



Shift2Rail JU Funded IP3 Projects  
IN2SMART / IN2TRACK / S-CODE  
**Mid-Term Conference**

24 January 2018  
UIC / Paris

*An event co-organised by:*





24 January 2018, UIC, Paris

Moderator: Prof. Clive Roberts, University of Birmingham

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## Programme

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**08:30-09:00**    *Registration*

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**09:00-09:05**    **Opening and Welcome**

Prof. Clive Roberts, University  
of Birmingham

**09:05-09:30**    **Introduction**

Mr. Giorgio Travaini, Shift2Rail  
Joint Undertaking

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### **IN2SMART**

**Introduction to the project**

Mr. Carlo Crovetto, Ansaldo STS

**Introduction to the Intelligent Asset  
Management System (IAMS) Decision  
and activities Flowchart**

Mr. Federico Papa, Ansaldo STS

**09:30-11:00**

**IAMS Data Architecture**

Mr. Federico Papa, Ansaldo STS

**IAMS Monitoring Systems**

Mr. Roald Lengu, Ansaldo STS

**IAMS Asset Management Procedures**

Mr. Henk Samson, Strukton Rail

**IAMS Story Board and Use Cases**

Mr. Benoit Guyot, SNCF and  
Andy Kirwan, NR as storyboards  
referents

**Conclusions**

Mr. Carlo Crovetto, Ansaldo STS

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**11:00-11:20**    *Coffee Break*

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### **IN2TRACK**

**Introduction**

Mr. Sam Berggren, Trafikverket

**11:20-12:50**

**Enhanced switches and crossings**

Dr. Ian Coleman, Network Rail

**Enhanced track**

Dr. Anders Ekberg, Trafikverket

**Structures**

Mr. Carlos Hermosilla, Acciona

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**12:50-14:00** *Lunch break*

**S-CODE**

<b>14:00-15:30</b>	<b>Introduction to S-CODE and overview of Phase 1 of the project</b>	Prof. Clive Roberts, University of Birmingham
	<b>Next generation control: monitoring and sensing systems</b>	Dr. Edd Stewart, University of Birmingham
	<b>Next generation design: materials and components</b>	Ing. Lukas Raif, DT - Výhybkárna a strojírna, a.s.
	<b>Next generation kinematic systems: actuators and mechatronics</b>	Prof. Roger Dixon, Loughborough University
	<b>Conclusions and next steps</b>	Prof. Clive Roberts, University of Birmingham

**15:30-15:50** *Coffee break*

**15:50-17:00** **Round table, wrap-up and conclusions**

**17:00** *Meeting close*

**Information and contact:**

For more information about the projects, please contact:

<b>IN2SMART</b>	<b>IN2TRACK</b>	<b>S-CODE</b>
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# INTRODUCTION TO SHIFT2RAIL INNOVATION PROGRAMME 3: COST-EFFICIENT AND RELIABLE HIGH-CAPACITY INFRASTRUCTURE

## CHALLENGE

The design, construction, operation and maintenance of rail network infrastructure has to be safe, reliable, supportive of customer needs, cost-effective and sustainable. Furthermore, to deliver the benefits of market opening and interoperability and to reduce the life-cycle costs of rolling stock and on-board signalling systems, there needs to be a (gradual) elimination of network diversity through a migration towards a common high-performing infrastructure system architecture.

Infrastructure accounts for approximately one-third of the railway's operating costs; EU Member States spent between EUR 29 billion and EUR 34 billion on railway infrastructure in 2012.

A significant part of these costs is related to labour-intensive maintenance, most of which is preventive, although ad hoc interventions are also needed when faults occur — and these can be particularly costly and disruptive. Taking into account the ageing of existing infrastructure and the expected growth in passenger and freight volumes (+ 34 % and + 40 % in 2030 respectively, compared to a 2005 baseline), shorter infrastructure access times, maintenance needs and costs are likely to increase significantly in the coming years. Therefore, Shift2Rail must first and foremost focus on activities to support the reduction of these maintenance costs (such as simplified procedures or automation), and on solutions that can be rapidly and efficiently deployed.

