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Network-wide Road Safety Assessment

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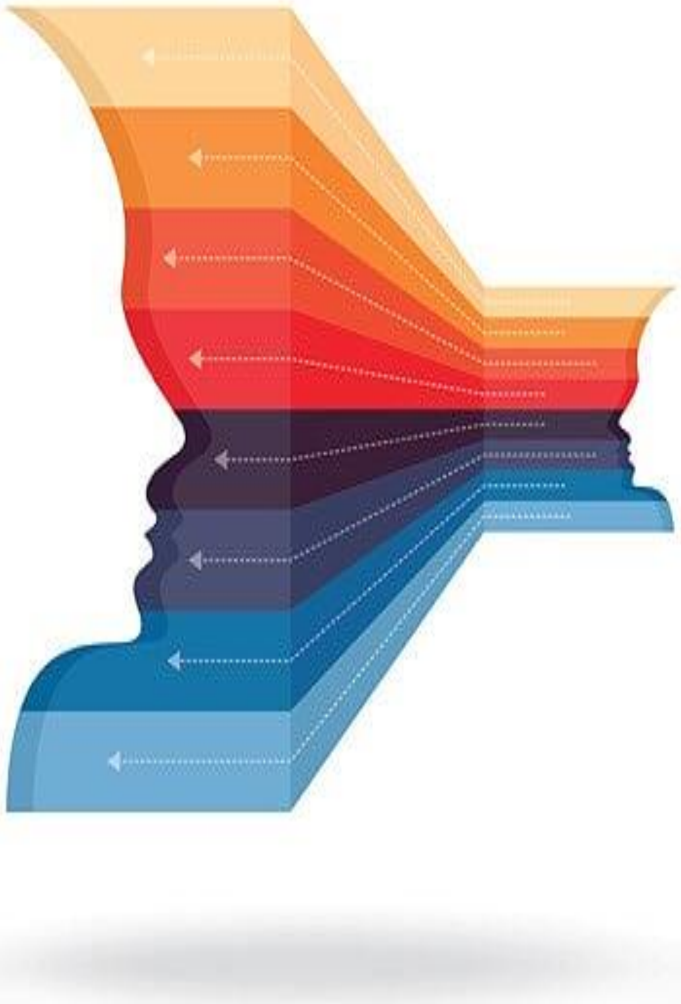
Presentation Outline

