

OUTPUT FACT SHEET

Pilot actions (including investment, if applicable)

Version 2

Project index number and acronym	CE1044 TalkNET
Lead partner	North Adriatic Sea Port Authority
Output number and title	O.T3.3 – PA for multimodal nodes/terminals efficiency and optimization: ICT/ITS tools for rail traffic
Investment number and title (if applicable)	
Responsible partner (PP name and number)	LP North Adriatic Sea Port Authority
Project website	https://www.interreg-central.eu/Content.Node/TalkNET.html
Delivery date	August 2020

Summary description of the pilot action (including investment, if applicable) explaining its experimental nature and demonstration character

The North Adriatic Sea Port Authority has developed the second phase of the Integrated System for the Management of the Railway Shunting - SIMA2 system, a software application as the upgrade of the SIMA1.

A new software SIMA2 has been implemented and new functionalities allow the interfacing among SIMA2 and some IT systems used by other players involved into the process, such as the Infrastructure Manager, Railway Undertakings and Terminals.

SIMA2 system optimizes planning procedures efficiency through an optimization of train placement in railway yard and their relative movements using machine-learning techniques and logistic algorithms (i.e. reduction of the "double" shunt or avoiding the need to shunt more than once a single convoy).

In particular, SIMA IT system retrieves, processes and stores data during the manoeuvring procedures and the wagons positioning operations inside a port area or a railway hub, aiming to support management and real time monitoring of the operations. SIMA2 comprehends the following functional modules:

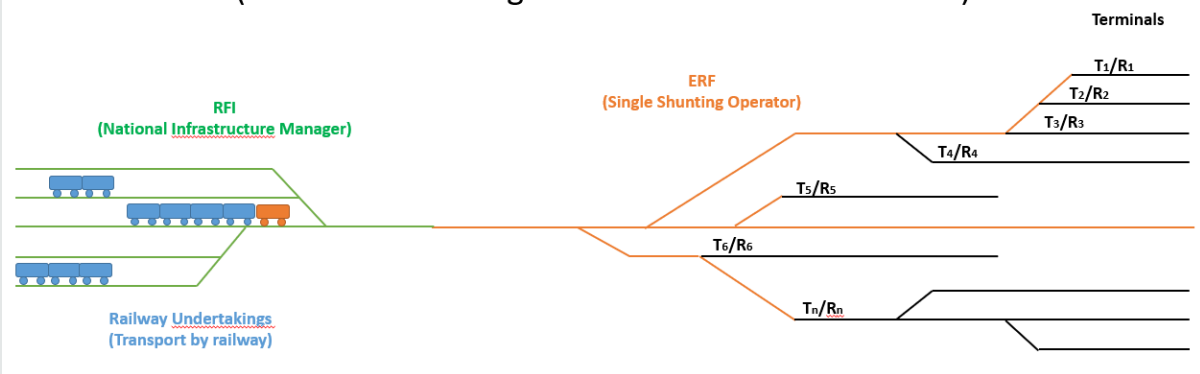
- Shunting Management
- Shunting Monitoring
- Reporting
- Account management
- Mobile and GPS infrastructure

The software is used by ERF (Esercizio Raccordi Ferroviari), the Single Shunting Operator in Venezia Marghera Scalo Railway District.

Specifically, the functionality of the tool is as follows.

