

# OPTI YARD

Optimised  
Real-time Yard  
and Network  
Management

*OptiYard will provide decision support tools to Yard Managers that consider the surrounding network, in a view to ensure smooth marshalling that is essential for the global efficiency of the transport chain.*



This project has received funding from the Shift2Rail Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 777594





## PROJECT OVERVIEW

OptiYard will provide decision support tools to Yard Managers that consider the surrounding network, in a view to ensure smooth marshalling that is essential for the global efficiency of the transport chain.

The Commission's 2011 White Paper states that by 2050, rail should substantially expand its modal share over medium and long distances. This is consistent with the Policy goals of expanding rail capacity and cost reduction, both cited in the Horizon 2020 and Shift2Rail (S2R) calls. Considering the ambitious Horizon 2020 Key Performance Indicator (KPI) calling for a surge in the utilisation of capacity within a range of 70-90%, yards, hubs and terminals play a key role in facilitating this step-change by contributing to a competitive, reliable and safe freight transport, thus making Rail the preferred modal choice. As yards are the first and last points of the rail journey, they must be easily accessible and fully adapted to efficient operations.

The Optiyard decision support tool will greatly contribute to meeting the Commission Policy objectives.



## FACTS AND FIGURES

Total Budget: €1,5 million  
(1,5€ million funded)

Duration: 24 months  
Project Start Date: 01/10/2017  
Project End Date: 30/10/2019

Partners: 13 from 7 countries

Grant agreement n° 777594

## PROJECT COORDINATOR

International Union of Railways,  
UIC

## WEBSITE

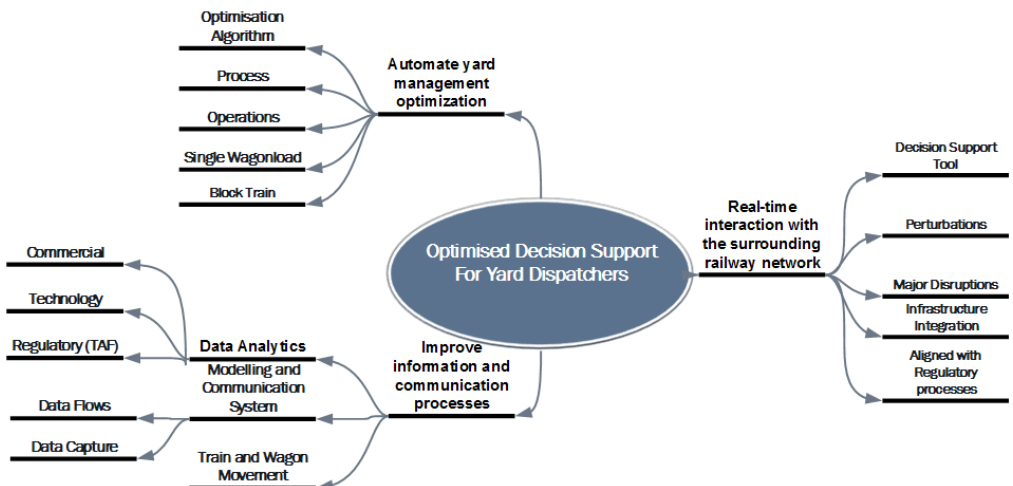




## OPTIYARD OBJECTIVES

OptiYard uses a three-pronged approach to develop an optimised decision support system for yard dispatchers by:

- 1 Providing enhanced, automated yard management by analysing existing process and operations and developing appropriate optimisation algorithms to improve operations for both single wagon load and block train traffic;
- 2 Improving information and communications processes between the Yard Management System, the RUs and Network (IM) by analysing data feeds and modelling an enhanced communications environment;
- 3 Enhancing real-time interaction with the surrounding network, giving the yard dispatcher better visibility of pending perturbations and major disruptions to the yard production schedule.



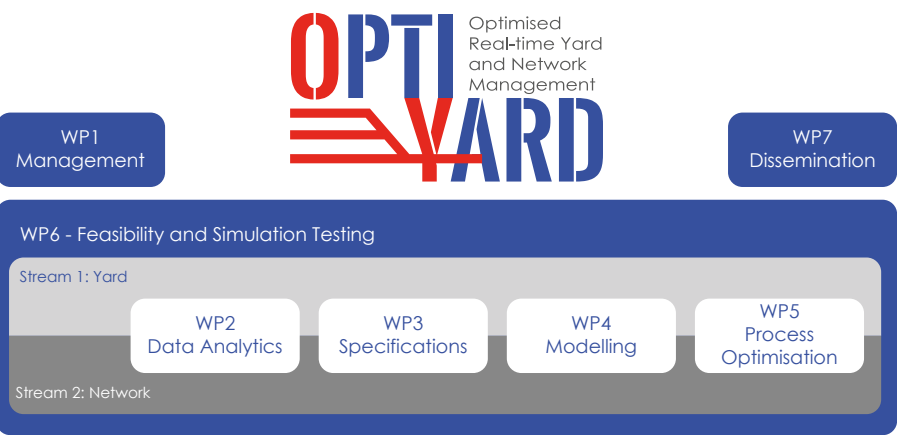


## PROJECT

The project is broken down into four technical work packages that follow in order:

