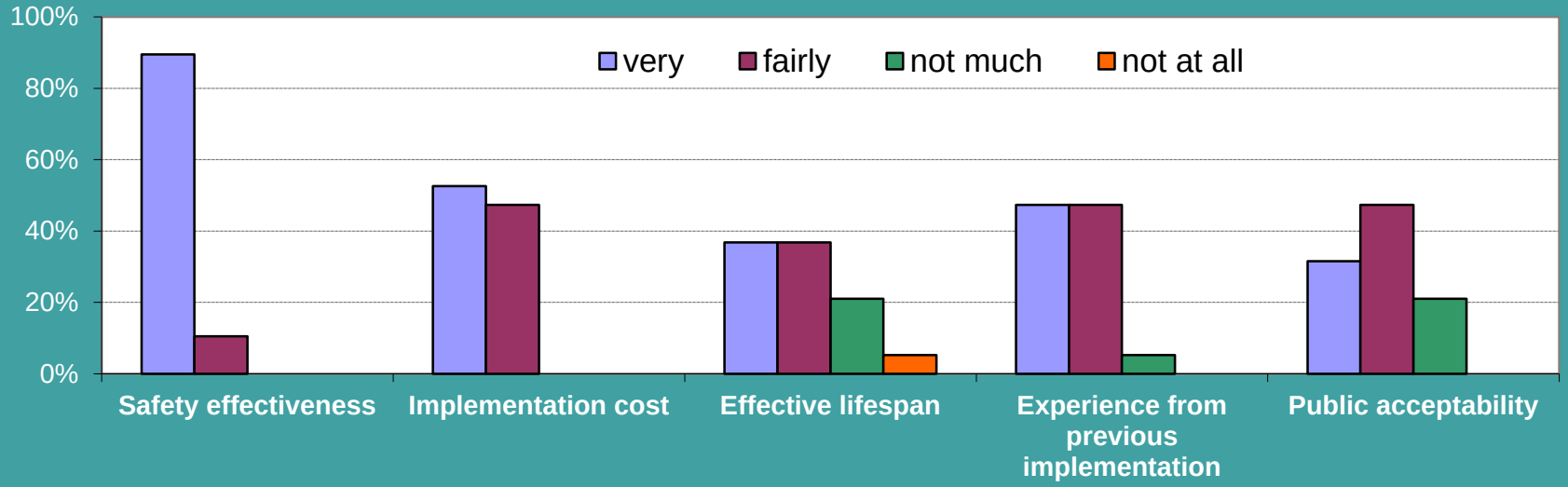
- Brief introductory part,
- **Part A** regarding the Decision Making Process,
- **Part B** regarding Data Sources,
- **Part C** regarding information on CMFs and road safety measures assessment
- **Part D**, aimed at gathering a summary of experience on road safety measures / CMFs

