Integrated and Sustainable Transport in Efficient Network - ISTEN

DT2.2.5 - Local Action Plan for Trieste hub

WP no. and title	WPT2 – Activity 2.2 – Action plans for ADRION hubs
WP leader	PP2 – ITL
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Planned delivery date	M22 – September 2019
Actual delivery date	M29 – April 2020
Reporting period	RP4

Dissemination Level		
PU	Public	X
PP	Restricted to other program participants (including the Commission Services)	
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Document information

Abstract

In line with the framework objective defined within the ISTEN project to become an integrated port-inland hub, the main need of the Port of Trieste is to move from being one separate node in the global supply chain, to the pivot of a Proximity Terminal Network (PTN).

The main challenges the Port of Trieste faces with regard to multimodal node efficiency and connections, relate to adapting the physical and non-physical infrastructures to the growing intermodal transport and can be summarized as follows:

1) upgrading the railway (last mile) infrastructures;
2) optimizing existing infrastructures through ICT tools;
3) working with the other ports and RRTs as a network.

The current situation described in the Local Context Analysis, in particular the existing bottlenecks, as well as the above mentioned challenges have served as basis to define a series of actions concerning on the one hand, the port railway network, addressing infrastructural bottlenecks and on the other, ICT tools and namely the Sinfomar PCS and tackling shortcomings in operations and innovation.

Following a common methodology based on the so-called CANVAS model, this document outlines the more mature actions, detailing for each the stakeholders involved, key actions, aims, timeline, possible risks and problems emerging during the implementation, funding sources and impact on the identified bottlenecks.

Keywords

Port-hinterland chain, port-inland hub, Proximity Terminal Network, bottlenecks, infrastructure, operations, innovation, railway, last mile, combined transport, intermodal transport, upgrade, railroad terminal, PCS, ICT, electronic data, free zone

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Document history

Version	Date	Reviewed paragraphs	Short description
1	31/01/2020		1st draft
2	08/04/2020	1, 2	WP Leader/MemEx comments
3	30/04/2020	All	Revised ToC, overall document structure and addition of details in the description of specific actions; new §4

Table of contents

List of figures

List of tables

Abbreviations

AP: Action Plan

CAP: CANVAS Action Plan

CEF: *Connecting Europe Facility*

Co.SELAG: *Consorzio per lo Sviluppo Economico Locale dell'Area Giuliana*

EDI: Electronic Data Interchange

EIB: *European Investment Bank*

EU: *European Union*

EUSAIR: *European Union Strategy for the Adriatic Ionian Region*

EUSALP: *European Union Strategy for the Alpine Region*

FZ: Free Zone

ICT: Information and Communication Technology

IT: Information Technology

ITU: Intermodal Transport Unit

LAP: Local Action Plan

MRN: Movement Reference Number

MTO: Multimodal Transport Operator

PCS: Port Community System

PNA EAS: *Port Network Authority of the Eastern Adriatic Sea*

PTN: Proximity Terminal Network

RCA: *Rail Cargo Austria*

RFI: *Rete Ferroviaria Italiana*

RRT: Railroad Terminal

SOAP: Simple Object Access Protocol

TEN-T: *Trans European Network – Transport*

TEU: Twenty-foot Equivalent Unit

TOS: Terminal Operating System

TSCM: *Trieste Campo Marzio*

1 Introduction

Having regard to the current positive trend in traffic volumes, the Port Network Authority of the Eastern Adriatic Sea is focusing on its multimodal-related infrastructures and processes also in order to incorporate inland node terminals, utilising existing facilities and designing innovative solutions able to ensure competitive advantage in terms of port and hinterland connectivity.

For these reasons, as detailed in the following sections, various policy initiatives and considerable investments in port capacity have been undertaken in the last years and planned for the next few years.

1.1 The framework objective: towards an integrated port-hinterland hub

All in all, the main need of the Port of Trieste is to move from being one separate node in the global supply chain, to the pivot of a Proximity Terminal Network (PTN), thus building new relations with neighbouring and distant terminals.

In the normal situation, terminals compete each other to position themselves on the market.

Rodrigue[1] defined the concept of transport terminal "hinterland" as follows: "Each transport terminal has its own hinterland (or "natural" hinterland), representing a set of customers (distribution, manufacturing and retailing activities) with whom it has transactions. These transactions involve movements of freight (…) that at some point will be transhipped by the terminal. Movements are either originating or are bound to a space that can mainly be categorized as the main hinterland and the competition margin."

The concept has been graphically depicted as shown in the figure below: two terminals, A and B, compete for customers in their competition margin. An island as catchment area for a terminal within the hinterland of another terminal can also exist, mainly due to privileged relationship between the terminal and a client and/or because of efficient inland distribution system serviced by a specific transport corridor.

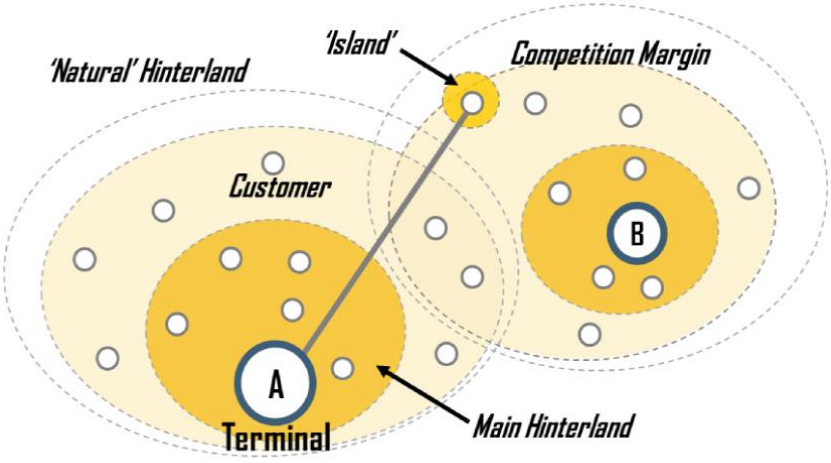

Figure 1 – Hinterland of an Intermodal Terminal [Source: Rodrigue, 2013]

[1] Rodrigue J.P., *The Geography of Transport Systems*, Routledge 2013.

Therefore, from the physical point of view a Terminal Network can be seen as being defined by the location of freight nodes (terminals) and the linear transport infrastructure connecting them; to these, the connecting services between the terminals are also added.

Starting from this, a "coopetition" model can be outlined to enable both fair competition and cooperation among terminals.

