6th German Conference on Rail Human Factors
18th/19th February 2025

Safety, Security, and Information Security: An Integrated Approach for Railway Operations

Katrin Fischer, Jonas Brüngger, Stefan Wahrstätter, Nicole Müller, Stefanie Weiss

Safety, security, and information security are critical components in the railway operations, where robust protection against accidents, sabotage, and cyberattacks is essential. Historically, these three domains have often been addressed in isolation, leading to conflicts in objectives and measures that can only be identified during incidents. This fragmentation poses challenges, as safety-driven measures may inadvertently compromise security or information security. Given the increasing complexity and interconnectivity of railway systems, along with shared threats and regulatory demands, an integrative approach to protection is imperative.

Human and organizational factors play a key role in this integration. Elements such as situational awareness, compliance with regulations, risk perception, and communication practices can significantly influence outcomes in railway operations. Therefore, a holistic examination of these factors is essential to leverage synergies, promote consistent safety, and enhance resilience against security incidents in the railway sector. This project focuses specifically on how regulatory authorities and railway operators can systematically identify and assess potential conflicts between safety, security, and information security. The aim of the ongoing research project is to develop theoretically grounded tools and instruments that encourage reflective and evaluative processes, facilitating an integrated view of safety measures critical to rail operations. These tools will not only raise awareness but also provide practical, implementable processes for embedding conflict assessments into the supervisory and operational workflows within railway systems.

Key research questions include how operators can integrate an integrated approach to safety, security and information security in railroad operations, how risk management tools should be designed to meet the challenges of integrated protection in this context, and how operators (as well as regulators) can systematically identify and assess potential conflicts between these areas.

Specific project aims include creating tools that enable a structured, theory-based evaluation of measures across safety, security, and information security, as well as establishing mechanisms for systematically incorporating conflict assessments into operational practices. These tools are intended to supplement traditional risk management, promote the reflection process between operators and supervisory authorities, support an integrated view of safety measures and help with conflict assessment.

Ultimately, the project aspires to enhance the understanding and development of human and organizational factors related to integrated protection in the railway transport. It aims to cultivate awareness of the necessity for an integrated approach by identifying and addressing conflicts arising from the diverse requirements of safety, security, and information security within the railway context. This comprehensive approach is designed to foster a culture of integrated safety that encompasses all three areas specifically rail operations.