18th EUROPEAN WEEK of REGIONS and CITIES

05>09 OCTOBER 2020 | 12>16 OCTOBER 2020 | 19>22 OCTOBER 2020

European Committee of the Regions

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Wednesday, October 14 2020

Network-wide Road Safety Assessment

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Outline

1. Methods to Assess Road Safety

- Accident occurrence
- "In-built" safety assessment

2. Network-level Safety Assessment

- Methods, manuals, and tools
- Applied practices in Europe
- Considerations for automated vehicles

3. Conclusions

Methods to Assess Road Safety

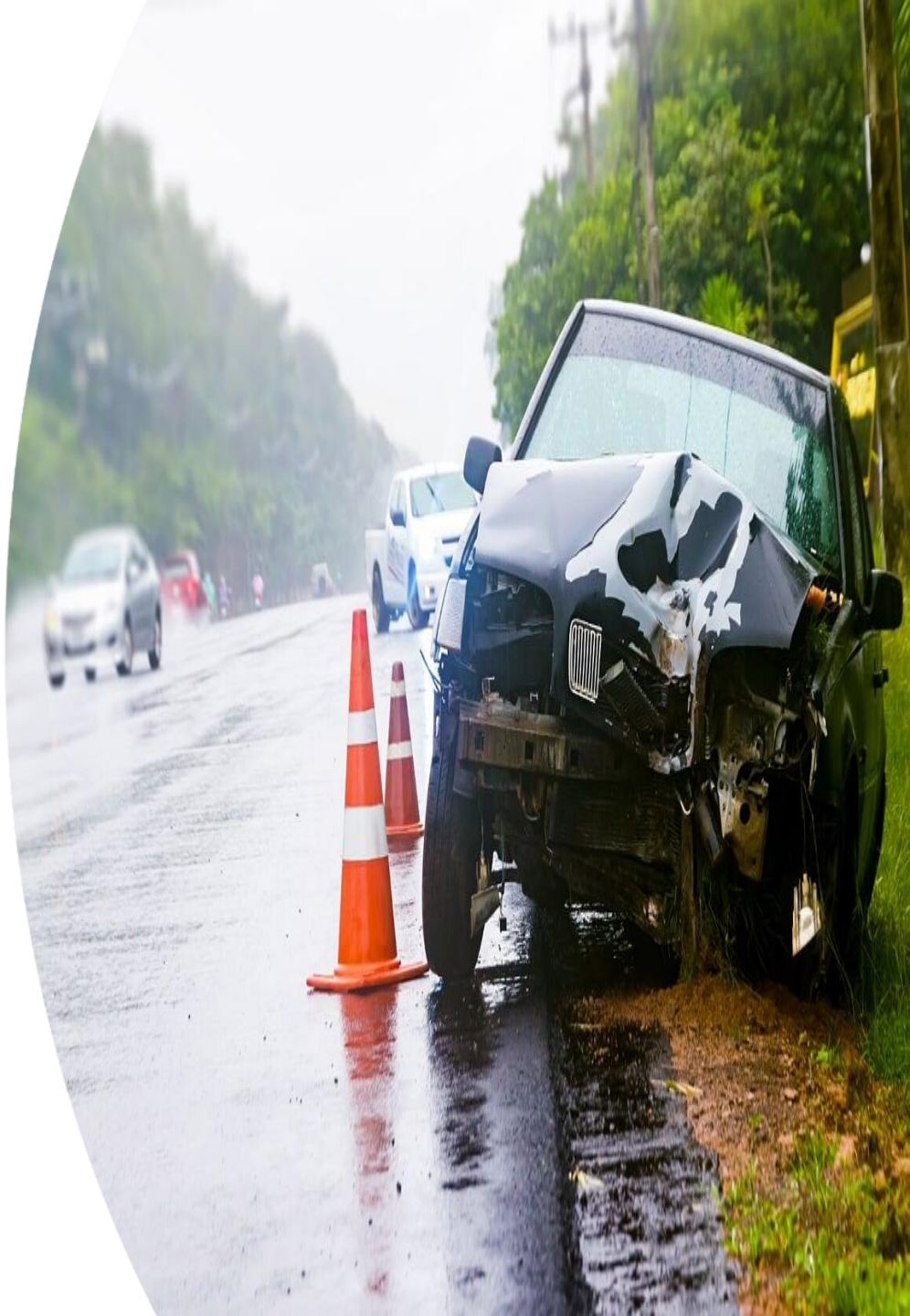
- **Accident occurrence:** Identification of sections with high accident frequency – *reactive approach*
- **"In-built" safety assessment:** Consideration of roadway design characteristics to assess road safety – *detailed proactive approach*
- **Network-wide safety assessment:** Consideration of the in-built safety of an entire road network – *large scale proactive approach*

Methods to Assess Road Safety: Accident Occurrence

Collection of:

- **Macroscopic data:** recorded by the police and consists of 50-100 variables associated with the accident
- **Microscopic data:** collected by research institutes, hospitals, insurance companies, private companies and authorities and consists of >500 variables associated with the accident

It is critical that these data are of good quality and consistently recorded.