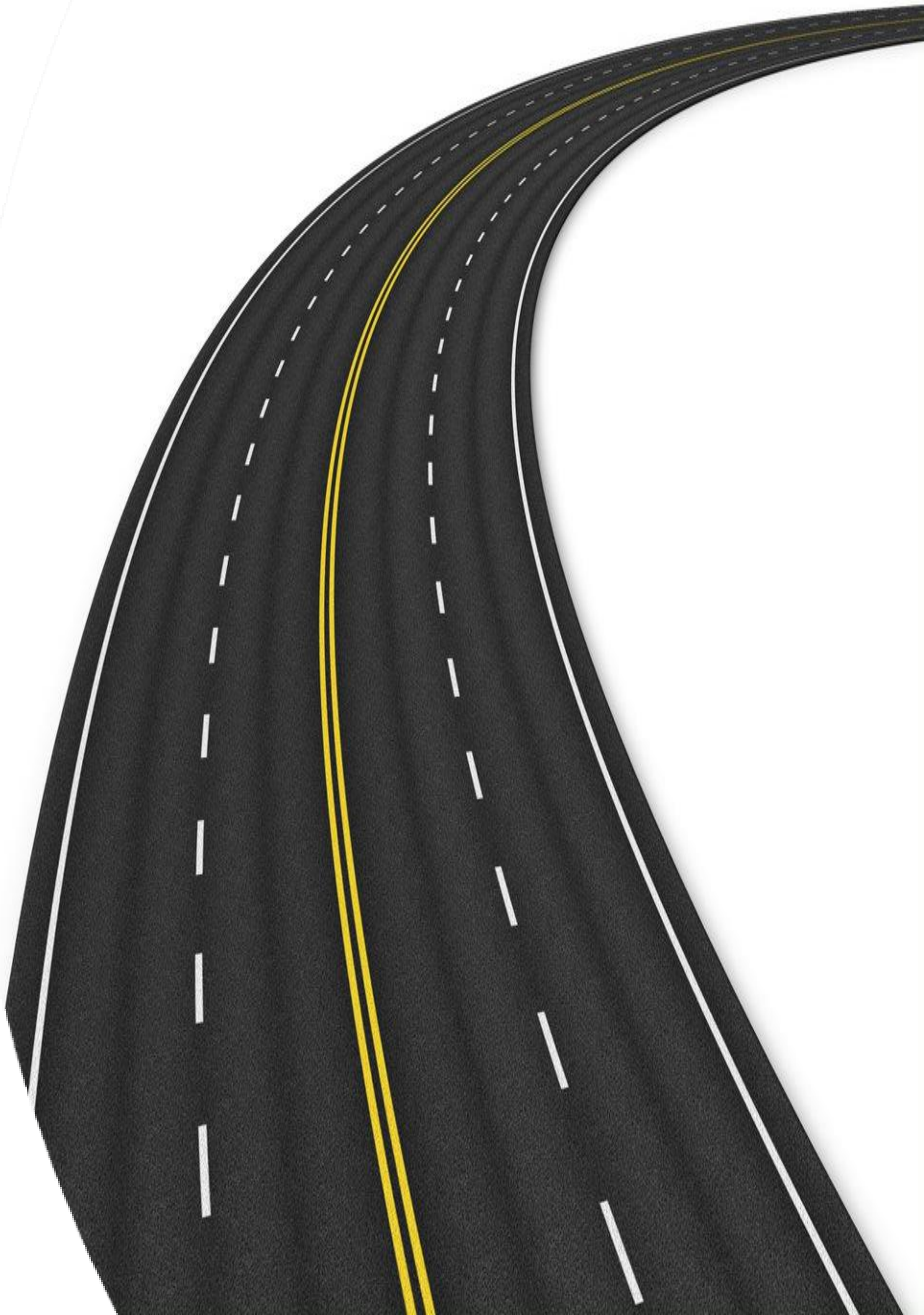
1. RISM Study (2 slides)
2. Findings from the questionnaire survey and the literature review (5 slides)
3. Integrated methodology for network-wide safety assessment (3 slides)
4. Next steps (1 slide)



Road Infrastructure Safety Management (RISM) Study

Methodology (1/2)

- **Review** of existing **methodologies** and **practices** that assess road safety:
  - proactively (i.e., in-built safety assessment)
  - reactively (i.e., analysis of accident records).
- Understand **data availability** across the EU Member States, as road and accident data availability may affect the proposed methodology.
- Development of a **methodology** for assessing the **in-built safety of roads** via the identification of appropriate **parameters** and **relationships** that link the parameters to a selected safety outcome.
- Development of a **methodology** for **accident occurrence** analysis.



Methodology (2/2)

- **Integrate** the two methodologies in a common framework for the **network-wide** road safety assessment.

- **Evaluate** the **applicability** of the proposed (integrated) methodology in a specific environment per Member State and provide Member State authorities **guidelines** on how to **implement** it.

- Maintain active **communication** and **consultation** with:
  - relevant **stakeholders** to inform them and receive their **feedback** for the proposed methodology,
  - EU Member States to **engage** them in adopting and implementing the methodology.

Findings from the questionnaire survey and the review of the literature

Questionnaire survey & review of the literature

- A questionnaire survey was directly disseminated to 81 persons in addition to the network of CEDR, ETSC, and EuroRAP; 26 Member States provided at least one response.
- Collected information concerns:
  1. Road classification system per country
  2. Relevant available datasets
  3. Applied practices regarding road safety assessment (reactive and proactive)
- The review of the road infrastructure safety literature focused on: project reports, manuals, guidelines, scientific literature with the objective to identify applied practices regarding road safety assessment (reactive and proactive).

Data availability & data collection methods – National databases

Based on the questionnaire survey, it was found that many Member States keep detailed, frequently updated databases with data useful for in-built safety analysis.