Such a model can be named as "Proximity Terminal Network" – PTN for short – of a terminal. The PTN involves exploiting the capacity of a terminal in cooperation with other terminals, located reasonably close to it from a geographical perspective. A "reasonable" geographical distance implies that common services can be built and offered to the market in a consolidated way among the PTN-terminals, thus having as ultimate goal to optimize the capacity usage of their available resources. Such services could include both node and line services, i.e. maintenance and repairing, ITU handling, cargo bundling to profitably operate rail long-distance transport.

The main challenge in the development of an efficient PTN is the ability of exploiting the resources available in the various terminals at their best, thus including freight transport, equipment maintenance, etc.

This model is linked to the topic of defining the characteristics of an "integrated port-inland hub", which represents the long-term goal, or framework objective, the actions included in this plan tend towards. DT1.3.6 – ISTEN Toolbox considers such properties to be the followings:

- effective physical transfer processes between modes;
- efficient administrative processes (e.g. customs);
- two-way data sharing between operational actors and between private and public actors;
- visibility of port-inland freight flows to operational actors;
- existence of regular (i.e. fixed-time schedule, at least weekly frequency) environmentally-sustainable transport services (rail/barge) towards the hinterland;
- a remarkable share of rail traffic (e.g. > 10%) in the transnational hinterland throughput;
- sharing of data concerning environmental sustainability indicators with the local community.

When tackling the issue of making the port-hinterland system an efficient and integrated hub the analysis should envisage the infrastructural, operational, institutional, market and innovation prospects.

From an infrastructural point of view, a good network of roads, railways and rivers/canals, together with efficient interconnection systems, is a first requirement for the easy multimodal accessibility of the hinterland. As far as operations are concerned, for the hinterland transport and logistics systems to be efficient fast, frequent and reliable transport links and value-added services for freight, based on effective cooperation and real coordination among the actors involved in the logistics chain, are needed. These go hand-in-hand with technological solutions, which are essential in view of simplifying both administrative procedures and documentation related to multimodal transport and to efficiently manage information flows generated by the several actors in the logistics chain. From the institutional point of view, streamlining of

administrative processes and coordinated management of the entire system are crucial. The port-hinterland system must have a governance model and management able of enhancing resources, to serve the whole system with the aim of strengthening existing activities and attracting new ones. Finally, the market should count on efficient companies providing customers with an offer of land transport services allowing the attraction of traffic to/from the port.

This approach shaped the work done to elaborate the Local Context Analysis (DT1.1.4), which represents the needs assessment for this Action Plan, although not every single aspect touched by the context analysis will find a correspondence in the actions detailed in sections 2 and 3.

1.2 Main challenges identified

The main challenges the Port of Trieste faces with regard to multimodal node efficiency and connections, relate to adapting the physical and non-physical infrastructures to the growing intermodal transport and can be summarized as follows:

4) upgrading the railway (last mile) infrastructures;
5) optimizing existing infrastructures through ICT tools;
6) working with the other ports and RRTs as a network.

Over the last five years, the Port of Trieste has enjoyed growing trends in the maritime and railway services, as shown in tables 1 and 2 below.

	2015	2016	2017	2018	2019	Δ % 2015/2019	Δ % 2018/2019
TOTAL THROUGHPUT	57,011,723	59,244,255	61,947,454	62,676,502	61,997,445	8.75	-1.08
Liquid Bulk	41,286,761	42,756,341	43,750,555	43,234,735	43,349,423	5.00	0.27
Dry Bulk	1,596,232	1,971,001	1,639,595	1,665,508	1,717,294	7.58	3.11
General Cargo	14,128,730	14,516,913	16,557,304	17,776,259	16,930,728	19.83	-4.76
Number of Vehicles	301,092	302,619	314,705	309,424	233,418	-22.48	-24.56
Number of containers (TEUs)	471,641	486,462	616,153	725,426	789,594	67.41	8.85

Table 1 – Port of Trieste: total throughput 2015-2019

	2015	2016	2017	2018	2019	Δ % 2015/2019	Δ % 2018/2019
TOTAL TRAINS	**5,980**	**7,631**	**8,682**	**9,732**	**9,771**	**63.39**	**0.40**

Table 2 – Port of Trieste: number of trains 2015-2019

Unlike the other Italian ports, the Port of Trieste does not serve mainly Italian regions, but Central European markets, as it can be easily noticed from the following figure, showing intermodal connections with origin/destination in the Port of Trieste.