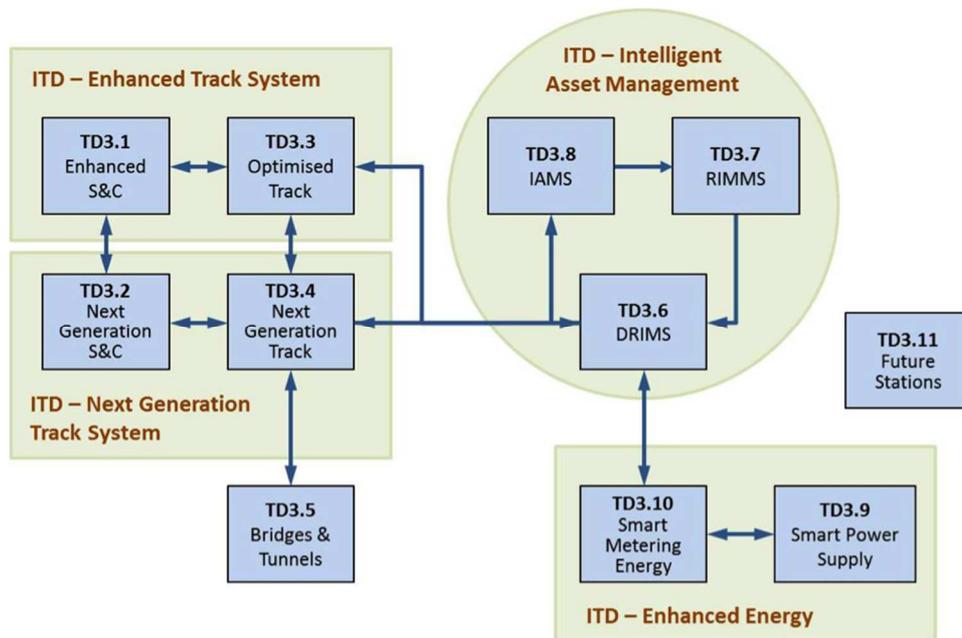
At the same time, many parts of existing railway infrastructure (railway lines, stations and terminals) are nearing maximum capacity or are incapable of offering users and customers the level of service they demand. There is thus a need for a step change in the productivity of infrastructure assets. These will have to be managed in a more holistic and intelligent way, using lean operational practices and smart technologies that can ultimately help improve the reliability and responsiveness of customer service, as well as the capacity and overall economics of rail transportation.

Lastly, in order to support vital pan-European rail corridors and co-modal links, and offer a smart and competitive alternative to short and medium-distance flights and water and road-borne freight flows, rail infrastructure must ensure compatibility between infrastructures (interoperable and standardised infrastructure), as well as with other modes (intermodal infrastructure, including stations and passenger and freight hubs).

## IP3 Innovations and ambitions

Work in IP3 is organised around the following Technical Demonstrators (TDs) covering all R&I areas indicated in the Shift2Rail Master Plan: Enhanced Switch & Crossing System, Next-Generation Switch & Crossing System, Optimised Track System, Next Generation Track System, Proactive Bridge and Tunnel Assessment, Repair and Upgrade, Dynamic Railway Information Management System, Railway Integrated Measuring and Monitoring System, Intelligent Asset Management Strategies, Smart Power Supply, Smart Metering for Railway Distributed Energy Resource Management System and Future Stations.

The 11 TDs are strongly interrelated and they are clustered together into Integrated Technology Demonstrators (ITDs).



The work in IN2SMART is part of TD3.6, TD3.7, TD3.8, IN2TRACK is linked to TD3.1, TD3.3, TD3.5 and S-CODE is covering TD3.2.