1	2	3	4
Data analytics addressing current data handling capabilities as well as identifying new data models needed for the yard management system optimisation	Development of specifications that apply to the new optimisation modules	Dual modelling of the yard and network environments	Process optimisation

These work packages will lead to demonstrations at the Česká Třebová hump yard in the Czech Republic and the Port of Trieste rail yard in Italy. These demonstrations will validate that the OptiYard innovation can be applied to all types of marshalling yards throughout Europe, handling both single wagon load and block train operations.





## OPTIYARD KEY OUTPUTS

**In order to improve capacity and service reliability, OptiYard will produce:**

- an innovative algorithm to automate and optimise the organisation of the processes to be performed in a marshalling yard;
- a novel decision support tool providing network information to the optimisation algorithm and enabling improved ad-hoc timetabling and traffic management in the rail network surrounding the yard;
- a state-of-the-art yard simulation platform compatible with short term innovations, in order to achieve improved modelling and communication systems, and to integrate optimised decisions into the real-time simulation;
- a technical demonstrator in the form of a fully functional software module to show how the developed intelligent real-time simulation can provide concrete and validated optimal decision support for dispatchers in yards, with a link to network management;
- new effective structures for the flows of data towards and from the terminals, necessary for communication and information sharing with infrastructure managers and railway undertakings.



## OPTIYARD BENEFITS

### **The expected impacts of this innovative approach will be:**

- incorporation of real-time ETA and ETD in yard operations and in network management;
- improvement of punctuality and reliability and precise prediction of the estimated time of each train and wagon operation;
- flexibility to link predicted ETD to available timetable slots and to inform the yard staff to prepare the train for both single wagon and block train operation.

### **The implementation of Optimised Decision Support for dispatchers will be profitable for:**

- Wagon owners, through an increased possibility of asset utilisation;
- Yard Managers through increased safety, capacity and efficiency of yard operations;
- Infrastructure Managers in order to optimise capacity and planning;
- Shippers with a more reliable freight transport which will enable them to benefit from a more reliable supply chain, thus giving enhanced attractiveness to rail;
- RUs by giving the opportunity to reduce idle time of their assets.



## OPTIYARD INNOVATION PROPOSITION

The optimisation module and algorithms will be proven for large and complex freight transport networks, and integrate well with Shift2Rail IP5 activities towards automation, e.g., intelligent assets and automated shunting and mainline operations.

The major innovation and value proposition of OptiYard is illustrated in the opposite diagramme.

In current practice, the yard management receives manually transferred information on the progress of the train from the IM. Moreover, information on train composition typically arrives quite late. This forces yard managers to preserve extra resources to face unexpected constraints due, e.g., to the volume and the concentration of arrivals, to operate safely and effectively. OptiYard brings the digital world to yard management.

