OptiYard

Optimised Real-time Yard and Network Management

Newsletter

February 2019

Foreword

The OptiYard project started on October 1st, 2017 with a duration of 24 months. OptiYard's consortium is composed of 13 partners from 7 European countries. Partners are working on providing decision support tools to yard managers that consider the surrounding network. The project is now in its second period. Here is the latest issue of the OptiYard project newsletter.

This newsletter gives the project partners the opportunity to present some of the results achieved so far within the four technical work packages (WP2 to WP5). These include the detailed analysis of the two case studies (Trieste Campo Marzio, Italy and Česká Třebová, Czech Republic) to simulate intelligent real-time yard operations, the analysis of real-time interaction with the surrounding railway network, and a comprehensive analysis of actual information and communication processes, to define improved strategies for two-way interactions between yard and network in real-time.

Work package 6 (business cases – Feasibility & Simulation Tests) has begun in month 13, and its results will be presented in mid-2019.

OptiYard is collaborating with the complementary Shift2Rail project FR8HUB.

Shift2Rail

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

FACTS AND FIGURES

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

Duration
24 months

Project Start Date
01/10/2017

Project End Date
30/09/2019

Partners
13 from 7 countries

Grant agreement
n° 777594

PROJECT COORDINATOR

International Union of Railways
UIC

WEBSITE

Shift2Rail JU Funded IP5 project OptiYard mid-term conference in Paris

This event has given the thirteen partners of the consortium an excellent opportunity to share the initial results achieved during the first twelve months of the project and to discuss future plans to ensure continuity and collaboration within the work of IP5, and to communicate Shift2Rail's ambition for the European rail freight.

Mr. Giancarlo De Marco Telese, coordinator of the project, presented the project's context and its main objectives. Mr. Lucas Garvia, Shift2Rail JU OptiYard project officer, then presented the Shift2Rail vision and its current implementation and highlighted the high expectations of the Shift2Rail JU for OptiYard to contribute to the development of the railway freight sector.

Results of Work packages 2 to 5 were presented and amply discussed. All of the presentations made during the conference are now available on the OptiYard website at: https://optiyard.eu/downloads/.

Coming Event

More information about the OptiYard final Conference will be available soon on the OptiYard website and on our twitter feed.

For more information or if you wish to be added to our project mailing list, please contact Ms. Christine Hassoun at hassoun@uic.org.

Website: https://optiyard.eu/ - Twitter: @OptiYard

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WP2 - *Data Analytics addressing current data handling capabilities as well as identifying new data models needed for the yard management system optimisation*

Leading partner: University of Newcastle Upon Tyne

Task 2.1	Rail freight operating process, targeted information and data
Task 2.2	Suitable methods for data analytics
Task 2.3	Mapping out functional requirements of methods against critical situations

WP2 on Data Analytics is coming into an end. we have successfully completed the work on defining and selecting suitable methods for real-time management and data analytics. Our findings suggest that real-time data analytics should provide instant responses. It is very important for data to immediately become available. This makes it possible to instantly respond and react to critical situations in real-time, which involve delays, failures, disruptions, operations with sensitive and priority freight as well as dangerous goods. The flow of data through the terminal, yard and network needs to be captured, processed in real-time and utilised to form a single view. The data formats need to be consistent and compatible therefore fulfil the requirements defined in TAF TSI regulation and profit of the existence of a standardised set of messages in place, the TAF TSI XML catalogue.