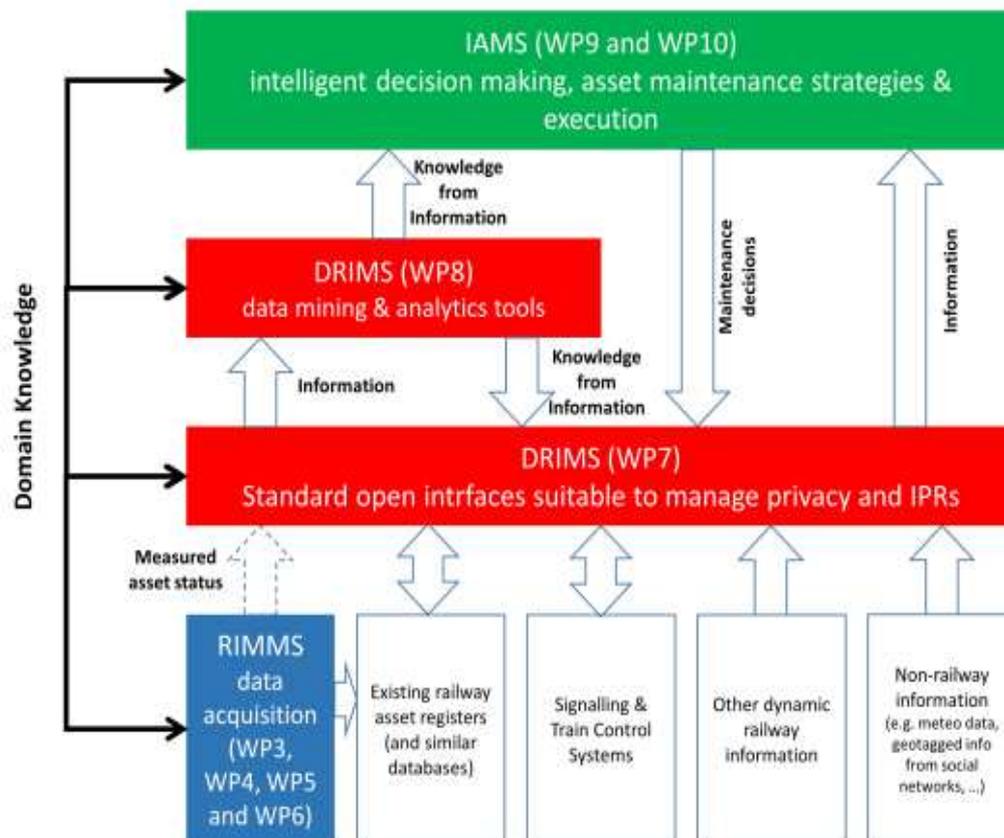
## Intelligent Innovative Smart Maintenance of Assets by integRated Technologies

IN2SMART aims to contribute to the overall concept for Intelligent Asset Management based on the following three main interlinked layers:

- Measuring and Monitoring systems to collect, process and aggregate a set of heterogeneous railway asset status data, by developing (when necessary) or applying specific monitoring systems or data diagnostic collection techniques.
- Data management, data mining and data analytics procedures to process data from the field and from other sources by applying standard open interfaces to access heterogeneous maintenance-related data and developing analytic tools to automatic detect anomalies and predict railway assets decay towards prescriptive maintenance.
- Decision making, maintenance strategies and execution procedures to develop a generic framework, based on the combination of traditional and data driven degradation models to pave the road for future decision support tools and systems.

IN2SMART will complement the work of the IN2RAIL lighthouse project to reach a homogeneous TRL4/5 demonstrator.

**Facts and figures:**  
 Total budget: €16,4 million  
 (€7,3 million funded)  
 Duration: 36 months  
 Project start date: 01/09/2016  
 Project end date: 30/09/2019  
 Partners: 22  
 Project coordinator: Ansaldo STS



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This project has received funding from the Shift2Rail JU under the European Union's Horizon 2020 research and innovation programme under grant agreement No: 730569

The main objective of IN2TRACK project is to set the foundations for a resilient, consistent, cost-efficient, high capacity European network by delivering important building blocks that unlock the innovation potential that have been identified as part of the Shift2Rail Innovation Programme 3.

