



Twin-Safe: Advancing Road Safety Through Twinning

Summary of Deliverable 4.3

Materials on road safety assessment methodologies ("Train the Trainer")

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Document summary

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Lead Beneficiary	University of Zagreb Faculty of Transport and Traffic Sciences
Responsible Author	Marko Ševrović, Leonid Ljubotina
Contributions from	University of Zagreb, Faculty of Transport and Traffic Sciences: Dario Babić, Marko Ševrović, Leonid Ljubotina, Željko Šarić

Glossary and abbreviations

Word / Abbreviation	Description
FTTS	University of Zagreb, Faculty of Transport and Traffic Sciences
HU	Hasselt University
LU	Lund University
TWIN-SAFE	The project on the topic of Advancing Road Safety Through Twinning
CERTS	Centre of Excellence for Road Traffic Safety at FTTS
WP	Work package

Summary

Fourth work package of the TWIN-SAFE project entitled "Empowering the Centre of Excellence for Road Traffic Safety", is dedicated to boosting the further development of Centre of Excellence for Road Traffic Safety (CERTS) and the Faculty of Transport and Traffic Sciences University of Zagreb (FTTS) research capacities and expertise. However, due to the FTTS specific expertise in road safety, two activities (T4.5 and T4.6) of aforementioned work package are aimed to increase the expertise of the researchers from Lund and Hasselt University through "Train the Trainer" approach.

Within Task 4.5, FTTS shared their knowledge and expertise related to road safety assessment methodologies, gained through extensive work on national and EU projects such as NETSAFETY, RADAR, SLAIN and SABRINA and iRAP projects. In total five online workshops were organised between February and April 2025.

Workshop 1 - Workshop on iRAP Star Rating Assessment

The first workshop was held on February 14th 2025 and aimed to provide participants with a comprehensive understanding of iRAP methodologies, focusing on improving road safety through structured assessments. The session began with an introduction to iRAP and its connection to the Road Infrastructure Safety Management (RISM) Directive, followed by a discussion on the differences between Star Ratings and Risk Mapping, emphasizing how each approach contributes to road safety evaluation. Participants then explored road survey and data collection techniques, gaining insights into how data is gathered. The concept of road attribute coding was introduced, highlighting its importance in assessing road features and identifying potential hazards.

A significant portion of the workshop was dedicated to data processing in ViDA, iRAP's specialized tool for analysing road safety data. This was followed by an in-depth explanation of star ratings, helping attendees understand how iRAP star ratings measure road safety levels based on infrastructure and roadside features and how they are calculated.

The workshop also covered Safer Roads Investment Plans (SRIP), which provide identification of ways in which fatal and serious injuries can be improved in a cost-effective way. The session included a case study from Croatia, demonstrating the practical application of iRAP methodologies in Croatia and the project SLAIN. The workshop concluded with a Q&A and wrap-up session, allowing participants to clarify doubts and engage in discussions.

Workshop 2 – EU Network Wide Road Safety Assessment

The second workshop was held on February 28th 2025 and focused on the EU's Network-Wide Road Safety Assessment (NWRSA) methodology, developed by a consortium led by the National Technical University of Athens (NTUA). The methodology, mandated by the 2019 EU directive, aims to enhance road safety by assessing the entire road network. It incorporates both reactive and proactive approaches, with the former based on crash data. Developed through a literature review and pilot projects across EU countries, the methodology integrates data from various sources, including crash records, road layouts, and average daily traffic (ADT), to classify roads into safety categories.

The workshop covered the methodology's three key components:

- Reactive approach – focuses on crash occurrence and historical accident data.
- Proactive approach – evaluates road features and potential hazards to prevent accidents.
- Integration of results – combines both approaches to provide a more comprehensive road safety assessment. Additionally, the session showed the steps involved in both reactive and proactive

approaches, explaining the analysis process, including segmentation methods, road type identification, and data collection.

Lastly, the workshop included a case study from Croatia on the WRSA methodology and iRAP. The presenter analysed a specific road segment in Croatia, showing the data sources used, the results of proactive, reactive, and integrated methodologies, and their implications. Following this, the iRAP assessment of the same road segment was also discussed.

Workshop 3 - Road Safety Audits (RSA)

The third workshop was held on March 4th 2025 and began with an overview of Road Safety Audits, highlighting key differences between RSA and other safety assessments. Additionally, the workshop introduced the concept of the iRAP Star Rating Assessment, demonstrating how it complements RSA principles.