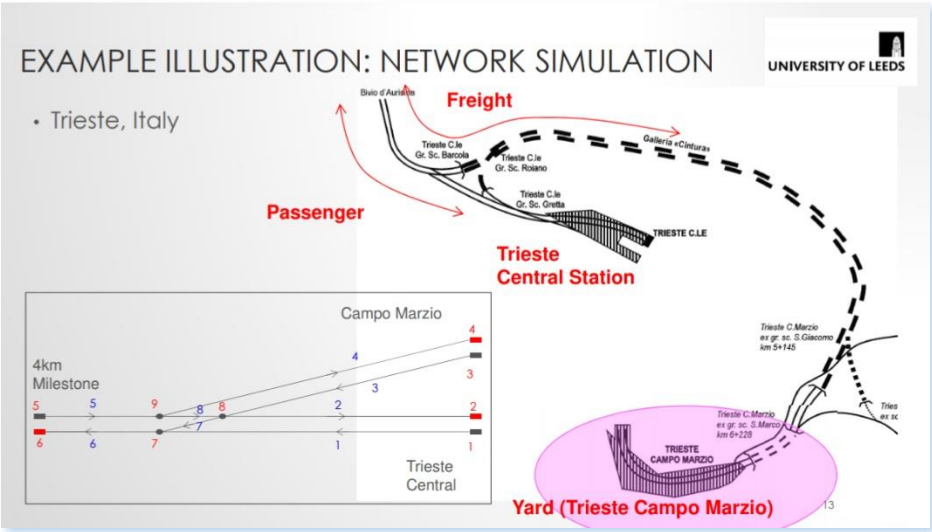
A key contribution of WP2, was also to reconsider and redefine the operating processes and data requirements to allow operations to be fully managed in real-time. A key rationale for real-time, integrated yard and network operation is to take advantage of opportunities on the network, which suggests a greater focus on organising the work at the yard in such a way as to offer greater flexibility in the departure procedures for the outbound freight trains. For more information, please see: D2.2 on Draft Recommendations for Improved Information and Communications for Real-Time Yard and Network Management (https://bit.ly/2N4DlAM).

WP3 - *Development of Specifications that apply to the new optimisation modules*

Leading partner: University of Leeds

Task 3.1	Requirements for general applicability of the simulation environment
Task 3.2	Functional specification
Task 3.3	Technical specification
Task 3.4	Mapping out functional requirements of methods against critical situations

WP3 faces two key challenges. First, a successful real-time yard management lies in understanding, designing, implementing and managing the real-time information exchange between the yard and the relevant eco-system, and managing the interactions between yard management and network management. Second, WP3 aims to specify the simulation of yard operations and the co-ordination of this simulation with the relevant network eco-system



The identified functional specifications are:

- ✓ all necessary information and characteristics of yards, terminals, surrounding networks, wagons and trains for simulation;
- ✓ activities and behaviours in yards, terminals and surrounding networks that need to be simulated.

The technical specifications are based on existing systems, but these are being adapted to the precise needs. They also need to be interfaced together and their compatibility with developing rail information systems needs to be ensured.

The network simulation model is developed and shows the occurrence and causes of delays; a better real-time network management can help to reduce the delay.

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WP4 - *Dual Modelling of the yard & network environments*

Leading partner: SAPIENZA Università di Roma, DICEA department

Task 4.1	Yard Model
Task 4.2	Network Model
Task 4.3	Simulation Software
Task 4.4	Validation of non-optimised models and simulator

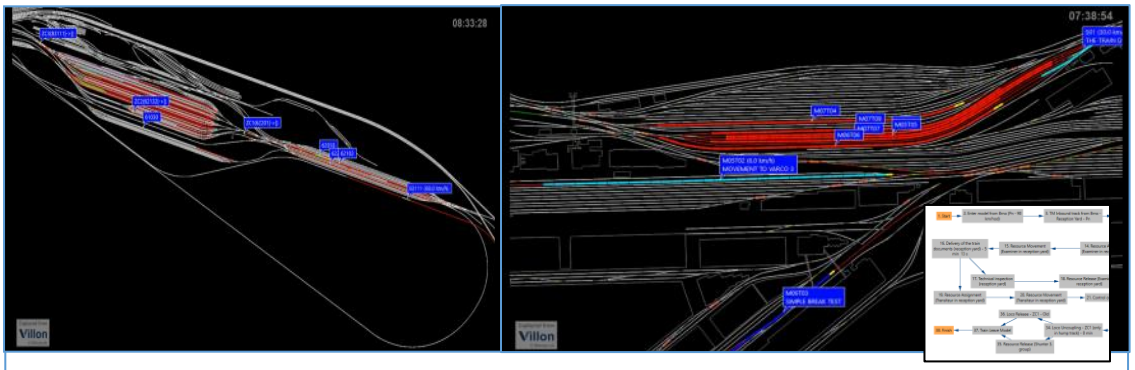
The main objective of WP4 is to develop the microsimulation models and software of the two case-study yards - Česká Třebová in the Czech Republic and Trieste in Italy - and their surrounding network, as well as to validate them by comparing their outputs with data from actual operations.

OptiYard WP4 visit to the Česká Třebová marshalling yard. The yard dispatcher is our main "Customer"!