Overall objectives of IN2TRACK are divided into three parts:

- Enhancing and optimising the switch & crossings and track systems in order to ensure the optimal line usage and capacity;
- Investigating novel ways of extending the life of bridges and tunnel assets through new approaches to maintaining, repairing and upgrading these structures;
- Development and adoption of a holistic, whole system-approach.

A whole-system approach, which is defined as the system boundaries extending from dynamic wheel-rail interaction (loading input) through to degradation of the S&C system, sub-systems, individual components, and underlying track foundation, will also be at the heart of IN2TRACK on how to reach the objectives.

**Facts and figures:**

Total budget: €6,4 million  
(€2,8 million funded)

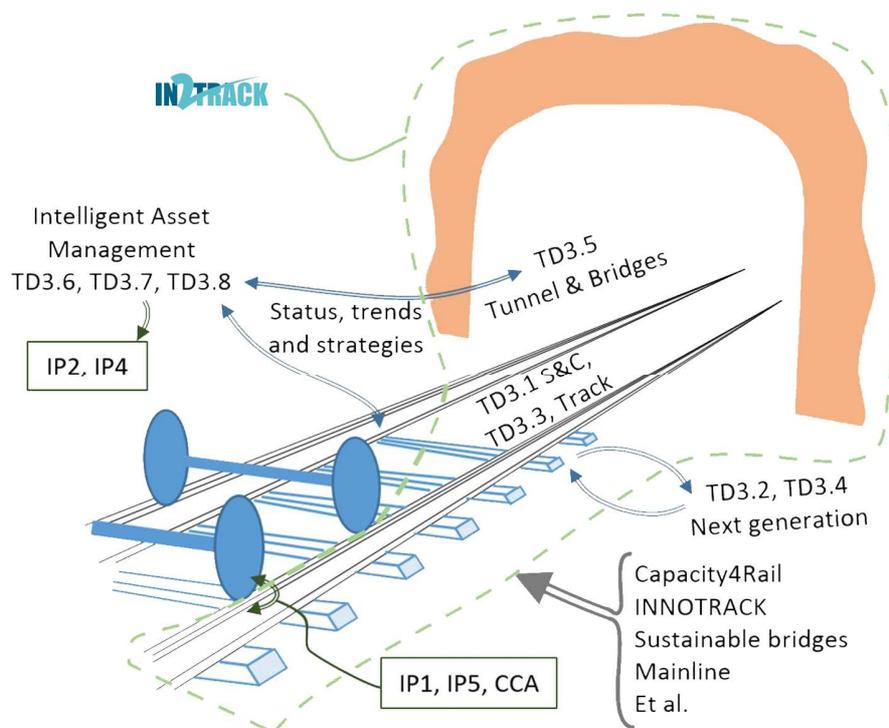
Duration: 30 months

Project start date: 01/09/2016

Project end date: 28/02/2019

Partners: 25

Project coordinator: Trafikverket



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.

The S-CODE project will build on existing European and national research projects (in particular, the lighthouse project In2Rail, Capacity4Rail and Innotrack) to identify radically different technology concepts that can be integrated together to achieve significantly improved performance for S&C based around new operating concepts (e.g. super-fast switching, self-healing switch).

**Facts and figures:**  
 Total budget: €5 million (€5 million funded)  
 Duration: 36 months  
 Project start date: 01/11/2016  
 Project end date: 31/10/2019  
 Partners: 9  
 Project coordinator: University of Birmingham

The project is divided into three phases:

- **Phase 1:** Requirements and initial design – focusing on understanding constraints and critical requirements, and developing a radically different architecture and operation that makes use of technologies from other domains;
- **Phase 2:** Technical development – undertaking detailed modelling and simulation to identify an optimal configuration to maximise performance;
- **Phase 3:** Validation and evaluation–testing (to TRL4) the design concepts and formally evaluating their performance so that an integrated design can be presented for further development.

