The SafetyCube DSS inventory of assessed infrastructure risk factors and measures

**Summary**

The core results of the work undertaken in the "Infrastructure" Work Package, on the basis of the SafetyCube methodology, aiming to develop the "inventory of road infrastructure risks and measures", which populates the Road Safety Decision Support System (DSS).

**Ranking of infrastructure risk factors**

- **Effect of Traffic Volume on safety**
  - Congestion as a risk factor
  - Occurrence of Secondary crashes
  - Road surface - inadequate friction
  - Poor Visibility - darkness
  - Adverse weather - rain (motor vehicles only)
  - Workzone length
  - Alignment deficiencies - low Curve Radius
  - Cross-section deficiencies - number of lanes
  - Shoulder and roadside deficiencies - absence of paved shoulders
  - Shoulder and roadside deficiencies - narrow shoulders
  - Presence of tunnels
  - Uncontrolled railroad crossing

- **Road Surfaces - inadequate friction**
  - Alignment deficiencies - absence of transition curves
  - Road functional class
  - Poor Visibility - darkness (all and two-wheeler vehicles)
  - Workzone length
  - Alignment deficiencies - low Curve Radius
  - Cross-section deficiencies - number of lanes
  - Shoulder and roadside deficiencies - absence of paved shoulders
  - Shoulder and roadside deficiencies - narrow shoulders
  - Shoulder and roadside deficiencies - alignment deficiencies - Poor visibility - dark
  - Shoulder and roadside deficiencies - alignment deficiencies - Poor visibility - fog

- **High risk sites treatment**
  - Workzones: Signage implementation of rumble strips at central
  - Installation of chevron signs
  - Traffic signal installation;
  - Traffic signal maintenance
  - Convert at grade junction to interchange
  - Sight distance treatments
  - Automatic barriers installation
  - Dynamic speed limits
  - Creation of by-pass roads

- **Road surface treatments**
  - Variable message signs
  - Speed limit reduction
  - Dynamic speed display signs
  - Installation of section control & speed cameras
  - Installation of speed humps
  - Implementation of lighting & improvement of existing lighting
  - Workzones: Signage installation and improvement
  - Shoulders implementation (shoulder type)
  - Increase shoulder width
  - Safety barriers installation; change type of safety barriers
  - Create clear-zone / remove obstacles & Increase width of clear-zone
  - Traffic sign installation; Traffic sign maintenance
  - Variable message signs
  - Sight distance treatments

- **Shoulder and roadside deficiencies - narrow shoulders**
  - Shoulder and roadside deficiencies - alignment deficiencies - low Curve Radius
  - Shoulder and roadside deficiencies - alignment deficiencies - workzones
  - Shoulder and roadside deficiencies - alignment deficiencies - narrow shoulders
  - Shoulder and roadside deficiencies - alignment deficiencies - high grade
  - Shoulder and roadside deficiencies - alignment deficiencies - poor visibility - dark
  - Shoulder and roadside deficiencies - alignment deficiencies - poor visibility - fog

- **Risks associated with safety barriers and obstacles**
  - Shoulder and roadside deficiencies - safety barriers & obstacles
  - Shoulder and roadside deficiencies - alignment deficiencies - Poor visibility - dark
  - Shoulder and roadside deficiencies - alignment deficiencies - Poor visibility - fog

- **Road composition (VRUs only)**
  - High risk sites treatment
  - Road safety audits & inspections
  - Implementation of median
  - Installation of rail-guard
  - Installation of traffic calming schemes (b)
  - Dynamic speed limits
  - Implementation of traffic calming schemes
  - Dynamic speed limits
  - Installation of chevron signs
  - Traffic signal installation;
  - Traffic signal maintenance
  - Convert at grade junction to interchange
  - Sight distance treatments
  - Automatic barriers installation
  - Dynamic speed limits
  - Creation of by-pass roads

- **Cost benefit analyses**
  - Road safety audits - light measure case
  - Road safety audits - heavy measure case
  - High-risk intervention
  - Dynamic speed limits
  - Shoulder control
  - Installation of speed cameras
  - Implementation of section control & speed cameras
  - Installation of traffic calming schemes (b)
  - Shoulder implementation (shoulder type)
  - Increase shoulder width
  - Safety barriers installation; change type of safety barriers
  - Create clear-zone / remove obstacles & Increase width of clear-zone
  - Traffic sign installation; Traffic sign maintenance
  - Variable message signs
  - Sight distance treatments

**The SafetyCube “infrastructure” inventory includes:**

- 240 coded studies on infrastructure risk factors and 260 studies on infrastructure measures.
- Overall 50% of the studies were published after 2012, 75% after 2007
- 28% of risk factor studies and 43% of measures studies originated from Europe
- 39 synopses (5 meta-analyses) for infrastructure risk factors, 48 synopses (>35 meta-analyses) on infrastructure measures
- 19 Cost Benefit Analyses on selected measures

**Focus: Infrastructure “hot topics”**

- Workzone length
  - Alignment deficiencies - absence of transition curves
  - Shoulder and roadside deficiencies - alignment deficiencies - narrow shoulders
  - Shoulder and roadside deficiencies - alignment deficiencies - poor visibility - dark
  - Shoulder and roadside deficiencies - alignment deficiencies - poor visibility - fog

- Dynamic speed limits
  - Dynamic speed display signs
  - Installation of section control & speed cameras
  - Installation of speed humps
  - Implementation of lighting & improvement of existing lighting
  - Workzones: Signage installation and improvement
  - Shoulder implementation (shoulder type)
  - Increase shoulder width
  - Safety barriers installation; change type of safety barriers
  - Create clear-zone / remove obstacles & Increase width of clear-zone
  - Traffic sign installation; Traffic sign maintenance
  - Variable message signs
  - Sight distance treatments

**Cost-benefit analyses**

- Road safety audits - light measure case
  - Road safety audits - heavy measure case
  - High-risk intervention
  - Dynamic speed limits
  - Shoulder control
  - Installation of speed cameras
  - Implementation of section control & speed cameras
  - Installation of traffic calming schemes (b)
  - Shoulder implementation (shoulder type)
  - Increase shoulder width
  - Safety barriers installation; change type of safety barriers
  - Create clear-zone / remove obstacles & Increase width of clear-zone
  - Traffic sign installation; Traffic sign maintenance
  - Variable message signs
  - Sight distance treatments

**Ranking of measures cost-effectiveness**

- Road safety audits - light measure case
  - Winter maintenance
  - Automatic barriers installation
  - Installation of chevron signs
  - Installation of traffic calming schemes (b)
  - Dynamic speed limits
  - Installation of traffic calming schemes
  - Implementation of 30-zones

- Road safety audits - heavy measure case
  - Traffic signal installation - highways
  - Automatic barriers installation
  - Traffic signal installation - highways
  - Traffic signal installation - highways
  - Traffic signal installation - highways
  - Traffic signal installation - highways
  - Traffic signal installation - highways
  - Traffic signal installation - highways
  - Traffic signal installation - highways
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