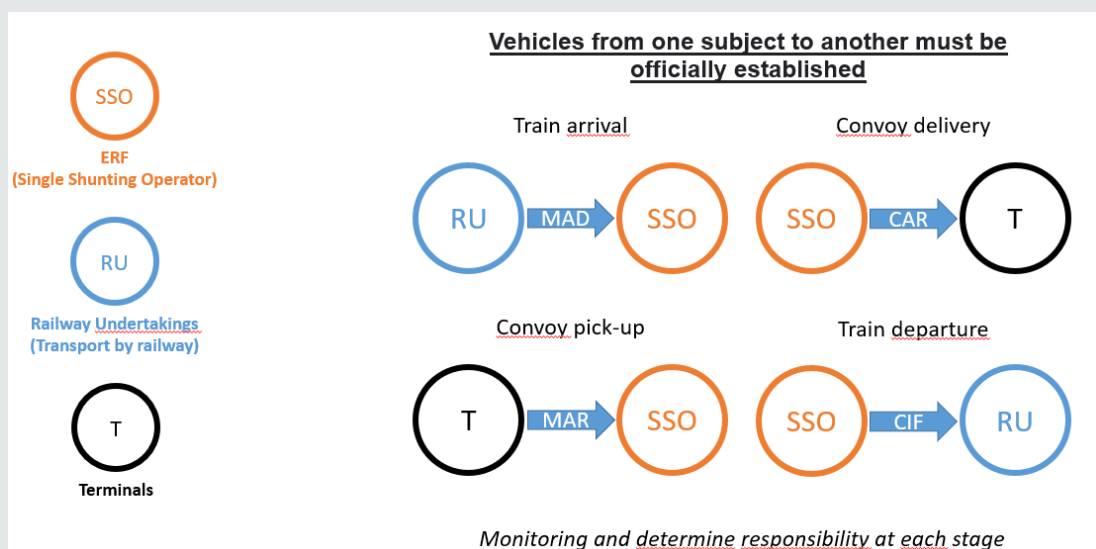
- 1) Once freight trains have arrived at Venezia Marghera Scalo Station they have to be delivered to a specific Terminal. To fulfil both European and national railway norms, Railway Undertakings must share some information with the Single Railway Shunting Operator such as: Train number / Time of train arrival / Number of wagons / Type of wagons / State of wagons (empty, load) / Wagons condition / Wagons length / Number of axes per wagon / Maximum load / RID / Kind of goods
- 2) Before shunting movement takes place, the Single Railway Shunting Operator have to perform activities like checking of the entire convoy and make sure that Terminal can receive it. It is up to the Single Railway Shunting Operator deliver into Terminal.

**Example of a shunting movement
(from Venezia Marghera Scalo Station to Terminal)**

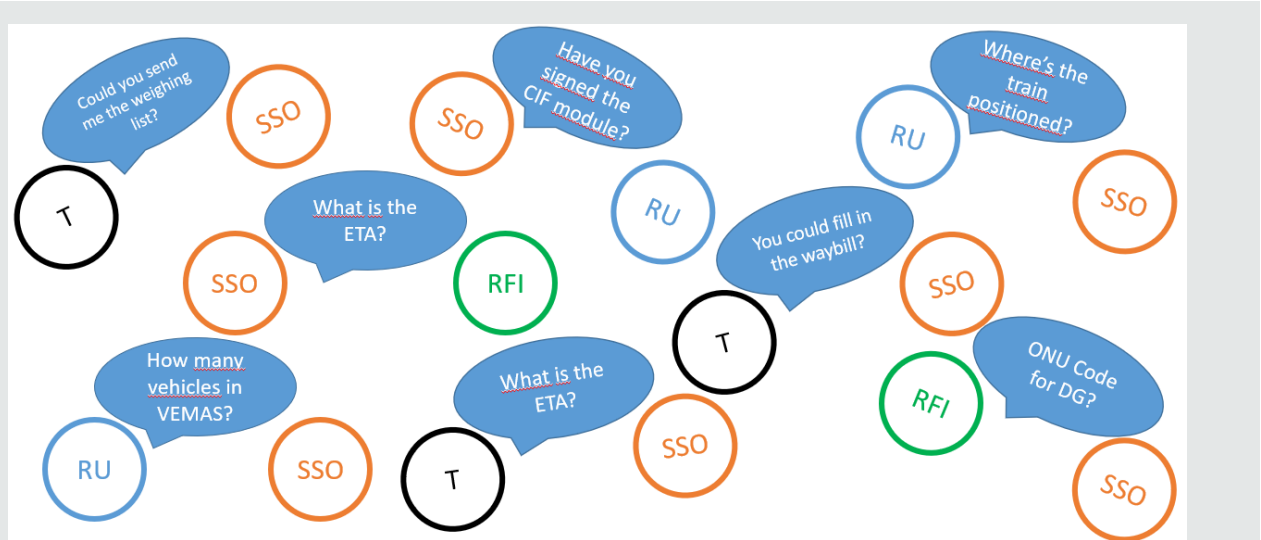


- 1) Once the wagons have been loaded/unloaded by the Terminal, wagons have to be delivered to the Single Railway Shunting Operator in order to take them out of the Terminal itself.
The entire convoy have to be placed to a railway track of Venezia Marghera Scalo Station and have to be delivered to the Railway Undertaking for departure.