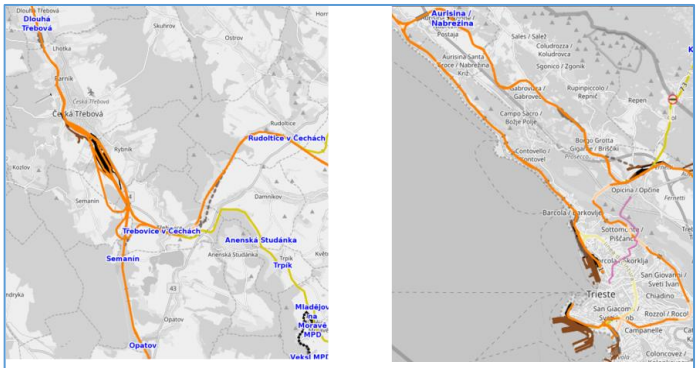
The data needed for the models were provided by CD Cargo and Adriafer through several yard visits.

This has allowed the development of the models in line with the original time-plan. The models are currently in the validation phase.

The yard models constitute "virtual yards" for the optimisation algorithms to test their suggestions on the next-best field to the real one.



Several trains running on the track infrastructure of the Česká Třebová and Trieste yards modelled in Villon. Each one is processed according to specific handling flowcharts.



The railway network surrounding the yards.
For Trieste, the port is also considered.

The rail networks surrounding the case-study yards are modelled with the purpose of understanding their real-time potential for interaction with IT systems such as RailNetEurope's Train Information System TIS, so as to improve, for example, ETA predictions for yard optimisation purposes particularly in the event of disruptions.

For Trieste the surroundings also contain a crucial and large facility: the port.

A good view of port operations during a data-collection visit to Trieste
a boundary condition for the Villon model of the rail yard.

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WP5 - Process Optimization

Leading partner: Institut français des sciences et technologies des transports, de l'aménagement et des réseaux (IFSTTAR)

Task 5.1	Improved **information and communication**
Task 5.2	Improved **decision support** system at the **yard** level
Task 5.3	Improved **decision support** system at the **network** level
Task 5.4	Definition of the **integrated framework** of optimization and simulation

Activities and results of the four tasks of this WP are:

1. Improved information and communication

   An analysis of the existing information has been performed for different tasks of marshalling yard optimization. For each task, inbound and outbound data has been identified and gathered into groups of data (attributes). A proposal of detailed data interface items based on Czech information systems has been initiated.

2. Improved decision support system at the yard level

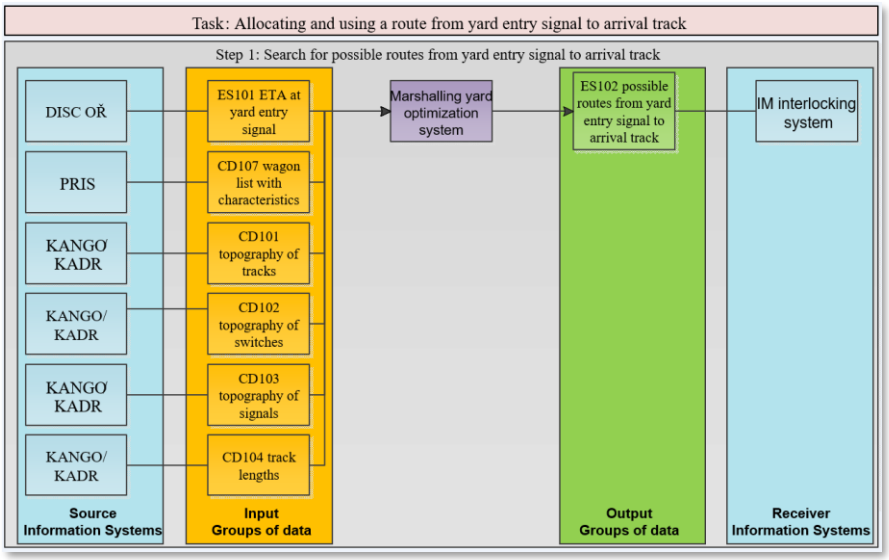
   An analysis of the state of the art of optimization algorithms for yard operations has been performed, a report on papers analyzed has been written and a survey article has to be submitted to a journal.

3. Improved decision support system at the network level

   A literature review has been initiated.

4. Definition of the integrated framework of optimization and simulation

   Definition of the specifics of the information share between the simulator and the optimization algorithms. All data needed in the loop interaction have been documented and specified in XML format schemes.



Example of data analysis of a task in the current process for ensuring marshalling operations

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DISSEMINATION

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