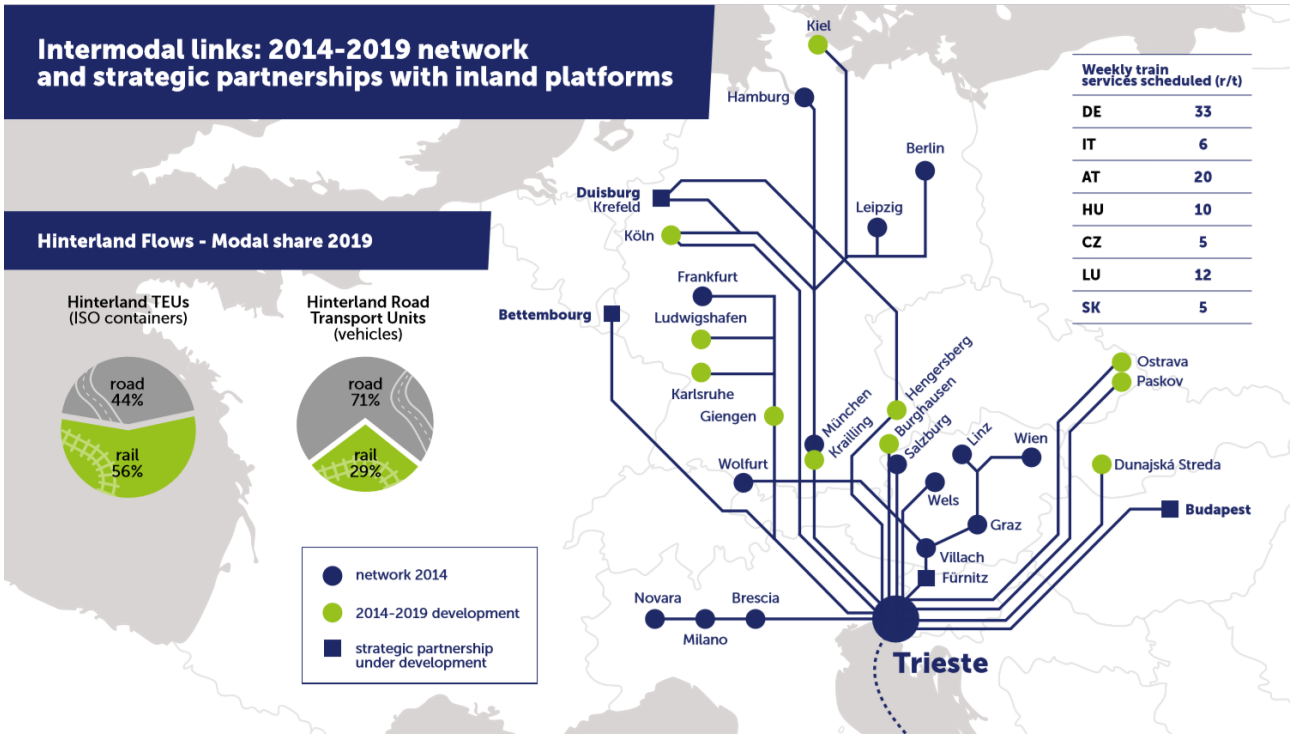

Figure 2 - Port of Trieste: intermodal connections

In fact, the port of Trieste has an excellent intermodal links network, with more than 200 weekly trains connecting to the Italian Northeast industrial sites, Luxembourg, Germany, Austria, Hungary, Slovakia and Czech Republic, totalling 9,771 trains in 2019.

Despite the steady growth rate in rail transport, railway infrastructures within and outside the Port of Trieste have not been upgraded accordingly, leading to the risk of a potential congestion in the coming years.

Considering the long-term timeframe that planning and realising significant infrastructural works entail, the Port Network Authority of the Eastern Adriatic Sea is also investing in the development of applied and customized IT solutions, designed to increase its railway capacity by streamlining and digitalising administrative procedures.

Based on the current situation analysed within DT1.1.4 and the challenges described above, actions concerning on the one hand, port railway infrastructure and on the other, ICT tools and namely the Sinfomar Port Community System (PCS) are listed as follows.

1) <u>Upgrade the railway infrastructures:</u>

   a. upgrade of the railway last mile connection in Campo Marzio station;

   b. infrastructural and technological upgrade of the port marshalling yard connecting Piers no. 5, 6 (RoRo transport) and 7 (containers) to Campo Marzio station and then to the national railway lines;

   c. renovation of lines Aquilinia-ex Wärtsilä (FreeEste area) and Aquilinia-ex Aquila.

2) Extend the scope of the Port Community System:
   a. extension of the PCS to the Port of Monfalcone and, in the long term, to Porto Nogaro;
   b. development of EDIs with the RRTs of Cervignano, Gorizia and Pordenone;
   c. development of EDIs with foreign RRTs;
   d. development of EDIs with the RUs serving the Port of Trieste;
   e. testing blockchain technologies.

The following pages detail the most relevant and mature actions of these two categories.

2 Infrastructure cluster

2.1 Upgrade of the railway infrastructure

2.1.1 Introduction and goals

The figures reported in section 1.2 above show that rail transport and specifically, the modal share (reaching 56% of hinterland TEUs flows in 2019) and the excellent network of intermodal connections represent a remarkable competitive advantage for the Port of Trieste. The railway infrastructure and namely, last mile connections to the main station serving the port – Campo Marzio need to be upgraded in order to support a steady growth rate in railway traffic.

For these reasons, the Port Network Authority has elaborated the so-called "Global Project", comprising four main sections:

1. upgrade of the railway last mile connection;
2. infrastructural upgrade for the reactivation of the railway line connecting Aquilinia station to Campo Marzio;
3. upgrade of the existing infrastructure and new railway station at Scalo Legnami;
4. infrastructural and technological upgrade of the port marshalling yard connecting Piers 5, 6 and 7 to Campo Marzio station and then to the national railway lines.

The Italian government has already funded most of this Global Project, but only on the sections belonging to the national infrastructure manager (Rete Ferroviaria Italiana – RFI S.p.A.).

Item	Cost	Entity
Infrastructural and technological upgrade of the port marshalling yard (Campo Marzio)	57,230,000	Port Authority
Renovation of lines Aquilinia-ex Wärtsilä and Aquilinia-ex Aquila	7,800,000	Port Authority
Infrastructural and technological upgrade of the Campo Marzio station	80,000,000	RFI S.p.A.
Tunnel junction between Servola and main line	5,000,000	RFI S.p.A.
Renovation of line Campo Marzio – Villa Opicina	27,000,000	RFI S.p.A.
TOTAL	**177,030,000**	**Port Authority: 65,030,000** **RFI S.p.A.: 112,000,000**