Data types with availability higher than 70%
Horizontal alignment data
Number of lanes
Road/ lane width
Shoulder type
Presence of side safety barriers
Pavement quality
Posted speed limit
AADT
% of heavy vehicles

Accident data
Accident type
Number of fatalities
Number of serious injuries
Number of slight injuries
Number of PDO accidents
Outside accident influences
Road features (i.e., site of the accident)
Road user characteristics
Vehicle characteristics
Precise GPS data on accident location
Use of alcohol or drugs

Data storing systems
Conventional databases
GIS maps
CAD files
Image files

Traffic data collection methods
Continuous loop detectors
Short-term counters
Toll-station counts
Video cameras

In-built safety assessment methods

- Road Safety Inspections are detailed methods, where all aspects of the road environment are thoroughly checked. They are time consuming and require trained experts, therefore they are used for site-level assessment rather network-wide.

- The existing network-level, in-built safety assessment methods:

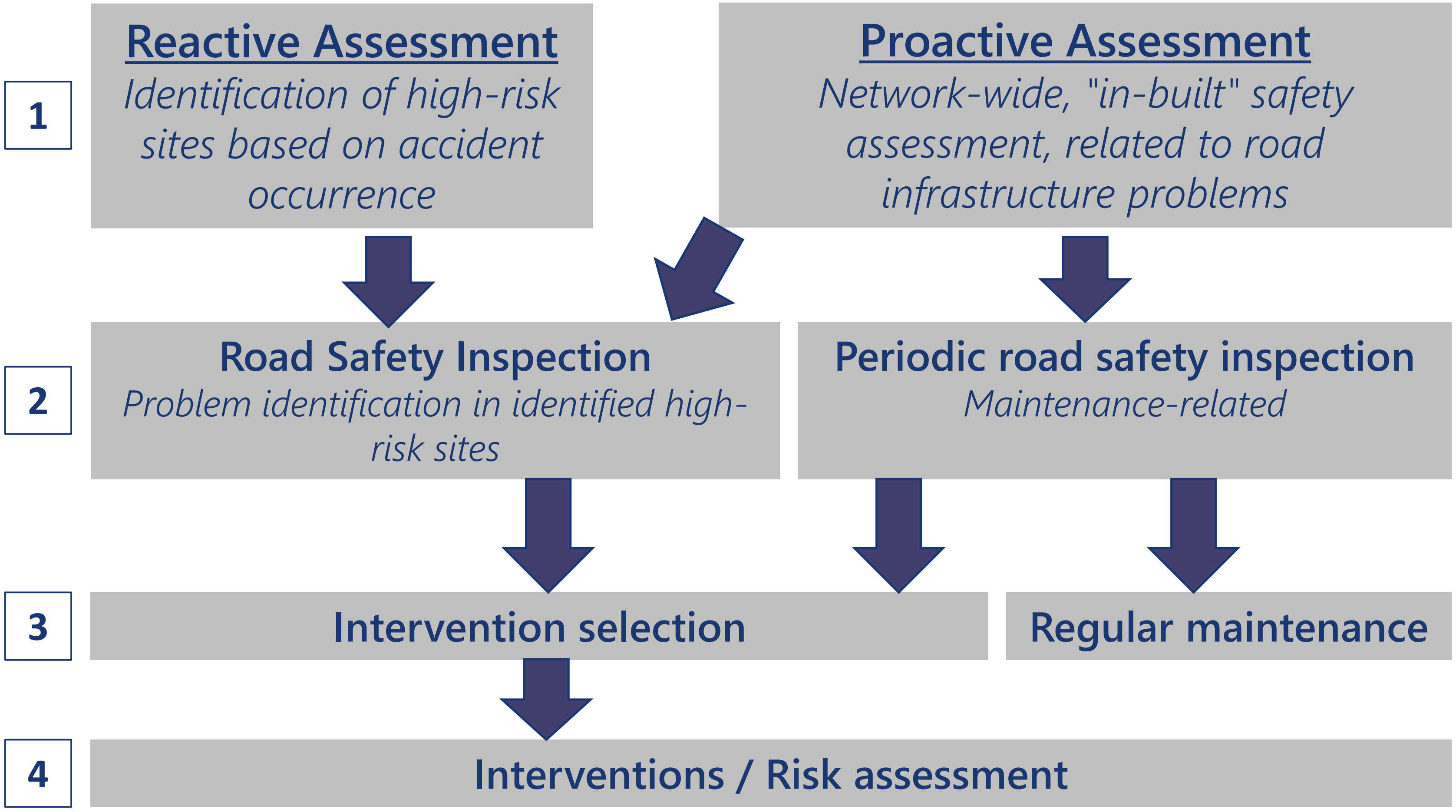
Method	Approach and considerations
1. AASHTO Highway Safety Manual Predictive Method	**Accident prediction models**: high validity, data intensive, need for expertise, low transferability
2. PRACT Models	
3. iRAP Star Rating Protocol	**Combination of in-built safety assessment and risk estimation:** high validity, data intensive, need for expertise, high implementation cost
4. Australian National Risk Assessment Model	
5. Risk Identification Method	**Methods to examine and rate the influence of critical safety-related aspects based on reference tables:** Comprehensive methods and low implementation costs. Depending on the method there are accuracy, validity, and data needs considerations
6. Safety Ranking Method	
7. Rural Road Safety Index	
8. Proactive Road Safety Program	
9. SAMO method	