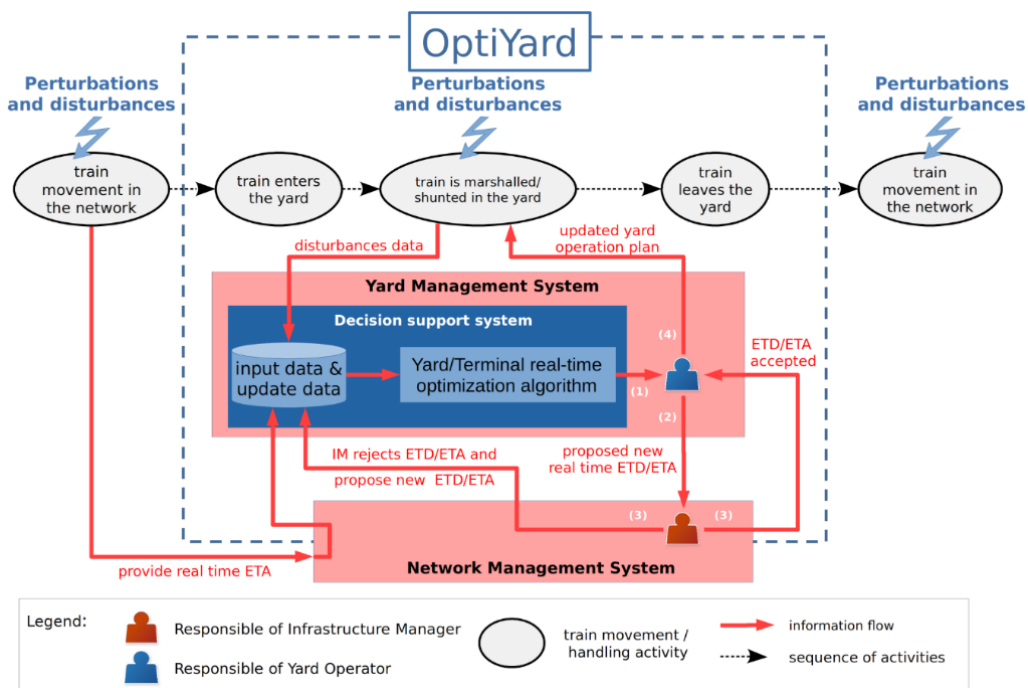
### **OptiYard enables:**

- long distance monitoring of incoming trains from the external network on screens enabling to prepare pre-advanced work planning;
- interaction with the IM to obtain a more accurate ETA as soon as the train enters the relevant network, enabling refined planning. This is done thanks to an algorithm enabling optimised operations and to return a new proposed ETD and ETA to the IM;
- interaction with the IM to find the best possible solution for yard management, train management and the client's demands;
- interaction with the IM using real-time optimisation to deal with unexpected events during the approach of the train or the operation in the yard. Thanks to the OptiYard decision support tool, yard management is able to reset a work plan and new ETD and ETA accepted by the IM, thus enabling the client to have accurate updated information on the situation and the future progress of the train.





This innovative approach will enable stakeholders to optimise the use of the network capacity and yard resources whilst enhancing client satisfaction through delivery of accurate and timely information.

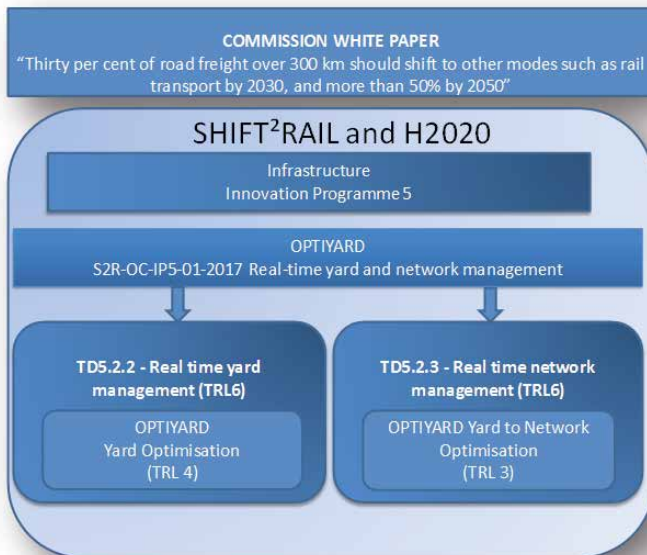




## RELATIONSHIP TO THE S2R PROGRAMME

OptiYard specifically falls under Innovation Programme (IP) 5 – Technologies for Sustainable & Attractive European Rail Freight. The intention is to deliver outputs at this level to be taken forward in the project addressing the Shift2Rail members-only call S2R-CFM-IP5-01-2011, “Startup activities for freight automation”.

OptiYard will focus on lower Technology Readiness Level (TRL) development, up to TRL4, and by the end of the project will be ready to deliver outputs to rail industry partners who are better placed to take these forward to higher TRL demonstration, and then to deployment.





## CONSORTIUM

1	Union Internationale des Chemins de fer - Coordinator	UIC	France
2	SAPIENZA Università di Roma	DICEA department	Italy
3	Institut français des sciences et technologies des transports, de l'aménagement et des réseaux	IFSTTAR	France
4	Union Internationale pour le transport combiné Rail-Route	UIRR	Belgium
5	University of Newcastle Upon Tyne	UNEW	United-Kingdom
6	University of Leeds	LEEDS	United-Kingdom
7	CD cargo a.s.	CD Cargo)	Czech Republic
8	EURNEX e. V.	EURNEX	Germany
9	Oltis Group	OG	Czech Republic
10	NEW OPERA AISBL	NEW OPERA)	Belgium
11	Simcon	SIMCON	Slovakia
12	Technische Universitaet Dresden	TUD	Germany
13	Adriafer srl.	ADRIA FER	Italy



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## DISSEMINATION

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