QUESTIONNAIRE SURVEY RESPONSES

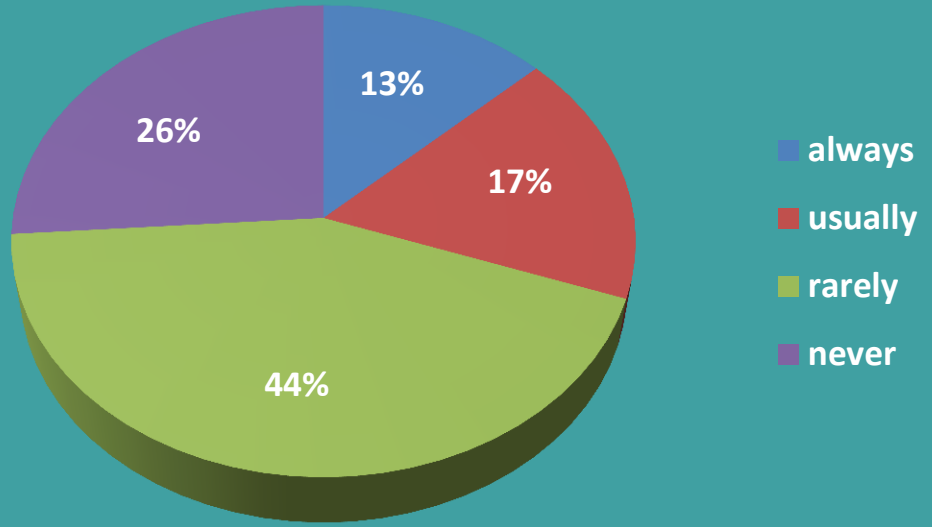


Country	Sent questionnaires	Received
Austria	1	1
Belgium	2	1
Cyprus	1	1
Denmark	1	1
Finland	1	1
Germany	1	1
Greece	1	1
Hungary	1	1
Iceland	1	1
Ireland	1	1
Italy	3	2
Luxembourg	1	1
Netherlands	1	1
Norway	1	1
Slovenia	1	1
Spain	1	1
Switzerland	1	1
UK	5	3
USA	2	1
Australia	1	1
Total	28	23

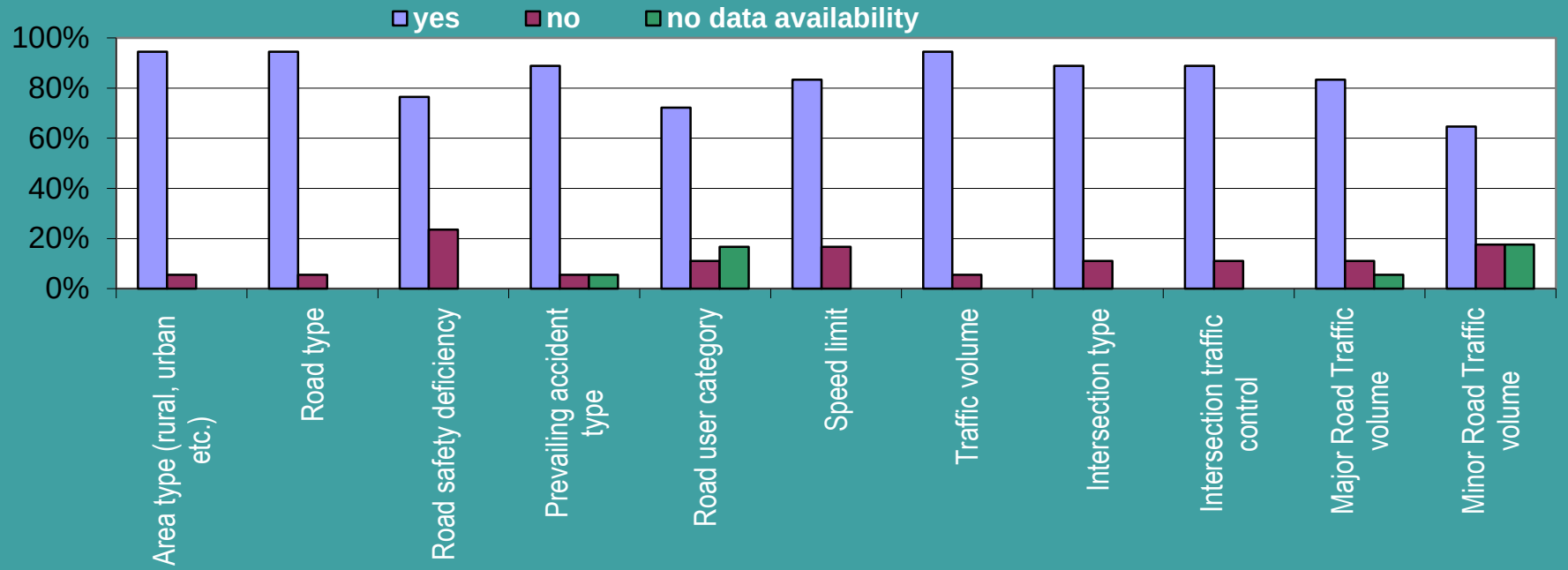
ASPECTS CONSIDERED DURING MEASURES ASSESSMENT