Many actors are involved in the railway operations and each actor have to deliver/take wagon from the other ones. Each passage of wagons determines a passage of responsibility in the management of the same.



The management of railway wagons and their passage to various subjects belonging to the entire logistic chain of transport currently involves a multiple entry into the various IT systems of the same data (for example wagon ID, the type of the wagon, goods, etc.).



The railway shunting services are h24 from Monday to Saturday but it has also given the possibility to customers to make services request also during the weekend; so the system has been thought to be online 24/7. In case of system's upgrading and modifying, actions will be taken palce during the night and the structure of the entyre system can permit to do that using a little time -window during the night.

In case of a malfunction of the server, a backup of the entire system has been planned on parallel machines; in this way the system can make an automatic switch from one machine to another without manifesting too long interruptions in operation.

Once developed the system, all modules were tested also in terms of reliability, availability. A testcase was build-up simulating as many scenarios as possible that could happen in real life and scenarios which included bad managing by the operators in order to guide better the user through the process of data input.

The system has shown an excellent level of reliability, maintainability and availability and it is fully operative from 1 May 2021. SIMA2 functionality has been shown to the companies involved on 17 March 2021. Therefore, it is currently available for testing in the daily logistic practice.

Moreover, SIMA2 is linked to the Railway DATAMART (pilot action of TalkNET project), which is a data warehouse that are linked to SIMA, allowing the transfer and storage of shunting operations data from SIMA, with the aim to further elaborate the data collected above all for analysis and statistic purposes.

NUTS region(s) concerned by the pilot action (relevant NUTS level)

NUTS 2 - Veneto Region (IT)

Investment costs (EUR), if applicable

Not applicable

Expected impact and benefits of the pilot action for the concerned territory and target groups and leverage of additional funds (if applicable)

A new work tool has been created that uses new technologies. In particular, both the front-end (user interface) and the back end (business functionality) have been completely re-engineered.

A radical, fundamental overhaul was made, the entire "Progressive Web App" and "Mobile App" was rethought from scratch, and not just simple adjustments, or calibrations, or operational improvements from SIMA1.

The expected impacts are the following:

- monitoring the entire shunting process
- decongestion of the internal railway system
- optimization of locomotives use
- CO2 reduction
- increase of freight traffic by rail
- boosting further new investments in port facilities to increase the intermodal capacity

There are many actors involved in the entire logistic chain for railway traffic: Railway Undertakings, Infrastructure Managers, Terminals, Shippers, etc.

Once the train is arrived at the Venezia Marghera Scalo Railway Station (carried by a Railway Undertaking) must be delivered by ERF to a Terminal (and vice-versa in case of a departure).

The aim of this project is to make actors involved in the railway traffic on Venezia Marghera Scalo railway District interact one to each other in order to make a clearer overview of what is happening in terms of train's arrival or departures, freight vehicle's position and state, requesting shunting service and many other services linked to the railway shunting (e.g. weighing of railway wagons).

For that reason, stakeholders can interface their own systems with SIMA2 in order to obtain lots of information in real time regarding the state of the freight vehicles also integrating their activities.

In the port of Venice, the interfacing with the railway system should be useful for:

- The possibility to interact with the PIC system of the national infrastructure manager RFI (Rete Ferroviaria Italiana) that allows real-time communication of changes to the general planning for train's arrivals and departures (e.g. deletion or changes in the schedule) and the insertion of unplanned trains through an XML protocol or similar one.
- The possibility of interfacing with the Railway Undertakings IT systems for the recovery of information regarding train composition (list of wagons and containers carried by each wagon, type of goods, state of the vehicle), useful for the automatic management of wagon groups through an XML protocol or similar one.
- The possibility for Terminal to have the possibility to request services linked to the shunting movement.
- The possibility to know exactly when the transfer of responsibility of freight wagons is: when responsibility for wagons pass from one subject to another a receipt is send, also by email, to both subjects involved.
- The possibility, for ERF, to know in real time where the convoy is during every phase al the shunting movement and where wagons are parked.

