Safe4RAIL

Safe architecture for Robust distributed Application Integration in roLling stock

MISSION

Safe4RAIL (Safe architecture for Robust distributed Application Integration in roLling stock) targets to provide the baseline for a fundamentally simplified embedded computing and networked Train Control Monitoring System (TCMS) platform for modular integration and certification for distributed hard real-time controls, safety signals and functions up to the highest Safety Integrity Level (SIL). Safe4RAIL will reinforce European competitiveness by offering fundamentally simplified electronic and train control and monitoring architectures required for the optimization of railway systems. The outcomes refer to the reduction of the number of on-board computing devices, improved reliability, shortening the integration and (re)commissioning times and thus life-cycle cost reduction, as well as the ability to implement the SIL4 functions in TCMS.

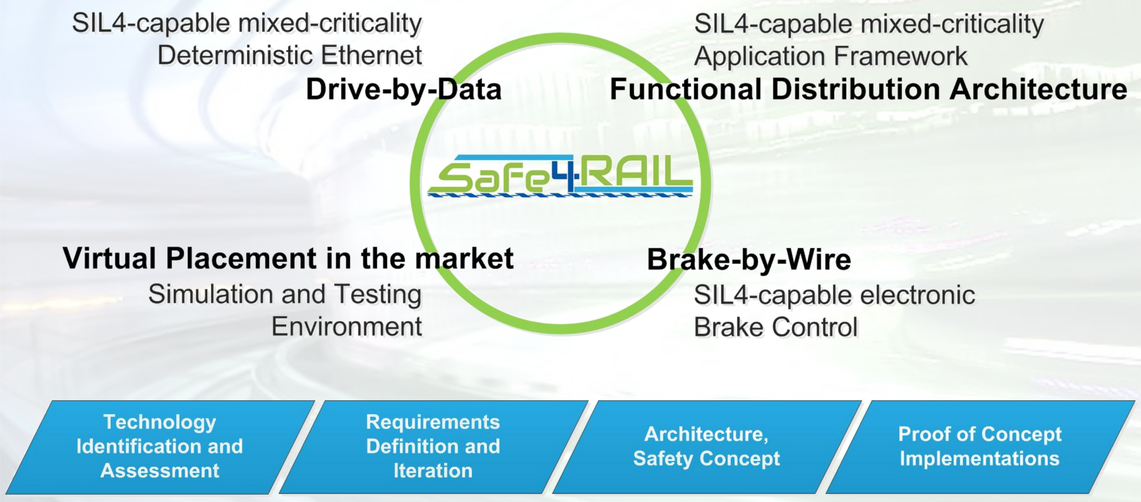
CONCEPT

The project Safe4RAIL aims to create safety concepts for mixed-critical Ethernet-based networking as well as a mixed-criticality application framework, including the brake-by-wire concept. The project will provide recommendations for standardization and certification of next generation TCMS embedded platform.

OBJECTIVES

In order to define the networking and application framework safety concepts, Safe4RAIL starts from cross-industry best practices, models of computation and embedded platform (computing, networking and software) technologies. These inputs lead to the development of proof-of-concepts that demonstrate the core components of the technology and ensures sustainable design of integrated modular architectures and next generation TCMS. The technology is demonstrated in the context of electronic train brake control based on a novel fully electronic architectural concept based on drive-by-wire technology. As a whole Safe4RAIL targets the following objectives:

- **Objective 1:** Configurable Mixed Criticality networking “Drive-By-Data” Concept
- **Objective 2:** Mixed Criticality Application Framework Concept
- **Objective 3:** Simulation and Testing Environment for distributed embedded railway systems
- **Objective 4:** Architecture and Safety concept for Brake-by-Wire (SIL4) utilizing the Networking- and Application Framework Concepts
- **Objective 5:** Modular Certification capability enabled by the distributed embedded railway platform and systems
- **Objective 6:** Contribution to safety – and technology standards for future European uptake



PROJECT PHASES

Phase 1 – State of the Art

The Safe4RAIL project starts with an exploratory inventory of technology and solutions from the aerospace, automotive and railway domains with regards to system-level, embedded platform with networking, computing, functional distribution, safety and security analyses.

Phase 2 – Requirements and Technology Assessment

The traceability of requirements is a baseline essential for the knowledge transfer, future system development and system platform demonstration activities. The concepts and methodology for the design, configuration, integration, analysis, simulation and verification of subsystems are as essential as the set of principles, components, and networking capabilities enabling the definition of advanced integrated systems, so that they can be certified and commissioned by railway authorities.

Phase 3 – Proof of Concepts and SIL4 Brake Use Case

The outcome of the activities will be validated by means of proof-of-concept demonstrators. The proof-of-concepts show the viability of the defined networks and embedded platforms for “drive-by-data” systems to host SIL4 functions and have all properties required for the TCMS system certification. The Brake-by-Wire activities and design concepts for electronics brake-by-wire system as an exemplary SIL4 can be placed and hosted on the same Safe4RAIL TCMS platform.

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Project start: 1st of October, 2016
Project duration: 2 years

This project has received funding from the Shift2Rail Joint Undertaking under grant agreement No. 730830. This Joint Undertaking receives support from the European Union’s Horizon 2020 research and innovation programme. The content of this poster reflects only the author’s view - the Joint Undertaking is not responsible for any use that may be made of the information it contains.