The objectives of road safety audits were outlined, along with a discussion on the composition and qualifications of RSA teams. Emphasis was placed on the expertise required to conduct thorough and effective audits.

A significant portion of the session was dedicated to four RSA audit phases, covering different stages of a project: preliminary and detailed design, construction completion, and post-opening monitoring. Each phase was explored through case studies, illustrating real-world applications and challenges in conducting effective road safety audits.

The four key RSA phases were detailed as follows:

- Phase I – Preliminary Design Stage: Focuses on design modifications to enhance safety, consideration of alternative alignments, and early-stage cost-benefit analysis.
- Phase II – Detailed Design Stage: Involves risk identification and analysis, particularly regarding horizontal and vertical traffic signage, protective guardrails and terminal systems, other traffic equipment, lighting, merging/diverging lane lengths, and traffic signal systems.
- Phase III – Completion of Construction: Conducted before the road is opened to traffic, this phase ensures that road features are built according to safety recommendations. It serves as the final opportunity for safety improvements.
- Phase IV – Post-Opening Monitoring: Focuses on safety assessments of user behaviour, analysis of crash data, and performance reviews.

The workshop concluded with a session on reporting and feedback mechanisms, detailing the structure of RSA reports and their role in improving road safety.

Workshop 4 - “Workshop on CycleRAP - Star Rating Assessment for Evaluating Road and Bicycling Infrastructure”

The fourth workshop was held on March 25th and provided an in-depth exploration of CycleRAP, a methodology designed to assess road and cycling infrastructure, reduce crashes, and enhance safety for bicyclists and other light mobility users.

The workshop started with an introduction to iRAP, highlighting its mission, global impact, and key collaborations. This was followed by an overview of iRAP’s research and innovation initiatives, including CycleRAP, which was initially piloted in the Netherlands in 2015, remodeled in 2020, and continuously refined based on global projects. The methodological approach was described and included the definition of the project scope and road extent, selection of the appropriate vehicle, equipment, and software, and determining key survey logistics such as inspection teams, health and safety measures, riding speed, working hours, congestion management, and accommodation planning.

Several key infrastructure rating factors were discussed, including narrow passages, uncyclable sections, poor infrastructure conditions, legal barriers, and route blockages. The process of flow and speed data collection was also demonstrated, with both manual and automated methods.

The next section introduced road attribute coding, featuring an integrated webGIS system with a coding tool application. The coding procedure involves systematically recording bicycle or light vehicle facility features in 10-meter segments. This iterative and detailed process captures attributes such as: facility type, facility access, flow direction, property access, curvature, intersections and operating speed.

The Safety Treatment Model (STM) was presented towards the end of the workshop. The CycleRAP Safety Treatment Model leverages collected data and risk scores to provide a prioritized list of recommended safety treatments for cycling routes. The model includes 25 treatments categorized into four groups, aimed at improving infrastructure and reducing crash risks.

To conclude the workshop, a case study from Fayetteville, USA, was presented. The study examined 15 cycling routes covering approximately 80 km, applying the CycleRAP methodology to assess safety and identify necessary infrastructure improvements.

Workshop 5 – Workshop on Accident data, use of statistical methods & monitoring - Croatian experience in „black spots” management

The final workshop took place on April 9, 2025, with the objective of sharing insights and strategies derived from Croatia's experiences in managing "black spots" through the application of accident data and statistical monitoring methods for road safety.

The presentation outlined a comprehensive methodology for identifying hazardous locations, detailing all essential steps including data collection, identification, site inspections, confirmation, proposal of remedial measures, implementation of improvements, and subsequent evaluation.

Furthermore, the session explored various statistical methods employed to pinpoint black spots, utilizing criteria such as accident frequency and rates. In addition, challenges posed by low-quality accident data and provided engaging demonstrations of crash tests featuring realistic crash dummies, highlighting the importance of accurate data for effective safety management.

The main part of this deliverable includes a set of workshop materials in form of presentations. These materials are designed to serve as valuable educational resources, primarily benefiting researchers from Lund University (LU) and Hasselt University (HU). Additionally, these resources provide learning materials for researchers and PhD students at the Faculty of Transport and Traffic Sciences University of Zagreb (FTTS). By engaging with these materials, researchers within TWIN-SAFE project will gain deeper insights into advanced road safety methodologies and international practices, thereby fostering academic growth and strengthening their expertise in the field.