

Risk Assessment on Danube Area Roads



• Final Conference / September 23, 2021

Striving for Safer Infrastructure for all Road Users in the Danube Area



Project co-funded by European Union funds (ERDF, IPA, ENI).

How to perform network-wide road safety assessments: reactive and proactive approaches

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Presentation Outline

- 1. Methods to assess road safety (5)
 - Reactive
 - Proactive Ш.
- 2. Network-wide road safety assessment: concept and challenges (1)
- 3. Combination of reactive and proactive safety assessment for the network-level (2)











Methods to Assess Road Safety

- Crash occurrence: Identification of high-risk sections across a network based on the analysis of crash records – reactive approach
- "In-built" safety assessment: Consideration of roadway design characteristics to assess road safety – proactive approach
- Network-wide safety assessment: Consideration of the in-built safety of an entire road network – *large scale proactive* approach













Methods to Assess Road Safety Crash occurrence

- Macroscopic (variables recorded by the police) or microscopic (variables collected by hospitals, insurance companies, etc.) crash data is analyzed to identify high-risk locations.
- Depending on other data sources (e.g., traffic volume, crash severity levels) various safety performance metrics may be chosen, such as: crash density, crash rates, crash costs, potential for crash reduction, etc.
- Crash data needs to be of good quality, reliable, and accurate, otherwise the analysis may be falsie or inconclusive.





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Shortcomings of the reactive approach

- crashes may not be the best proxy to assess road infrastructure safety; local human factors, behaviour, enforcement, vehicle fleet characteristics, etc., play a role in the overall safety of the road.
- Not applicable when the number of crashes is small or when the crash data is erroneous/incomplete (e.g., mistaken crash location or injury severity level)
- > Not applicable for **new roads**.
- Major road network improvements generally not examined.



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Methods to Assess Road Safety In-built safety assessment

Various proactive methodologies have been developed internationally:

- ➢ Road Safety Audits (RSA) or Road Inspections (RSI)
- \succ Models that predict the expected average crash frequency at the examined locations, as a function of traffic volume and road infrastructure characteristics (e.g., number of lanes):
 - AASHTO Highway Safety Manual Safety Performance Functions and Crash Modification Factors
 - PRACT models
 - Stand-alone multivariate crash prediction models
- ➢ iRAP Star Rating Protocol (used worldwide)
- > Methodologies that related a set of parameters to a risk rating system (e.g., National Swedish methodology)











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Need for Network-wide Safety Assessment

- ➤While detailed proactive approaches (RSIs, crash prediction models) are the most effective ways to identify hazardous locations and improve road safety, they are time- and resource-consuming, this is why they are applied to small sections or parts of a network.
- Network-wide safety assessment evaluate the broader road network and can identify in a less costly way, (large) sections of the network that are in urgent need of improvement.
- This way, road safety-related resources are allocated more effectively.













Developing a Network-wide Safety Assessment methodology – Challenges

- Identification of appropriate road characteristics, i.e., a set of parameters, that affect network-level safety, for example:
 - barrier presence and safe roadside are important
 - the presence of an uncovered barrier end does not affect network-level safety, although it's important for the specific site
- Identification of a scientifically sound relationship between the set of parameters and safety outcomes
- Achieve a balance between accuracy and level of detail, without being overly data-intensive and costly to use.









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Need for Network-level Safety Assessment: Pro- or Re-active?

A general rule is that proactive approaches help saving lives as actions are taken in advance of crashes.

- Proactive approaches that consider the geometric, operational, and traffic characteristics are applicable for:
 - New roads
 - Roads where no sufficient and/or reliable/accurate crash data are available
- Combination of proactive and reactive approaches: Expansion of the network-level safety assessment framework to focus on locations with high crash concentration.



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Combined reactive and proactive assessment framework





Danube Transnational Programme

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