Table 3 – Global Project: items and financial plan

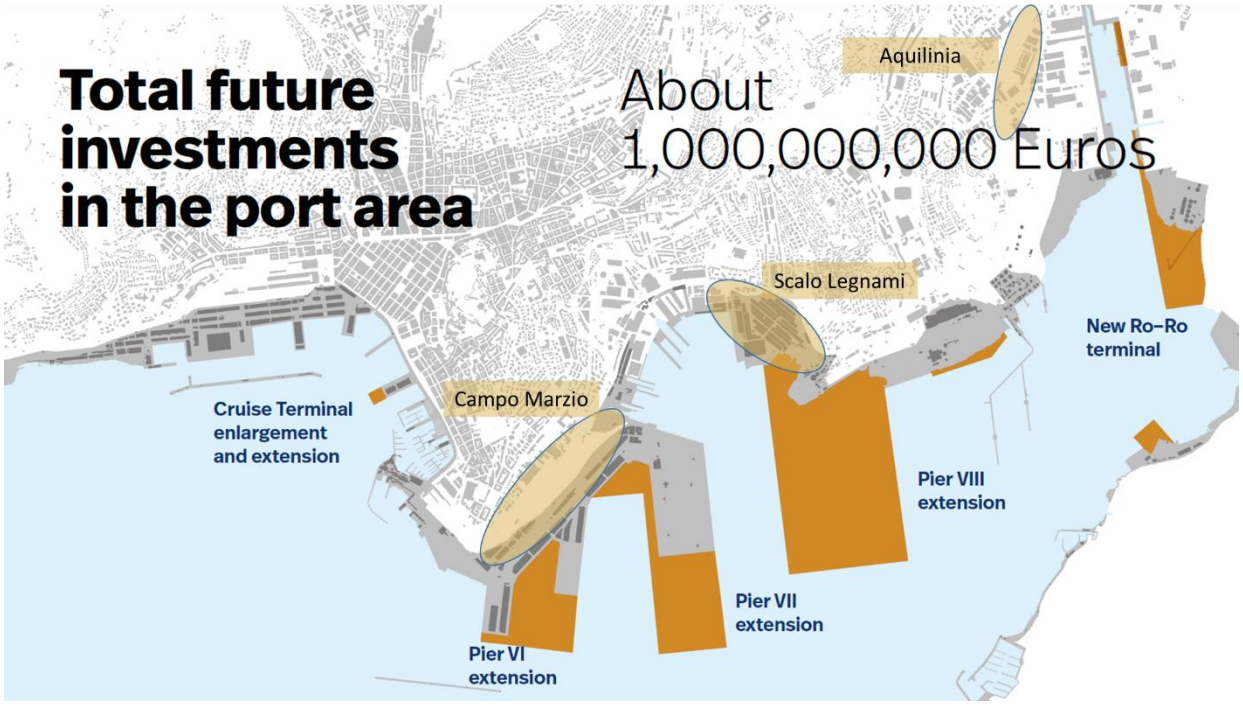

Figure 3 – Port Masterplan and Global Project

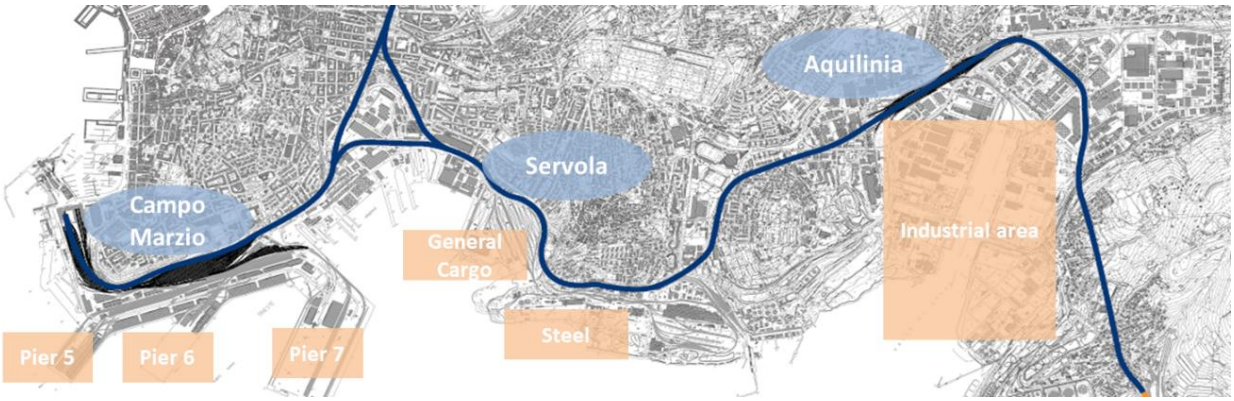

Figure 4 – Railway infrastructures of the Port of Trieste

Piers no. 5, 6 (RoRo) and 7 (containers) generate most of the port's railway traffic and are connected to the national railway line through the port marshalling yard, to Campo Marzio station, managed by RFI S.p.A.. This is the most strategic and sensitive part of the port railway network, affecting the overall port efficiency.

The current railway layout of both Campo Marzio station (in black in figure no. 5) and the railway sidings managed by the Port Network Authority (magenta) hinders the further development of intermodal transport to/from the port. In particular:

1) the train length is currently limited to 550 metres, while EU Regulation no. 1315/2013 requires the Core network corridor accommodate freight trains at least 740 m long;

2) it does not allow trains to operate simultaneously from the three port terminals, forcing the other two to stand still when one of them uses the railway sidings managed by the Port Network Authority;

3) the manoeuvres of the marshalling yard are not automated, causing delays and posing higher risks to the safety of the operations due to human errors.