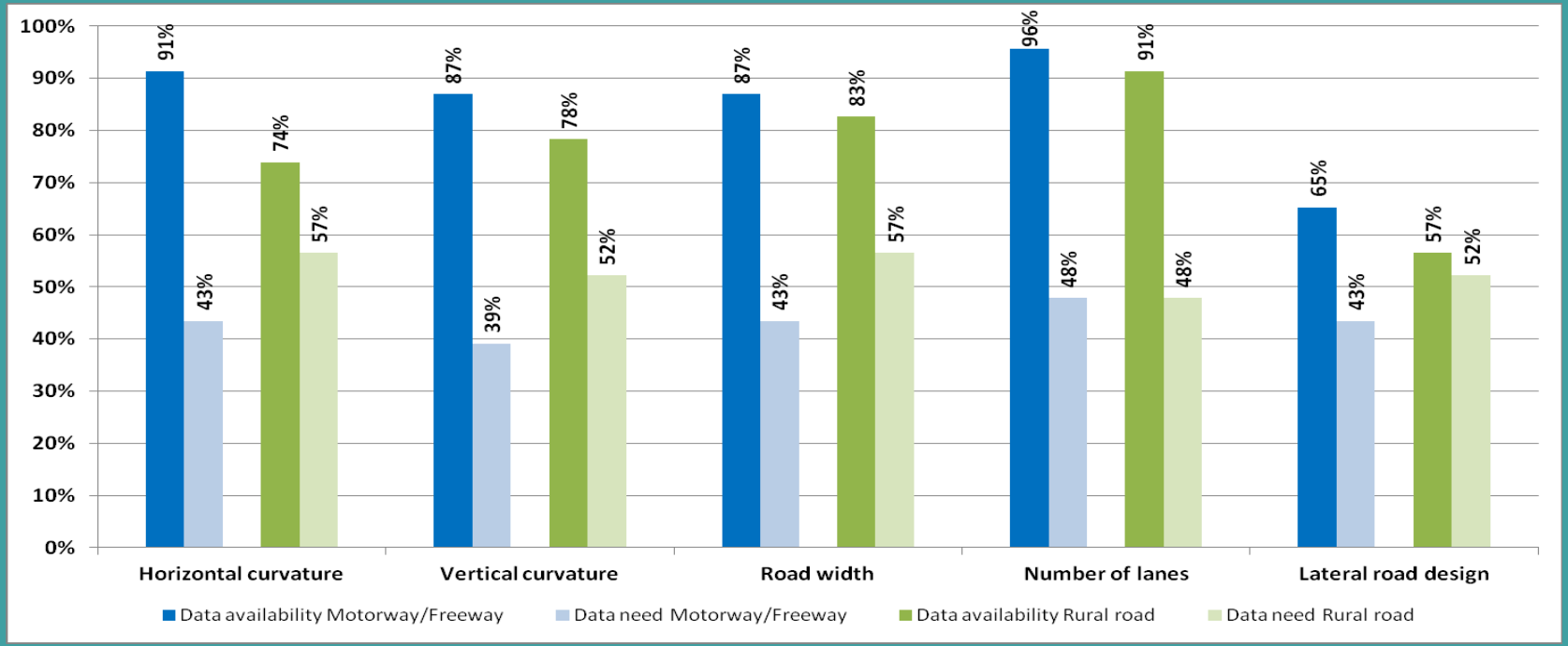
Use of APMs and CMFs During Measures Assessment



