

Shift2Rail JU Funded IP3 Projects IN2SMART, IN2TRACK and S-CODE jointly held their Mid-Term Conference in Paris on 24 January 2018

“Cost-efficient and reliable high-capacity infrastructure”

The joint Mid-Term Conference of IN2SMART, IN2TRACK and S-CODE, three Shift2Rail JU co-funded projects working within Innovation Programme 3 of the Multi Annual Action Plan, was held on 24 January 2018 at UIC in Paris.

Attended by more than 110 participants from 22 countries across the European railway community and beyond, the IN2SMART, IN2TRACK and S-CODE Joint Mid-Term Conference was the opportunity to share the initial results and plans of the three projects to ensure continued continuity and collaboration within the work of IP3, and to communicate Shift2Rail’s ambition for the IP3 Technical Demonstrators. IN2SMART is coordinated by Ansaldo STS, IN2TRACK is coordinated by Trafikverket and the coordinator of S-CODE is the University of Birmingham.

The conference was opened with introductory speeches by Professor Clive Roberts, Director of the Birmingham Centre for Railway Research and Education at the University of Birmingham and Mr Giorgio Travaini, Head of Research & Innovation a.i. at the Shift2Rail JU.

Mr Travaini introduced the Shift2Rail Multi Annual Action Plan (MAAP), which is a collaborative long-term investment planning document, which provides the Shift2Rail vision and capabilities.

Mr Travaini explained how IN2SMART, IN2TRACK and S-CODE each contribute to the achievement of the Shift2Rail Master Plan and the MAAP objectives. He also stressed the importance of cooperation between the projects and ongoing collaboration to ensure that there is no duplication of work in current and future research and innovation projects. Events such as this Mid-Term conference enable sharing of information between projects and with the wider railway community and enhance collaborative working, ensuring complementarity and coherence between the projects.

Featuring a broad range of activities within the IP3 Technical Demonstrators, the joint conference presented an excellent opportunity to present the results of the technical projects:

- [IN2SMART](#): Intelligent Innovative Smart Maintenance of Assets by Integrated Technologies
- [IN2TRACK](#): Cost-Efficient and Reliable High-Capacity Infrastructure
- [S-CODE](#): Switch and Crossing Optimal Design and Evaluation



Opening of the mid-term conference with (from left to right): Prof Clive Roberts, Moderator, University of Birmingham;

Mr Giorgio Travaini, Shift2Rail JU;

Mr Andy Doherty, Chief Rail Technology Officer at Network Rail



The conference highlights, can be summarised as follows:

IN2SMART

IN2SMART represents the first proposal of the Shift2Rail members referred, according to MAAP, to the following Technology Demonstrators (TDs): TD3.7 Railway Information Measuring and Monitoring System (RIMMS), TD3.6 Dynamic Railway Information Management System (DRIMS) and TD3.8 Intelligent Asset Management Strategies (IAMS). These TDs will deploy an overall concept for Intelligent Asset Management based on the following three main interlinked layers: Measuring and Monitoring systems to collect data from the field related to the railway assets status: IN2SMART will develop unmanned systems for “remote” monitoring; track geometry, switches & crossings and signalling monitoring systems; innovative measurement of train parameters and wheel defects combined with rolling stock identifications systems.

Data management, data mining and data analytics procedures to process data from the field and from other sources: IN2SMART will develop standard open interfaces to access heterogeneous maintenance-related data; analytic tools to automatic detect anomalies, discover and describe maintenance workflow processes and predict railway assets decay towards prescriptive maintenance.

Degradation models and decision-making tools to support maintenance strategies and execution: IN2SMART will lay the foundation of a generic framework for asset management and decision support process. This framework will specify the scope, objectives, workflow and outcomes of the decision-making process for maintenance interventions planning, and will be the enabler for the development of future decision support tools and systems. IN2SMART will also develop an optimised tamping tool and a robot platform for maintenance works.

IN2TRACK

This project is working to develop new methods and techniques to optimise the track systems, improve the operational performance of existing switches and crossings and extend the life of bridges and tunnels, researching new methods for maintaining and upgrading these structures. This project focuses on developing new, more accurate methods for inspection and assessment of structures. IN2TRACK is developing new techniques for repair and upgrade to reduce traffic disruption, and the project is working on methods to reduce noise and vibration. The project focuses on developing safer methods of assessment for tunnels and bridges that include the use of embedded sensors for self-diagnostics and condition monitoring.

Early results were presented. These included the ability to create test specimens with a microstructure very similar to the severely deformed surface layer of an operational rail, an investigation of grinding induced rail damage, evaluation of requirements for bituminous layers in the track substructure, evaluation of operational damage on bainitic rails, and a first investigation of an innovative method to demolish slab for repairs.

S-CODE

The overall aim of the S-CODE project is to investigate, develop, validate and initially integrate radically new concepts for switches and crossings that have the potential to lead to increases in capacity, reliability and safety while reducing investment and operating costs.

S-CODE is working to identify radically different technology concepts that can be integrated together to achieve significantly improved performance for S&C based around new operating concepts, such as super-fast switching and a self-healing switch.

The work programme for S-CODE is divided into three phases:

- ✓ Phase 1: Requirements and initial design
- ✓ Phase 2: Technical development
- ✓ Phase 3: Demonstration and evaluation

- Phase 1 of the project comprised best practice assessment, requirements elicitation, horizon scanning, architecture development and high level design. This work produced high level concepts that are now being further developed into technology designs in Phase 2. In Phase 3 of the project, which begins in August 2018, the most promising design concepts from Phase 2 will be taken forward for validation. The validation process will enable evaluation and assessment to be undertaken, either by modelling or in a laboratory, and final solutions to be integrated.

- Phase 2 of the project, which is the current phase, is focused on the detailed technical design of the three main subsystems (control, design, kinematic actuation). The overall aim of this current phase of work is to develop fault tolerant, low-LCC, low-carbon, low-maintenance turnout components and subsystems, through the use of novel materials, processes, electronics, signal processing and mechatronic design concepts as identified in Phase 1. A number of different design concepts are being developed for each subsystem, with the most promising designs being taken forward for detailed development in the second phase of work in TD3.2.

The conference was concluded with a round table discussion, led by Professor Clive Roberts (University of Birmingham) and which was composed of: Mr Federico Papa (Ansaldo STS), Mr Carlo Crovetto (Ansaldo STS), Mr Sam Berggren (Trafikverket) and Mr Andy Doherty (Network Rail) representing the projects, as well as Mr Giorgio Travaini, representing the Shift2Rail JU and Mr Simon Fletcher, representing UIC.

The round table served to reflect on the results achieved to date in the projects, to debate potential areas of research focus in the second phase of the projects and also to discuss how the projects will move forward in future collaborative research activities, within the framework of Shift2Rail.

In conclusion, the Shift2Rail JU Funded IP3 Projects IN2SMART, IN2TRACK and S-CODE Joint Mid-Term Conference was an opportunity to share details of the research focus in the projects, to ensure a collaborative approach is adopted and to focus on the potential to use the results achieved in future research work.

All of the presentations made during the conference are now available at: <http://bit.ly/2rGfXm7>.

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