Sustainability of the pilot action results and transferability to other territories and stakeholders.

The financial sustainability of this new software will be guaranteed with public funds by the North Adriatic Sea Port Authority.

SIMA2 is of strategic importance for the automation system of the rail shunting management in the port. This has already determined its political and institutional sustainability, as a new technology from which there cannot be a step backwards.

In terms of transferability, this solution is transferable to all the realities that have to manage the railway shunting.

In particular, in a transferability perspective of the results, SIMA2 offers the following macro-functionalities:

- Data acquisition, i.e. during the start-up phases of the shunting procedures, through the insertion of the annual, weekly or daily schedules of the single shunting, by entering data from the user interface;
- Data processing, through application of rules, constraints and suggestions for the benefit of the various users of the system (Business Logic);
- Notification of the status change of a procedure, through certified (timestamps based) and traceable communications;
- Data archiving and database query functionality, through facilities such as affinity search or recent history;
- System log recording for tracking all events and who did what;
- Automatic interface with GPS-EGNOS satellite tracking system, installed in locomotives;
- Representation, through a synoptic table, of the entire railway park area with real time monitoring of:
 - Tracks and relative occupation status;
 - Locomotives (pushing or pulling) together with wagons, tugs and trains, each with its state (to be unloaded, repaired, departing, etc.);
 - Recent, in progress or imminent operations.

Rights of intellectual property belongs to the North Adriatic Sea Port Authority as the owner of the source code. Access profiles of the system are available for ERF, railway undertakings and terminals.

Lessons learned and added value of transnational cooperation of the pilot action implementation (including investment, if applicable)

The implementation of pilot actions has allowed to:

- identify needs and critical issues shared together along with potential innovative solutions to be applied within the partnership;
- verify the potential deployment and transferability of tested innovations and services sustainability.

Moreover, the development of pilot actions has allowed to enhance the process of mutual learning and share capitalisation of the results achieved.

The pilot can be capitalised in all terminals with notable shunting inefficiencies. In general, SIMA2 can be considered a best practice as railway shunting software.

Main lessons learned is that SIMA2 can be transferred in all terminals with well-known shunting inefficiencies and is a good example on EU level. The specific assessment of pilot results have been carried out in ad hoc Working Groups (27-28 May 2020) and the following elements have been highlighted at transnational level:

Strengths of the pilot action:

- Decongestion of the internal railway system
- Optimization of locomotives use
- Increase of freight traffic by rail
- Optimization of shunting services that can lead to considerable cost savings, more efficient planning of routes and resources, and increased transport quality (punctuality, predictability) and safety
- Interface between application and other relevant IT systems permits the identification and deletion of useless outdated data function
- CO2 reduction
- Boosting further new investments in port facilities to increase the intermodal capacity

The pilot can be transferred in all terminals of partner ports with shunting inefficiencies, even if the some critical points have been highlighted, such as a long-term process necessary to achieve the optimization of the system and the need to have educated and well trained staff.

More in depth, the case of TalkNET has been of great facilitator of solutions that can be shared and tested among project partners, like the new tool developed and tested by the port of Venice. In particular, the following lessons learned has been highlighted from other ports, specifically maritime ports, that are facing quite similar challenges and, especially on railway topics:

- Port of Trieste: the Port of Trieste has checked the pros and cons of the use of a system such SIMA2, compared to the one already in use in the Port of Trieste. More specifically, the technical features were analysed, also with Adriafer S.r.l., the shunting company 100% owned by the Port Network Authority of the Eastern Adriatic Sea. The PA of the Port of Venice is significant, since the IT systems of the shunting area in the Port of Trieste will be overhauled in the next few months and years, owing to the activities to be carried out in the TriesteRailPort project, (Action no. 2017-IT-TM-0092-W), co-funded by the CEF Programme and EIB loan.

