



Towards an affordable, resilient, innovative and high-capacity European Railway System for 2030/2050

To face the future challenge of increasing traffic and make the railway system more attractive and competitive, a step change is needed to guarantee an adaptable system, offering a high operational capacity with high reliability and resilience to hazards.

This step change will only be achieved through a global and combined optimisation of infrastructure, operation and vehicle performances.

Paving the way for the specification of future railway technologies and systems and bringing together the major stakeholders of Industry, Infrastructure managers, Railway Undertakings, Engineering and Academic sciences, CAPACITY4RAIL will contribute to the development of guidance documents identifying further actions to be taken and the future technologies and systems to be developed.

It will demonstrate that step change in railway infrastructure and operations may be achieved within the constraints of the need to maintain railway services while the work is being performed.

Facts and Figures

Total Budget: €15 million
(€9.9 M€ EU funded)
Duration: 48 months
Project Start Date: 01/10/2013
Project End Date: 30/09/2017
Partners: 46
Grant agreement n° 605650

Project coordination

International Union of Railways
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Website

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Project breakdown



SP1 – INFRASTRUCTURE

Infrastructure solutions for conventional mixed traffic and very high speeds; reduced maintenance and highly reliable switches

SP2 – FREIGHT

Modern, automated, intelligent and fully-integrated system for efficient, reliable freight operations

SP3 - OPERATION AND CAPACITY

- Traffic capacity modelling and simulation
- Resilience to disturbances
- Real time information to customers and operators

SP4 - ADVANCED MONITORING

Integration of Advanced Monitoring Technologies in the design and built-in process for an easier-to-monitor (self-monitoring) infrastructure with low cost and low impact inspection.

SP5 MIGRATION

- Vision and roadmap for 2050
- Scenarios for smooth migration to 2050
- Sustainability assessment of the developed solutions
- Demonstration
- Recommendations and guidelines

SP6 DISSEMINATION & TRAINING, EXPLOITATION AND MANAGEMENT

- Dissemination and publication of project results
- Training on project outputs
- Exploitation and implementation of innovation



How does C4R address the capacity issue?

IMPROVING THE SYSTEM'S PERFORMANCE

- Performance of very high speed systems: bridges and transition zones
- Speed of freight trains
- Carrying capacity of freight trains (longer) and wagons (larger)
- Improved transshipment procedures and facilities (marshalling yards, terminals)
- Improved traffic planning and operation: automated data exchange and reasoning

MAKING THE SYSTEM MORE RELIABLE AND RESILIENT: AVOIDING ACCIDENT AND MITIGATE TRAFFIC DISRUPTIONS

- Improved behaviour of bridges and transition zones at very high speed
- S&C design based on failure modes
- S&C resilient to natural hazards (extreme weather conditions)
- Development of failure detection for infrastructure and freight vehicles
- Intelligent vehicles
- Resilient operations: decision support systems and incident management plans

MAKING THE SYSTEM MORE AVAILABLE: ALLOCATING MORE TIME TO OPERATION

- Reduced construction time and maintenance for infrastructure
- Development of monitoring for condition-based maintenance
- Non-intrusive infrastructure monitoring techniques with low impact on traffic
- Self-monitoring and intelligent components



What will the project deliver?

MORE THAN 60 TECHNICAL DELIVERABLES WILL BE PRODUCED



SPECIFICATIONS

- Future slab track systems and new concepts for switches and crossings
- Set of desirable standards for wagons, locomotives, gauge, infrastructure design, train management and infrastructure management as well as connectivity.
- Use of sensors in railway environments and backlash-free wireless transmission



GUIDANCE DOCUMENTS

- Combined RAMS- and cost-oriented design of infrastructure
- Design of track systems and subgrade resilient to flood; design of bridges for very high speeds
- New Concepts and technologies for optimised slab track and self-monitoring switches
- Freight terminal design
- Efficient freight vehicle systems,
- Fully integrated rail freight systems
- Incident and emergency management including extreme weather situations
- Roadmap for automation of traffic management systems.
- Advanced monitoring and future design-to-monitor construction philosophy



DEMONSTRATION

- New concepts of self-monitoring switches
- Innovative slab track system
- Retro-fit monitoring systems and system integration

The consortium

CAPACITY4RAIL has brought together a diverse range of 46 stakeholders in an ambitious partnership: manufacturers, railway operators, world-leading research organisations and specialist technology providers.

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