Applicability Criteria of the CMF/Measure Assessment



Road Design Data Availability & Need



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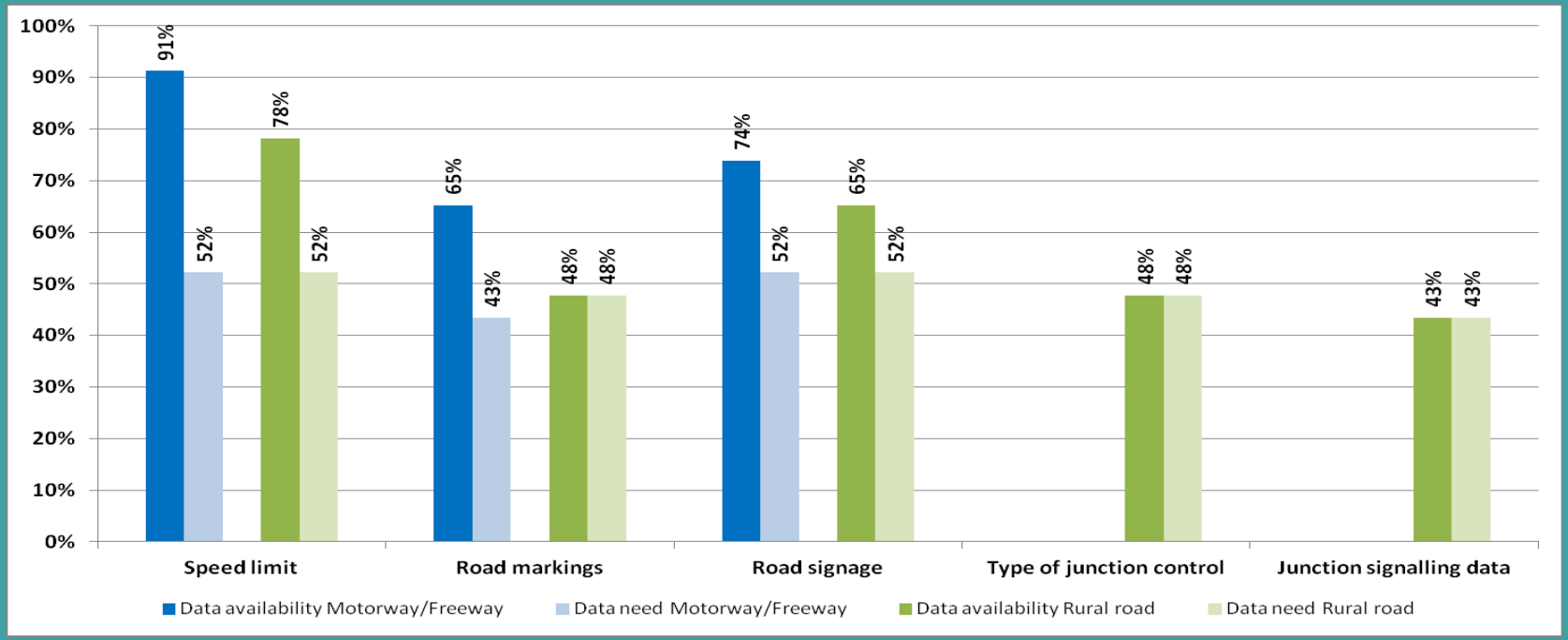
Road Operation Data Availability & Need