- Port of Koper: as it comes to shunting procedures the gained knowledge from the port of Venice will be useful in the next years, since a special working team of port IT officials and national railway operator officials is being currently established with a goal of optimization of IT interface among the port and rail operator.
- Port of Rijeka: just recently, a significant expansion of the railway capacities has been undertaken in relation to cargo railway traffic in the area of the container terminal, and even if the operator uses its own shunting and railway operations procedures, including telematics, the tool in use at the port of Venice can be interesting to develop further and new functionalities.

Contribution to/ compliance with:

- relevant regulatory requirements
- sustainable development - environmental effects. In case of risk of negative effects, mitigation measures introduced
- horizontal principles such as equal opportunities and non-discrimination

Relevant regulatory requirements:

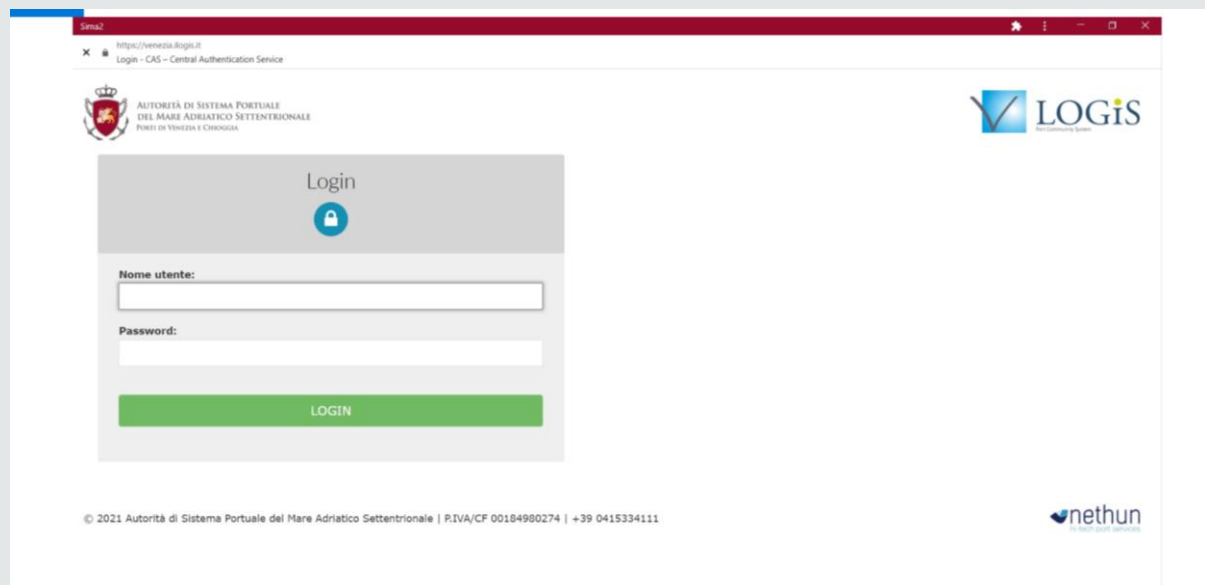
- EU Strategies and perspectives of digitalization & automation in Transport & Logistics
- The Agenzia per l'Italia Digitale - Agency for Digital Italy (AgID), the technical agency of the Presidency of the Council of Ministers. The main purpose of the Agency is to guarantee the achievement of the Italian digital agenda objectives and contribute to the diffusion of information and communication technologies, with the aim of fostering innovation and economic growth.

References to relevant deliverables (e.g. pilot action report, studies), investment factsheet and web-links

If applicable, additional documentation, pictures or images to be provided as annex

The deliverables used to produce the action plans are:

- D.T1.2.1 Analysis on multimodal nodes efficiency and connections – Venice (NAPA);
- D.T1.5.2 Action plan to improve multimodal nodes efficiency and connections – Venice (NAPA);
- D.T3.1.1 Meetings to involve key players of freight transport;
- D.T3.1.2 Summary report on stakeholders and target groups involved;
- D.T3.2.2 PA for multimodal nodes/terminals efficiency and optimization: innovative control shunting system
- D.T. 3.2.3 PA for multimodal nodes/terminals efficiency and optimization: ICT/ITS tools for rail traffic



SIMA2 login trough CAS – Central Authentication Service (NASPA)



SIMA2 direct Login - ERF