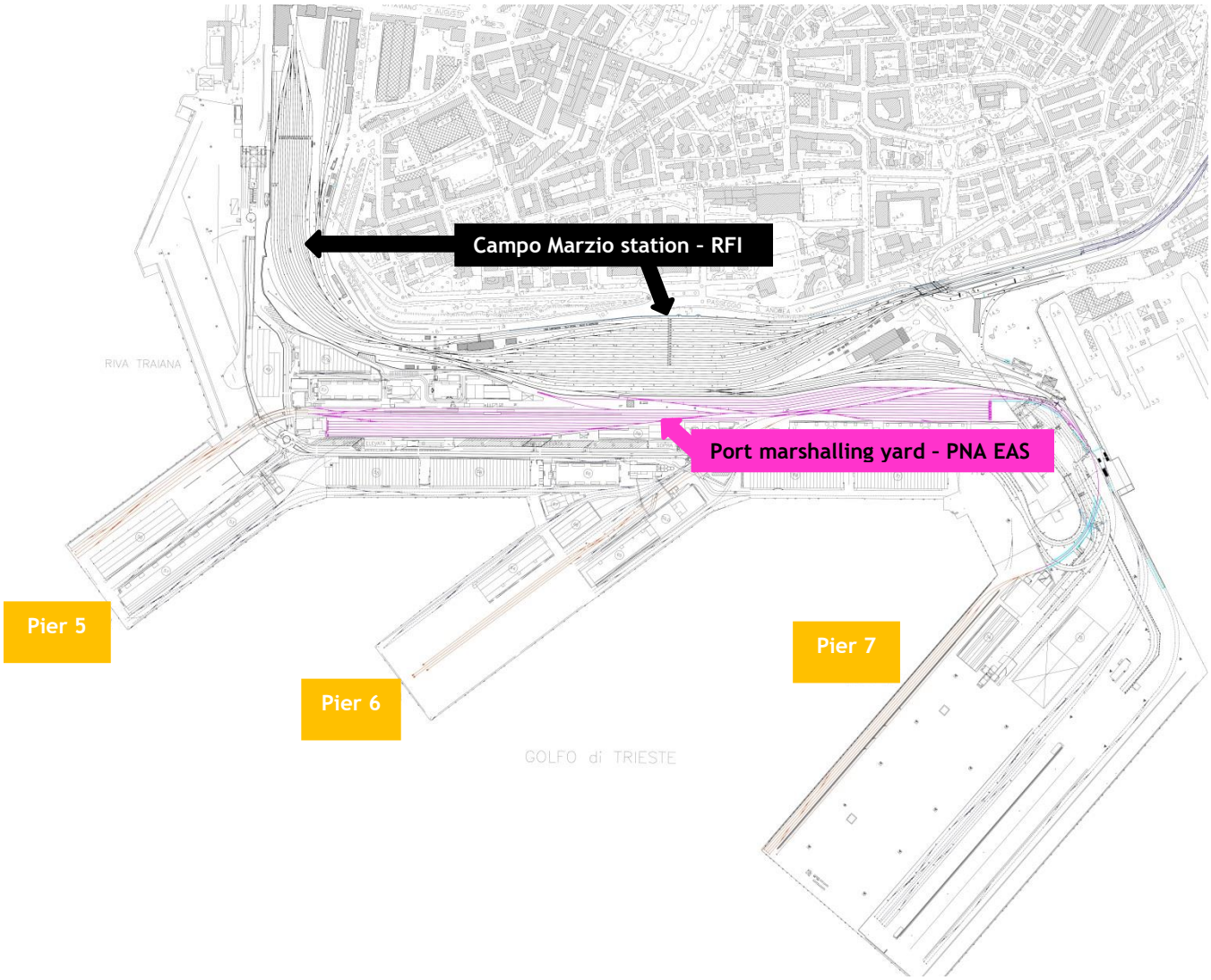

Figure 5 – Campo Marzio station: current layout

As shown in detail in figure no. 6, the eastern part of the port of Trieste (Zaule canal) is connected to the national railway line through the Aquilinia station, also serving the Industrial Zone of Trieste.

Figure 6 – Aquilinia-FreeEste and Aquilinia-ex Aquila railway tracks

The layout of the Aquilinia station, owned by RFI S.p.A., will also be renovated in the coming years, including a new logistic platform for the loading and unloading of containers, in the framework of the Global Project through already granted national funds. The Aquilinia station used to be the terminus of the railway line Trieste Campo Marzio–Trieste Servola-Trieste Aquilinia and will serve as a supplementary rail yard to the main one (TSCM).

Also, the Aquilinia station connects two different areas:

- FreeEste (ex Wärtsilä);
- ex Aquila.

Both tracks shown in figure no. 6 above are owned by the local public entity for the economic development of the Industrial Zone of Trieste (Consorzio per lo Sviluppo Economico Locale dell'Area Giuliana, Co.SELAG), which is controlled by the Port Network Authority.

Wärtsilä is a global leader in smart technologies and complete lifecycle solutions for marine and energy markets. Based in Helsinki and having almost 19,000 employees worldwide, the Trieste branch produces marine diesel and LNG engines. In 2018, Wärtsilä Italy sold part of the its Trieste area to the nearest inland terminal (Interporto di Trieste S.p.A.): the new "FreeEste" area was born, with 240,000 square meters of Free Zone status areas, and 74,000 square meters of warehouses, devoted to logistics and manufacturing, in close connection to the port-related activities.

This area has become of strategic importance for the Port Network Authority, which owns 20% of Interporto di Trieste S.p.A..

The FreeEste area is connected to the Aquilinia station (track marked red in figure no. 6) through a 3,156-metre long railway siding, which has not been used for several years, and now needs radical renovation.

On the easternmost side of the port, lies the so-called “ex Aquila” area, where the Aquila refinery was located.

Inactive since many years, the area recently attracted the attention of the Hungarian government, which decided in July 2019 to invest 100 million euros for the construction of a multi-purpose terminal for Hungarian goods in import and export, as this area benefits from the Free Zone status as the other port areas.

The area is connected to the Aquilinia station through a railway track (marked blue in figure no. 6), which is in a state of abandonment since many years.

2.1.2 Stakeholders involved

- National infrastructure manager (RFI S.p.A.);
- Trieste inland terminal (Interporto di Trieste S.p.A.);
- terminal operators;
- railway shunting company (Adriafer S.r.l.);
- railway undertakings.

2.1.3 Key actions

Works focusing on the TSCM area will be divided in three main activities, as outlined below in more detail.

1) Upgrade of the layout of the Campo Marzio station – port shunting area

Works for the new layout of the port’s marshalling yard will be divided into two subsequent stages. In the first phase, works will be launched on the northern part, while the southern part will remain fully operative in order to minimise the impact on the port and hinterland-related operations.

Phase 1 entails works in the northernmost part, closer to the area belonging to RFI S.p.A.:

- decommissioning and demolition of:
    - tracks 1-4 of the central and arrival yards;
    - tracks 1-6 of the departures yard;
    - modification to the interconnection with Pier no. 5, including new switches;
- building of the new access tracks from the Campo Marzio station with the new layout, without interfering with the daily operations to/from the port terminals.

Phase 2 comprehends works in the southern part, closer to the port terminals:

- decommission and demolition of:
    - the main rail pivot;
    - the railway access to Pier no. 7;

- tracks 5-11 of the central and arrivals yard;
- gate no. 3;

- building of the new layout of the rail pivot, including new switches;
- building of new interconnection with Pier no. 7;
- building of the new gate no. 5;
- completion of the tracks 5-11 of the central and arrivals yard connecting with Pier no. 5;
- opening of gate no. 2 (in the current layout this gate is closed, since it is at a dead end of a railway track) and no. 4, already existing, which will be reopened upon the completion of Phase no. 2.

2) New signalling system

This activity covers the procurement, licensing and installation of a new, automated and coordinated signalling system for the assembly and handling of trains in the port area, fully interoperable with the systems used by RFI S.p.A. in order to ensure a streamlined operation flow with the Campo Marzio station.

The signalling system will follow the Computer-Based Interlockings (ACC) architecture commonly adopted by PNA EAS and RFI S.p.A.. This consists of:

- one main control centre, aiming to safely manage the logical processes that govern the circulation functions of the shunting area with the consequent implementation and control of the equipment used for the connections with the various subsystems that make up the ACC;
- secondary control centres, connected to the main one through a fibre optic network, containing the operators for the command and control of the shunting.

The circulation of trains will be managed through a unique interface.

3) New soft infrastructures

This activity covers the installation of new hardware and software for full IT interoperability with all port stakeholders, namely:

- RFI S.p.A.;
- Terminal Operating Systems (TOSs) of the port terminals;
- Customs Agency;
- railway shunting company;
- MTOs;
- inland terminals/RRTs;
- railway undertakings.