Methods to Assess Road Safety: "In-built" Safety

- Statistical - mathematical models predicting the expected average accident frequency at the examined locations, as a function of traffic volume and road infrastructure characteristics (e.g. number of lanes, type of median, traffic control)
  - AASHTO Highway Safety Manual Safety Performance Functions and Crash Modification Factors
  - PRACT models
- Road Safety Audits or Road Inspections

Need for Network-level Safety Assessment

While detailed proactive approaches (SPFs, road safety audits and/or inspections) are the most effective ways to identify hazardous locations and thus, improve road safety, they are time- and resource-consuming methods.

On the other hand, network-level safety assessment provides an assessment of the broader road network and can identify those parts of the network that are in urgent need of improvement. This way, road safety-related resources are allocated more effectively.

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

*Generally in life, it is better to be proactive than reactive; being **reactive** means that **lives will be lost** before action is taken.*

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

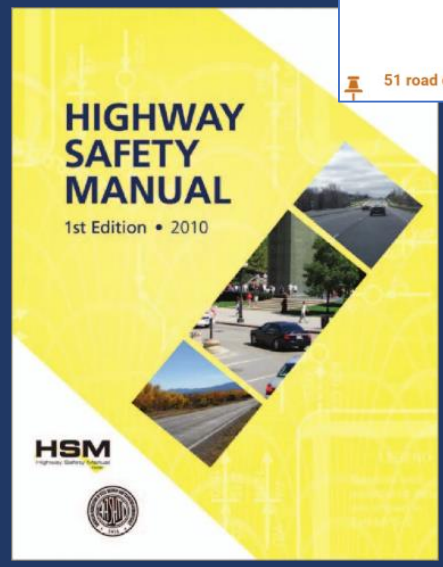
Applied Network-level Safety Assessment Methods & Tools

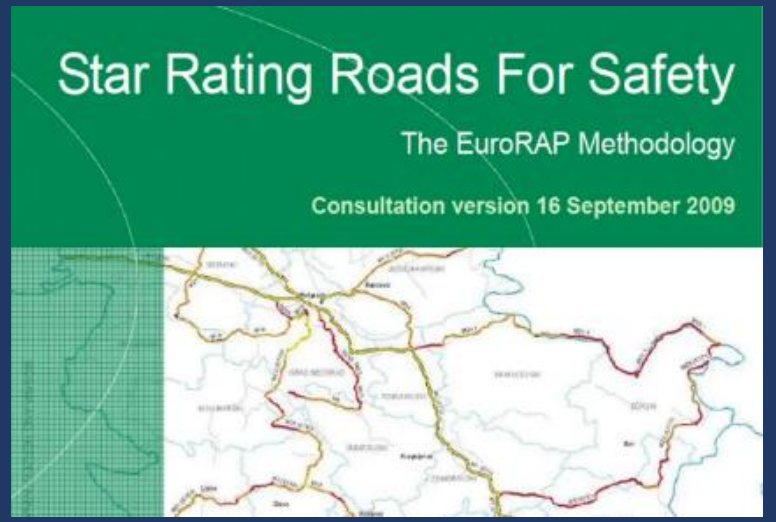
EU-based and applied methodologies

- iRAP/EuroRAP protocols
- PRACT Project Models (CEDR)
- ETSC PIN ratings
- National German methodology (ESN)
- Work-related safety ratings in Sweden
- ECF – ECS (European Certification standard)

International methodologies

- iRAP protocols
- World Bank road assessment methodology
- US Highway Safety Manual Predictive Method & IHSDM softwar
- Australian Road Safety Engineering Toolkit & ANRAM software





Europe and Network-level Safety Assessment

Initiatives in several European Countries regarding network-level safety assessment involve the use of iRAP protocols. Some other applied practices are:

- **Germany**: use of maintenance-related approach on network-wide safety assessment
- **Ireland**: follows an extensive Road Safety Inspection process enhanced by the PRACT models
- **Sweden**: applies a qualitative road safety classification approach based on speed limits and geometric characteristics

NWRSA and Automation

- Systematic network-level safety assessment can be proved highly beneficial to monitor the impact of gradual deployment of automation to the changing road safety performance.

- The transition to automated / connected vehicles will allow for more effective ways of implementing proactive safety approaches, and thus network-level safety assessment, due to their ability to collect multiple types of road data. Specifically:
  - Vehicle kinematic data (e.g., speed, acceleration) that can be used instead of accident data
  - Maintenance-related data (e.g., marking and signs reflectivity and pavement quality) that can inform authorities for maintenance needs

Conclusion

- Existing methods and practices rely on different assumptions and data and may produce output not always comparable

- A new, integrated methodology that combines the advantages of proactive (in-built safety) and reactive (accidence occurrence) methods to assess road safety and rank road networks is needed

- The methodology should achieve a balance between being accurate and detailed on one hand, without being overly data intensive and cumbersome in its implementation

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