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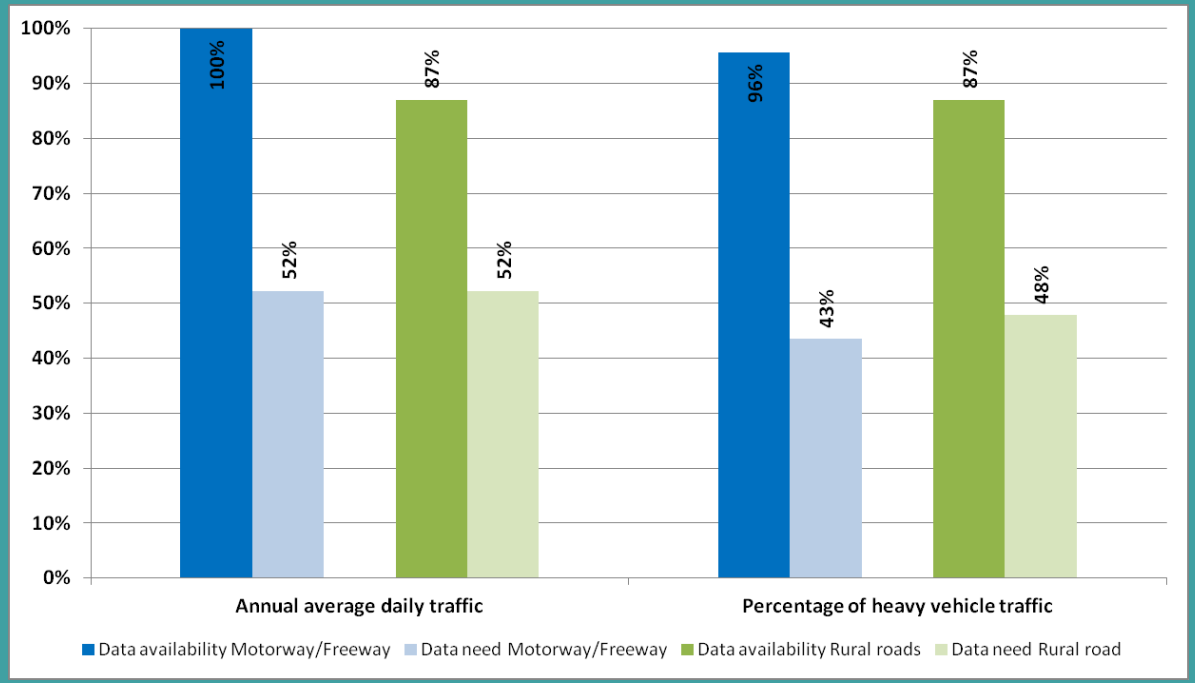
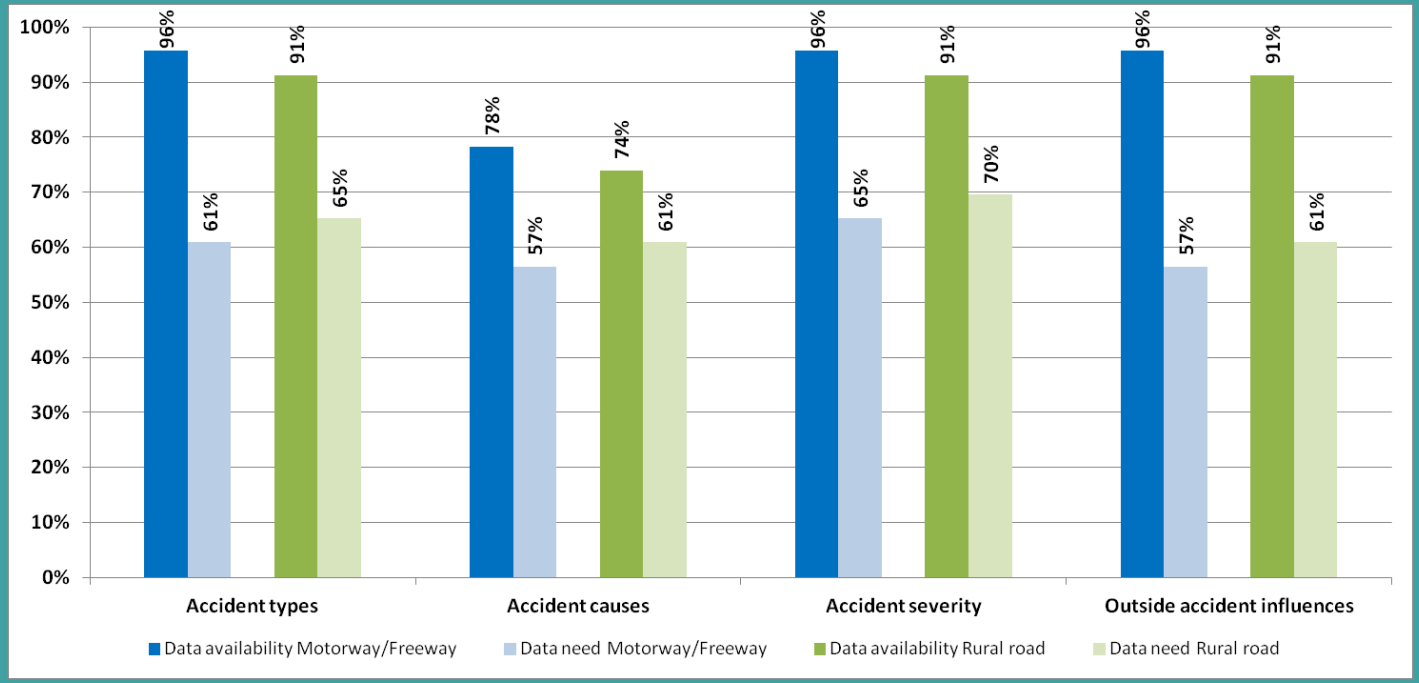
Traffic Data Availability & Need