This activity entails the development and deployment of a set of functionalities:

- the evolution of the electronic bill of lading, leading to the complete digitalisation of operations related to the rail movements and an effective tracking of goods/logistic units;

- the integration of terminal operators in the PCS environment, data exchange with related TOSs, enabling the complete exchange of logistical, security and customs data with operators;
- the activation of data exchange with existing train gates, equipped with automatic recognition systems (cameras) to allow, through the collection of logistical information on the entry/exit of trains in the port area, operations to be faster, verified and safe;
- IT interface with the "Trovatore" platform (Customs Agency), enabling automatic data exchange with the Customs Agency on inbound/outbound trains and each ITU transported, therefore compressing time for customs procedures and streamlining trains entrance/exit;
- IT interface with the IT systems of RFI for train circulation on the national railway lines and manoeuvres, achieving an integrated management of processes and documentation related to train manoeuvring and circulation;
- IT interface with the control and signalling systems, allowing to manage the booking and the assignment of the port railway tracks and therefore guarantee the correct routing of trains through the signalling and traffic management systems, as well as information on the internal location of trains useful for operational and customs purposes;
- IT interface with the "AIDA" system (Customs Agency) enabling, through an automated exchange of information on inbound/outbound trains and the ITUs transported, the planning of administrative controls demanded to the various competent authorities using a one-stop-shop approach (Single Customs Desk and Controls – SUDOCO);
- Customs dialogue evolution and Finance Police gate automation – this foresees the extension of the IT interface with the Trovatore system to automate customs controls and make the information detected by the cameras installed on the railway gates available also to the Finance Police (Guardia di Finanza) the application of the Railway Gate Automation model currently being studied at national level by the Customs Agency in the Port of Trieste.

The branch lines that connect the FreeEste and ex-Aquila areas to the Aquilinia station running at grade level with the roadways, for their reactivation in operational and safety conditions require a series of works to be carried out, such as:

- vegetation removal and railway grounds cleaning;
- replacement of wooden railway ties;
- renovation of a flyover;
- building of railroad crossings and related signage.

Once completed, these works will also pave the way to the realisation of a new set of exchange sidings in the FreeEste area to be used for container loading/unloading.

2.1.4 Aims

The objective of the actions focusing on TSCM is to improve the hinterland accessibility and multimodal connections of the Port of Trieste by upgrading the hard and soft railway

infrastructures of the port's marshalling yard connecting Piers 5, 6 and 7 to Campo Marzio station, in order to:

- increase the train capacity of the marshalling yard by 80%, up to 18,000 trains;
- allow 750m-long trains, thus increasing the train length by 35%;
- increase the speed of shunting operations on average by 35%, and by 70% for Pier no. 7 to 3 and 2 hours respectively;
- ensure full IT interoperability with port railway stakeholders.

The action concerning links to the Aquilinia station aims at shifting traffic flows generated by the wider port and inland terminals from road to rail, therefore improving the overall railway capacity and hinterland accessibility.

2.1.5 Problems faced during the implementation of the CAP

The Italian government has already allocated funds to RFI S.p.A. for the upgrade of the Campo Marzio station. On the other hand, the works on the port marshalling yard are financed by the CEF blending instrument that foresees 20% CEF funding and a EIB loan for the remaining share. Funds for the works on the Industrial Port branch lines are still to be retrieved. For these reasons, the main issue consisted in matching the priorities and timescale for the implementation of the actions with the available financial resources.

2.1.6 Timescale for implementation

Works in the Campo Marzio station will be completed by 2025, with actions linked to EU funding secured by the Port Network Authority to be finalised by 2023.

The feasibility study on the reactivation of the tracks connecting FreeEste and ex-Aquila areas to the Aquilinia station estimates the whole duration of the action (design and execution) to be two years.

2.1.7 Risk analysis

Risks are associated to (in part already experienced) delays in the design of the actions, which are to be agreed upon by both the national infrastructure manager and the Port Network Authority, as well as to the lack of funding for all the envisaged activities.

2.1.8 Funding sources

- Government allocations (RFI actions): EUR 112,000,000
- EU funding (PNA EAS actions): EUR 45,500,000 (6.5 Meuros CEF, 39 Meuros EIB)

2.1.9 Impacts on identified bottlenecks

The actions illustrated above focus on the upgrade of the railway hard and soft infrastructure serving the Port of Trieste, specifically its marshalling yard and two railway links connecting to the industrial port and inland logistics area, with the objective of enabling the use of combined/intermodal maritime-rail transport for the transfer of growing freight flows.

The enhancement of this infrastructure is expected to result in the decrease of road traffic, preventing the respective negative externalities, such as GHG and noise emissions, while at the same time accommodating growing demand.

For these reasons, the described actions will positively impact on the competitiveness of the port-hinterland system and the environmental performance of the local logistics chain.

3 Operational and innovation cluster

3.1 Development of EDI with the RUs serving the Port of Trieste

3.1.1 Introduction and goals

In the last five years the Port Network Authority of the Eastern Adriatic Sea has been steadily investing in IT solutions able to smooth communications and data exchange along the entire supply chain and to increase its railway capacity. The overall goal is to streamline and digitalise administrative procedures related to rail traffic through the development of new modules and functionalities based on interoperability standards of the IT platform currently in use in the Port of Trieste, the Sinfomar PCS.

The management of port-related supply chains is challenging due to the complex and heterogeneous operations of ports, with several actors and processes. This is particularly true with respect to the multimodal transport setting, which implies the management and control of port-related sea and inland traffic sectors throughout the interaction/coordination between different types of business actors. In fact, the cooperation of every actor in multimodal transport chain is of vital importance for efficient cargo movement while, at the same time, each actor has its own procedures and priorities.

The cornerstone of this approach is the Sinfomar PCS.

Figure 7 – Sinfomar multi-stakeholder cooperation approach

The Train Module of the PCS, devoted to the management of information flows regarding trains originating from or entering the Port of Trieste, is fully integrated with the other modules. In particular, it communicates with the Ship Module as the port railway gates are equipped with cameras using an optical reading system enabling the registration of ILU codes for rolling stock, BIC for containers, UIC for wagons.

As of 2018, handling of freight arriving/departing by sea and by train has been standardized as far as the aspects concerning customs, logistics and security operations are concerned through the automatic generation of arrival and departure notice documents.

To allow the complete tracking of a container/ITU/goods arriving and departing by train from/to the port areas, the rail carrier must issue customs documentation using a specific document called "CH30".

In the past, the Port of Trieste used 13 different models of CH30, with non-standardized data that were not comparable among them. Today, the PCS generates a single CH30 adopting a standardized template, agreed with the operators and the Customs authority according to objective criteria, and prepared using a shared terminology and structure.

This allowed to dramatically reduce the probability of errors, and paved the way to a more comprehensive electronic data interchange among public and private actors.

Barcodes related to customs procedures, such as the MRNs of the Train Freight Manifest, allow customs agents to close the consignment of goods on the Customs Agency IT platform (AIDA) by using a manual scanner, thus reducing the time needed to capture information from 10-15 minutes to less than one minute and eliminating errors linked to manual data entry.