Accident occurrence analysis methods

- Twenty-two accident occurrence analysis methods were identified, applied across Europe and internationally
- There are numerous ways to assess road safety based on accident occurrence and vary from country to country, although it was found that they often have a common structure, consisting of:

Main steps	Considerations and common practices
1. Network segmentation	Definition of homogeneous sections is based on geometry and traffic characteristics. Thresholds may also be set to define the min/ max section length.
2. Selection of safety performance metric	• Accident density • Accident rate • Accident cost or other metrics
3. Years of accident data	Most methods use at least 3 years of accident data. More years (e.g., 4-5 or more) are common in several methods, while a couple of methods rely on 1 year.
4. Accident severity types	Accident severity is not usually considered. When considered it is incorporated as: • Threshold of injury (serious and/or light)accidents • Weights per injury severity type • Estimated accident costs per injury severity type Across MS there are different injury classification systems
5. Criteria for determining "high-risk" sites	References to the normal level of safety can be made by comparing the occurred to the expected number of accidents using (a) accident prediction models or (b) average values across similar sites (e.g., network average).

Reactive and proactive safety assessment methods



- Accidents **may not be the best proxy** to assess infrastructure safety (because of local human factors, behaviour, enforcement, vehicle fleet characteristics, etc.).
- Not applicable for:
  - **low accident frequency**
  - **new roads**
- Major **road network improvements** generally not examined.

