ERA-NET ROAD
Road Infrastructure Safety Management Evaluation Tools - RISMET

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Govert Schermers, SWOV, Netherlands
Road Infrastructure Safety Management Evaluation Tools - RISMET

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Project Coordinator: SWOV
Institute for Road Safety Research

Project Partner 2: TUD
Technische Universität Dresden

Project Partner 3: LNEC
National Laboratory for Civil Engineering

Project Partner 4: TØI - Transportøkonomisk institutt Stiftelsen Norsk senter for samferdselsforskning

Project Partner 5: TRL – Transport Research Laboratory

Project Partner 6: KfV - Kuratorium für Verkehrssicherheit
• Responds to general goal of Safety at the Heart of Design

  “..improvement of road safety through increased awareness and acceptance to implement joint road safety solutions”

• More specifically

  “seeks appropriate solutions and measures for rural roads throughout Europe”
Problem Statement

• Existing techniques, tools and models for evaluating road safety engineering measure inadequate
• Not suited to measure effect of (elements of) design on behaviour and safety
• Techniques have no/limited predictive ability, at local and/or network level
• Relevance of traditional techniques (accident dispersion)
Rismet objectives

- Define minimum data requirements
- Develop uniform methodology for data collection and analysis
- Assess applicability of existing evaluation tools
- Amend or develop tools for assessing efficacy of safety engineering solutions
- Evaluate the applicability of (new) tools
- Formulate good practice guidelines
5 Workpackages

- WP 1: Project management and dissemination
- WP 2: Data systems and requirements
- WP 3: Applicability of existing evaluation tools
- WP 4: Development of new evaluation tools
- WP 5: Guidelines and codes of practice
• Project Management
  - Project management and financial administration
  - Project meetings; Project Steering Committee and Executive Board meetings
  - Reporting and service delivery

• Dissemination
  - Project Website
  - Detailed project work plan
    - Progress reports
    - Interim and final reports
  - External user group
Data systems and requirements (KfV)

• **Goal**
  To define the data and system requirements necessary to support the development of (future) evaluation tools required for effectively managing road safety in EU countries.

• **3 primary tasks resulting in deliverable (Data systems and requirements)**
Literature review of relevant and prominent accident factors with focus on:

- Head-on and single vehicle collisions
- Rear-end collisions
- Lateral collisions

Review of state-of-the-art databases/information systems:

- Safety Analyst
- MOLASSESS
- HSIS – Highway Safety Information System
- GIDAS – Database
- Road Database of the TU Dresden
- ASB – German Road Information Bank Protocol

Inventory of availability and operational level of road safety data in 11 European countries by road safety categories
• Deliverable 2 report (Data systems and requirements)
Applicability of existing tools

- Assess applicability of existing state of the art analytic tools (use/barriers)
- Outline steps to improve existing tools to become state of the art
• Quick scan/overview of existing tools and techniques
• Development of assessment criteria
  ▪ Data requirement; standardised procedures; reporting; skill levels; objectivity; updating
• Survey among road authorities/practitioner
  ▪ Type of tool, application and purpose
  ▪ I/O requirements and capabilities
  ▪ Model assumptions
  ▪ Problems etc
• State of the art report (Assessment)
Road safety audit
Impact assessment

Network screening
Accident modelling

Road safety inspection
Behaviour monitoring

Identification and analysis of hazardous road locations

Conflict studies, naturalistic driving studies

Protection scoring

In-depth studies
Impact ass/mon.
• Survey among 18 EU countries, 1 uses 10; 9 use at least 8 and 4 use at most 4
• Total scores based on weighting (use and monitoring) range from low of 15 to a high of 31 (max. 32)
• Only seven countries score higher than 70% indicating room to improve tools and promote usage
• No statistical correlation between use of tools and actual safety performance (small sample, many confounding factors)
1. RSA; RSI and RPS – monitor and evaluate effect by measure
2. Network screening – adopt Safety Analyst approach
3. Road accident modelling - test models empirically, incorporate RUB variables
4. BSM – employ Empirical Bayes approach for identification and the matched-pair approach for the analysis of contributing factors
5. RSIA – HSM reflects state of the art. Current practice to adopt this.
6. Monitoring of RUB – target max. five types of behaviour affecting safety (incl. speeding, not wearing seat belts and drinking and driving.
7. Conflict studies, naturalistic driver behaviour studies and in-depth studies of accidents are optional tools in the safety management toolbox; none are essential.
Development of evaluation tools

- To determine the most appropriate Bayesian modeling approach (Poisson; Poisson-Gamma and Poisson Log-Normal) and assessment methodology for intersections in EU countries
- To establish means to incorporate driver behaviour into APMs
- To test cross-country applications of APM
- To recommend approaches for future application and development
Results WP4 - Model form for junctions

- Data from 4 countries independently and collectively modeled (NO; AT; P and NL)
- 1250 rural junctions (3 and 4 legs; roundabout, signal; priority control) using 5 year accident and traffic data
- 3 models fitted to each country’s data, model fit checked and overall model choice scores compared
- Poisson-Gamma regression model most suited for accident modeling at junctions
Results WP4 - behaviour

- Speed prediction models developed describing relationship between crashes, speed behaviour and alignment
- Applying SPM to 5930km German rural roads, curves and curved sequences detected and accidents mapped
- APMs describing single curves; curved sequences and sequence elements developed
• Length of single curve

• Length of prior sequence

• Aadt

• Methodology suited for managing safety on existing roads
Results WP4 (LNEC)

- Tools for evaluating design consistency
  - Detection of tangent and curve elements; estimates of speed profiles calculated
  - Classification of horizontal curves
  - APM for roads with/without shoulders
- Benchmarking using DE/P/NL data
  - Differences in data and quality
  - Data sets small (km and accidents)
  - TUD method better for existing roads, LNEC better for new/redesign
- Calibration studies required
Data requirements for road network inventory studies and road safety evaluation – Guidelines and specifications

(based on inputs WP 2 and 3)

• Background,
• Purpose of guidelines
• Overview of current data collection and evaluation tools
• Framework for database (overview of databases, proposed dataset, data collection)
• Data specifications (roadway segments; alignment; intersections)
Guideline for development and application of road infrastructure safety management evaluation tools

- Intro. and purpose of guidelines
- Theory and fundamentals of road safety
- Overview evaluation tools
- Guideline chapters on application and development:
  - RSA and RSI
  - Network screening/NSM
  - Accident modelling
  - Road protection scoring
  - BSM
  - Impact assessment
  - Monitoring RUB, conflict studies and In depths
Outputs and further reading

- Website (http://rismet.swov.nl)
- Detailed Work plan (D1)
- Data Systems and requirements (D2)
- Data requirements guideline and specification (D3)
- Assessment and applicability of evaluation tools (D4;D5)
- Accident Prediction Models for Rural Junctions on Four European Countries (D6.1)
• Applying speed prediction models to define road sections and to develop APMs: A German case study and a Portuguese exploratory study (D6.2)

• Cross-country applicability of evaluation methods. A pilot study in Portugal and Germany (D6.3)

• Guidelines for development and application of evaluation tools (D7)
Thank you for your attention
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