MMTP CH30 PF - TRENO IN PARTENZA

spedizione: TRM2.0111P agente: SAMER & CO SHIPPING SPA
allibramento Sinfomar 2314235 del 05/02/2020

treno nr.: 41878 di data: 06/02/2020 ora: 13:40
diretto a: Bettembourg in arrivo da: SAMER SEAPORTS TERMINALS

Pos.	Vagone	Targa n. container	Merce	Semirimorchio/Container			Sigilli	UNDG	Tipo documento	Numero documento doganale	Nr. Sinfomar
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1	338549927121	ILU : EKOE1128310 Targa: /34 ED 0696	VASELLAME E ALTRI PRODOTTI PER USO DOMESTICO HS: 6912 00	8.819	7.500	16.319	06737712		T1/MRN	T1/MRN: 20TR34120000128127	2314195
		ILU : MARE0018257 Targa: /34 CDZ 399	7326 - LAVORI DI GHISA, FERRO HS: 7326	9.920	7.500	17.420	02231408		T1/MRN	T1/MRN: 20TR41010000007459	2314212
2	338549927329	ILU : MARE0009316 Targa: /34 VE 2936	7020 - VETRO E LAVORI DI VETRO HS: 7020	7.228	7.500	14.728	07152005		T1/MRN	T1/MRN: 20TR34200000004514	2314205
		ILU : MARE0018935 Targa: /34 CEF 926	7326 - LAVORI DI GHISA, FERRO HS: 7326	9.920	7.500	17.420	02231407		T1/MRN	T1/MRN: 20TR41010000007440	2314230
3	338549927238	ILU : MARE0016228 Targa: /34 BJS 039	7326 - LAVORI DI GHISA, FERRO HS: 7326	9.920	7.500	17.420	02231425		T1/MRN	T1/MRN: 20TR41010000008247	2314225
		ILU : MARE0016660 Targa: /34 BLK 160	7326 - LAVORI DI GHISA, FERRO HS: 7326	19.300	7.500	26.800	01337791		T1/MRN	T1/MRN: 20TR16070000007898	2314191
4	338549927311	ILU : MARE0019551 Targa: /34 CFE 881	7326 - LAVORI DI GHISA, FERRO HS: 7326	9.920	7.500	17.420	02231411		T1/MRN	T1/MRN: 20TR41010000007467	2314216
		ILU : MARE0018302 Targa: /34 CFE 917	8708 - VETTURE AUTOMOBILI, TRATTORI HS: 8708	18.619	7.500	26.119	02341616		T1/MRN	T1/MRN: 20TR41130000016832	2314226
5	335249561127	ILU : MARE0020383 Targa: /34 CLV 674	7326 - LAVORI DI GHISA, FERRO HS: 7326	9.920	7.500	17.420	02231371		T1/MRN	T1/MRN: 20TR41010000005484	2314200
		ILU : MARE0002142 Targa: /34 VE 1946	7020 - VETRO E LAVORI DI VETRO HS: 7020	5.360	7.500	12.860	05349990		T1/MRN	T1/MRN: 20TR34200000004440	2314228

Stampato il 06/02/2020 alle ore 14:15 - pagina 1 di 4

Autorità di Sistema Portuale del Mare Adriatico Orientale Porti di Trieste e Monfalcone

Figure 8 – Train Module "CH30"

3.1.2 Stakeholders involved

- National infrastructure manager (RFI S.p.A.);
- railway shunting company (Adriafer S.r.l.);
- railway undertakings;
- inland terminal/RRTs
- MTOs;
- Customs Agency and Finance Police.

3.1.3 Key actions

1) EDI on the relation Trieste – Bettembourg

This action is focused on the implementation of the interoperability with TX Logistik AG/Mercitalia Rail S.r.l. to reach a complete automatization of all procedures related to the intermodal rail service connecting Trieste to Bettembourg (Luxembourg). The action consists in enabling a two-way communication between the Sinfomar PCS and IT systems used by the railway companies. The exchange of logistical/customs data concerning inbound trains (e.g. position of the wagon in the train, wagon/container plate number, type of ITU, type and weight of goods etc.) is made possible by the creation of a Web Service using the Simple Object Access Protocol (SOAP). Real-time data is automatically collected through SOAP-based interoperability, allowing to know the exact position of the train for each timeframe. After such data is linked with information gathered by other modules in the Sinfomar PCS, it is easily accessible through a dashboard presenting the actual data concerning rail operations status and thus allowing better planning of future actions.

This action has been developed taking as a starting point an existing cooperation with Rail Cargo Austria (RCA) and that has allowed to reduce the time needed to handle train-related processes from 6-7 hours to 30-40 minutes.

2) EDI Port of Trieste - Fürnitz inland terminal

This action consists in the development and implementation of IT solutions for the creation of a cross-border logistic corridor between the Port of Trieste and the RRT of Fürnitz (Austria) which includes also control operations on the documentation concerning goods and ITUs by the respective Customs authorities. Also in this case, the followed approach has been to enable the communication between the Sinfomar PCS and the IT platform used by the rail carrier (RCA).

At the same time, this action is laying the groundwork for an upgrade in the interoperability between the Sinfomar PCS and the IT systems used by the Customs Agency (il Trovatore/AIDA) as well as for the standardisation of the rail waybill.

3) EDI Port of Trieste – Mahart Container Center

This action aims at capitalising the results of those described above, in that its objective is to upgrade the PCS module and functionalities whose data feed in the train-related documentation. In particular, the action will bring to the generation of the electronic waybill and achieve the interoperability between the Sinfomar PCS and the IT system used by Budapest Mahart Container Center (Hungary).

3.1.4 Aims

All actions result in a considerable reduction of the time needed to handle train-related documentation and ultimately the whole transport process, ensuring seamless freight flows and therefore contributing to make rail transport more efficient.

3.1.5 Problems faced during the implementation of the CAP

No particular problems arose from this activity.

3.1.6 Timescale for implementation

Actions no. 1 and 2 have been implemented and the respective functionalities are currently operational.

Action no. 3 is currently ongoing and its testing phase will be completed by December 2020.

3.1.7 Risk analysis

A risk linked to the implementation of similar actions is represented by the possibility of public procurement procedures incurring in delays, prior or following the selection of the external contractor(s) in charge of the technical development of the solutions required. Such a risk has been so far mitigated by putting in place joint tenders for actions having complementary scope, and taking into account in budgeting available resources, of the costs linked to maintenance activities.

However, given the very nature of IT solutions available technology evolves very quickly, therefore requiring a constant upgrade of realised tools.

3.1.8 Funding sources

EU funding:

1) Interreg Alpine Space Project, AlpInnoCT project: EUR 58,000;
2) Interreg Italy-Austria Programme, SmartLogi project: EUR 90,000;
3) Interreg Central Europe Programme, CoModalCE project: EUR 80,000.