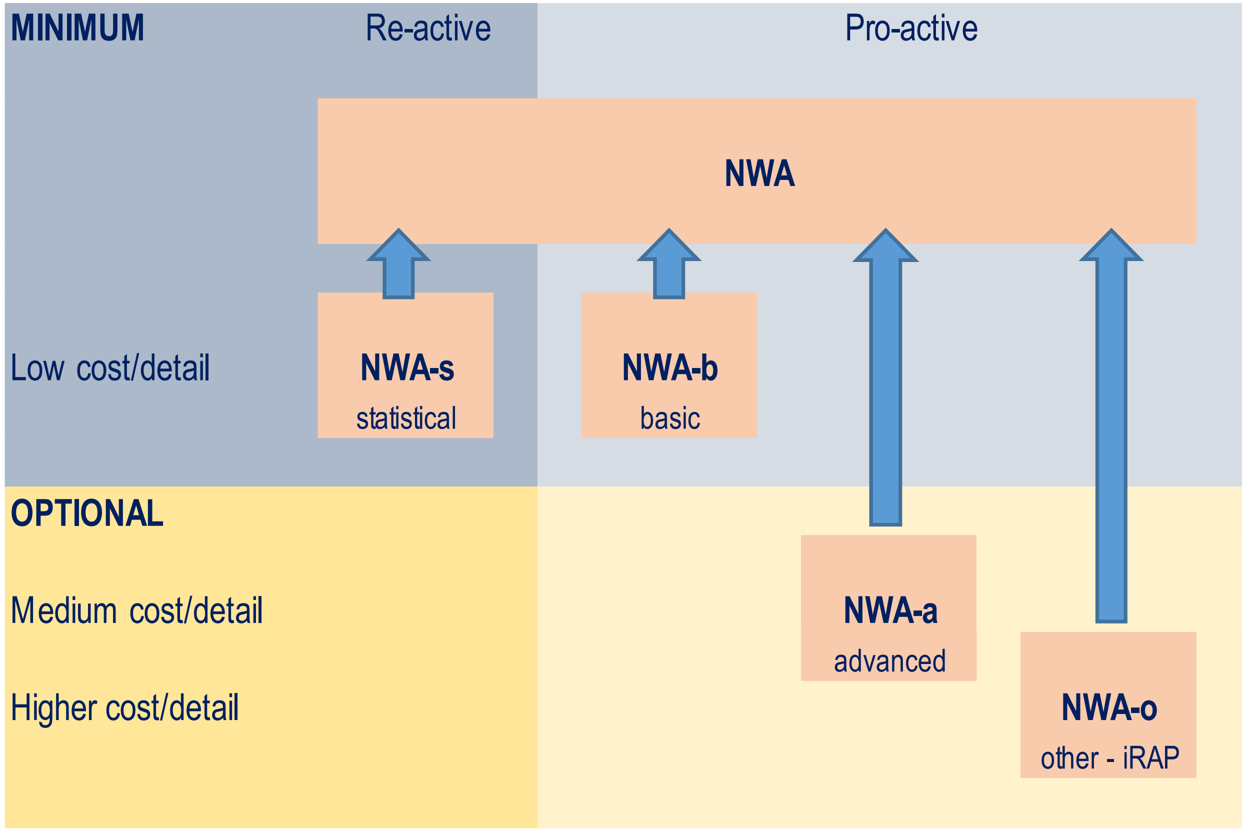
Integrated, network-wide safety assessment methodology

Network Wide Assessment Methodological Concept

- The integrated Network-Wide Assessment (NWA) methodology will **combine re-active** (accident based) and **pro-active** (in-built safety assessment) approaches.
- Considering data and resource availability, a **modular approach** is proposed:

  Minimum: (low cost and level of detail)
  - NWA-b (basic)
  - NWA-s (statistical)

  Optional: (high cost and level of detail)
  - NWA-a (advanced)
  - NWA-o (other - iRAP)



Prioritization for further inspection or treatment

- When a segment/ site scores high on both approaches (cell 1), it can be considered safe.
- When a segment/ site scores low on both approaches (cell 6), it can be considered unsafe, and it is of high priority for detailed inspection (e.g., RSI) and treatment.
- Between cells 3 and 4, higher priority is proposed for cell 4 (low score on proactive assessment), because:
  1. Reactive assessment results may be biased due to inaccurate accident data
  2. High traffic volumes may dilute the accident-based proxy (e.g., injuries/veh.km), while it is cost effective to prioritize treatments in high volume segments.
- In case of statistically uncertain results in the accident analysis approach (cells 2 and 5), priority can be determined based solely on the proactive assessment score.

Reactive Assessment Score \ Proactive Assessment Score	High	Low
High	1	4
Unsure	2	5
Low	3	6

Next steps for integrated network-wide safety assessment methodology

- Development of separate **proactive** and **reactive** methodologies.
- Continuous **discussion** and **feedback** from Member States and relevant stakeholders (mostly through EGRIS)
- Development of **supporting tools** and **guidance document** to support MSs in the implementation of the methodology.

Impact and future challenges

The proposed methodology will:

- **integrate proactive and reactive** safety assessment approaches to face the limitations of commonly applied accident-based assessments,
- **enable large scale road safety assessments** at network level in a cost-efficient way, thus allowing more targeted allocation of resources and reduction of fatalities and injuries across the EU,
- provide a **common understanding** of the **safety level** of all major road networks across the EU Member States.

Challenges concern:

- Data collection, storing, and maintenance issues
- Balancing accuracy and simple practical application
- Changes of the methodology in-light of CCAMs

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