Accident Data Availability & Need



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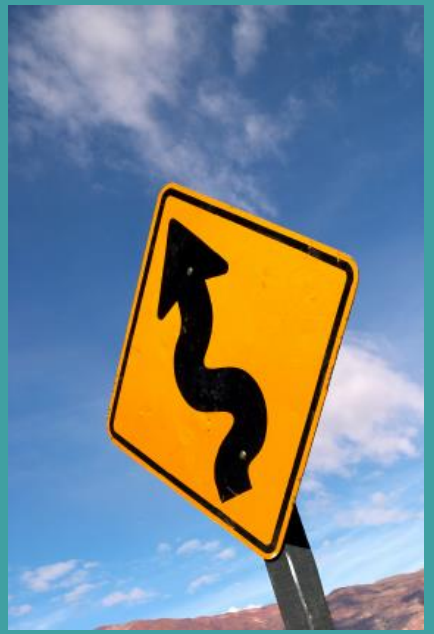
Summary of Experience on Road Safety Measures / CMFs

MOTORWAYS & DIVIDED FREEWAYS (without at grade intersections)	NEED		AVAILABILITY		TRANSFERABILITY	
Countermeasure - CMF	**HIGH**	**LOW**	**HIGH**	**LOW**	**HIGH**	**LOW**
Realignment (of road segments)	18.8%	81.3%	26.7%	73.3%	54.5%	45.5%
Rectangular rapid flashing beacons	21.4%	78.6%	7.1%	92.9%	45.5%	54.5%
Dynamic feedback speed signs	33.3%	66.7%	40.0%	60.0%	63.6%	36.4%
Landscaping and vegetation	35.3%	64.7%	14.3%	85.7%	63.6%	36.4%
Audible road markings	47.1%	52.9%	35.7%	64.3%	81.8%	18.2%
Sight distance and sight obstructions	61.1%	38.9%	21.4%	78.6%	63.6%	36.4%
Animals and wildlife related safety treatments	25.0%	75.0%	15.4%	84.6%	30.0%	70.0%
Advanced warning devices/signals/beacons	62.5%	37.5%	26.7%	73.3%	72.7%	27.3%
High friction treatments (including anti-skid/slip)	73.3%	26.7%	42.9%	57.1%	63.6%	36.4%
Skid resistance (in general)	64.7%	35.3%	40.0%	60.0%	63.6%	36.4%
Effects of Friction on Motorcycle Crashes	21.4%	78.6%	15.4%	84.6%	36.4%	63.6%
Variable message signs	58.8%	41.2%	43.8%	56.3%	63.6%	36.4%

Complete tables are available at: http://www.practproject.eu/

CONCLUSIONS

- The review of international literature indicates significant advances in the field of accident prediction modeling.
- Generally, high levels of data availability were reported, particularly for motorways.
- However, most National Road Administrations (NRAs) still do not systematically use such methods during decision making.