VIENNA 2018
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FROM REACTIVE TO PROACTIVE:
Czech examples of development and application of alternative road safety assessment approaches

CDV TRANSPORT RESEARCH CENTRE

Poster Number 10823

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INTRODUCTION

EU Directive 2008/96/EC … **road safety assessment** ("safety ranking and management of the road network in operation") **should:**
- take into account the number of accidents that have occurred in previous years per unit of road length in relation to the volume of traffic
- result in a priority list of road sections where an improvement of the infrastructure is expected to be highly effective

But the Directive description is short and not specific … EU countries apply different approaches and the proces is based only on accident history.

How to do it?

Empirical Bayes method = combination of accident history + safety of similar sites

… or proactively, without "waiting for accidents" (surrogate safety measures)

Two examples recently applied by CDV for road agencies:

Development of **accident prediction models** and their application for network screening according to the EB method.

Result: **ranked list of hazardous locations** for subsequent field reviews and proposal of countermeasures.

A proactive technique, using **speed consistency**, based on floating car data (FCD) from vehicle fleets.

Result: **identified hazardous locations** (horizontal curves), their categorization and proposal of signing/marking optimization.
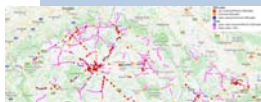
EXAMPLES

For details, see the paper

… or websites:
sfdi.cdvgis.cz
samo.cdvinfo.cz

Accident prediction models:

$$\hat{N} = \exp(\beta_0) \cdot (exposure)^{\beta_1} \cdot \exp\left(\sum_{i=2}^{n} (\beta_i \cdot x_i)\right)$$

- *exposure*: AADT, length
- x_i: risk factors (curvature, signals, number of legs…)

Empirical Bayes approach: $EB_i = w_i \cdot \hat{N}_i + (1 - w_i) \cdot N_i$
Potential for safety improvement: $PSI_i = EB_i - \hat{N}_i$

Descending PSI → safety ranking.

1. Segmentation into tangents and curves
2. Free-flow speeds from floating car data
3. Speed models → speed consistency
4. Network-wide application
- predicted consistency
- ranking based on speed, radii, curvature
- assessment of single element + relation design
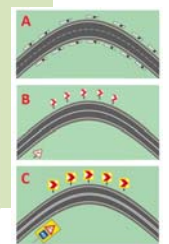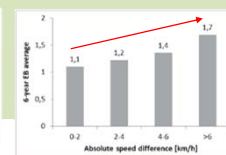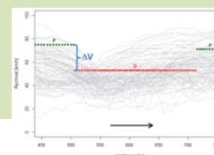
SUMMARY

Two alternative assessment examples presented: **EB method** and **speed consistency**.
Limitations: small sample size (Czech road network length), FCD uncertainty during low traffic volumes, anonymity of FCD data…

The proactive approaches are valuable **in current conditions of scattered accident occurrence, where traditional accident-based approaches do not perform well**.
The results based on both presented methods have been approved by Czech road agencies to supplement their decision making processes.

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