3.1.9 Impacts on identified bottlenecks

The analysed actions enhance the coordination among several key stakeholders in the logistics chain and improve the efficiency of combined/intermodal transport services, both in the cross-border and transnational dimension. The most challenging bottlenecks concerning operations and namely, misalignments in the processes involving port-hinterland private and public actors will not be completely overcome by these measures, which can nevertheless be seen as a step forward in the right direction.

3.2 Upgrade of the Sinfomar PCS for streamlining inland freight flows

3.2.1 Introduction and goals

The use of ICT is even more crucial when considering the latest changes in the governance of regional ports and RRTs.

Legislative Decree no. 169/2016 reforming the Italian port sector envisages that the President of port authorities can seek integration and a common governance with inland platforms.

As from January 1st 2020, the Port Network Authority of the Eastern Adriatic Sea has gained competence over the Port of Monfalcone, which is located 30 km from Trieste and is dedicated to RoRo and general cargo, totalling more than 4 million tons of yearly total throughput.

Moreover, it is the second shareholder of the inland terminal of Trieste-Fernetti, which controls also the inland terminal of Cervignano.

These recent developments show the willingness of the Port Network Authority to play a pivotal role in the regional logistic systems. Also, the Three-year Operational Plan envisages the creation of a new integrated railway service system with the other regional logistic nodes, optimizing existing infrastructures and offering competitive services as an integrated "continental gateway".

Figure 9 – Ports (red) and RRTs (blue) in Friuli Venezia Giulia

This new situation implies a change in the mindset of policy makers and operators alike.

A shift from individual platforms often competing to one another, to integrated platforms in "Proximity Terminal Networks" has to be realized, in order to optimise the use of existing infrastructures and gain the critical mass that the Friuli Venezia Giulia Region has been lacking.

Also, the main feature of the Port of Trieste is represented by its legal status of International Free Port established by the Peace Treaty of Paris, namely its Annex 8. This entails that the Free Zone (FZ) areas enjoy a customs clearance exemption and are to be considered as external to the EU customs territory.

This peculiar legal status has been taken into account since the early stages of the design process of the Sinfomar PCS, when FZ areas were basically concentrated within port areas. However, recent legislative developments granted the Port Network Authority a greater role in the administration of such FZ, which has led to this status being extended to inland facilities such as the railroad terminal of Trieste-Fernetti and the new FreeEste area.

In line with its strategic priorities, the Port Network Authority has commissioned to an external contractor the development of new PCS functionalities whose aim is to allow the integrated management of, and seamless freight flows between inland Free Zone areas, in order to streamline infrastructure and minimise the risk of road congestion.

3.2.2 Stakeholders involved

- Customs Agency;
- RRTs;
- logistics services providers;
- terminal operators.

3.2.3 Key actions

The pilot action implemented within ISTEN consists in ensuring that goods arriving and departing from inland FZ areas are handled efficiently and in a standardised way within the Sinfomar PCS. Such facilities, located in a 10 to 30 km range from the Port of Trieste, are currently used as external buffer areas, where vehicles directed to the terminals can park while waiting for the authorization to enter the port gates, in order to avoid cramming port areas and to enable planning traffic flows.

To this end, a new PCS module has been created to allow the integrated management of the pre-arrival notification, containing all the customs data concerning cargo arriving in the Free Zone area and of train-related documentation (CH30) for FZ areas including railway branch lines.

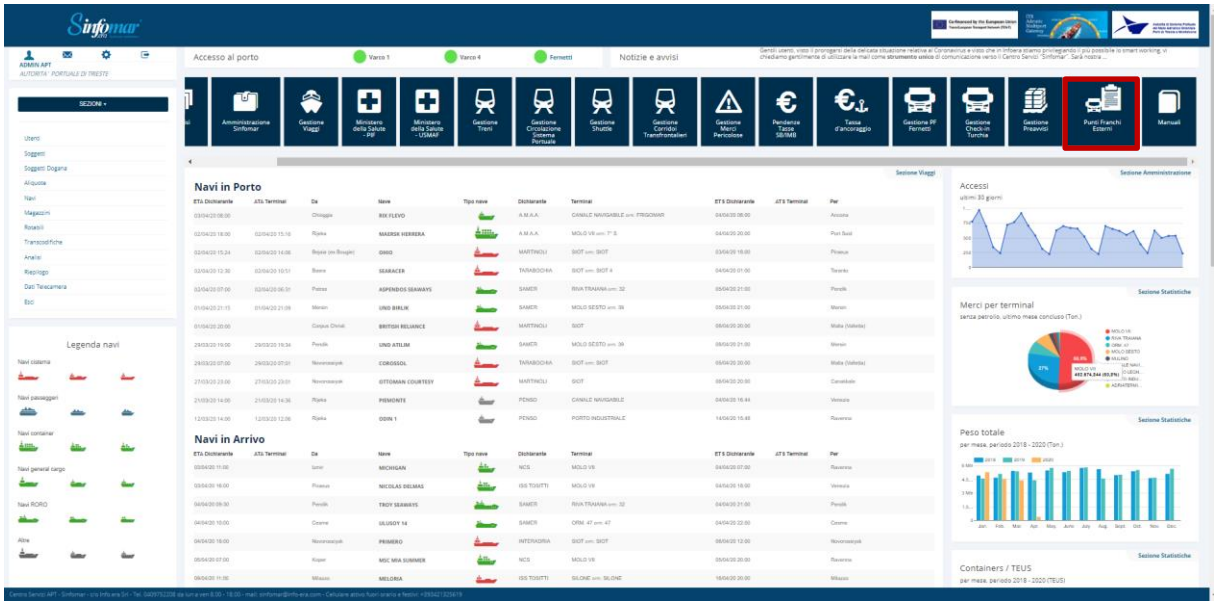

Figure 10 – New module in Sinfomar PCS

The customs regulations in force require all freight movements (inbound/outbound) to be collected in a registry in chronological order, with the indication of the respective customs documents. This registry contains the following data: number of customs operation, date of the operation, type and number of customs document, goods description, weight (net), reference number in the registry, goods quantity, goods position in the warehouses, reference to the transport document accompanying the goods in the FZ area, MRN (Movement Reference Number), type of handling operation.

The PCS module "External Free Zone areas" features the following functionalities working in real-time:

- management of pre-arrival notifications/incoming vehicles in the FZ area;
- management of vehicles in the FZ area;
- management of vehicles directed to the port of Trieste without using a customs corridor;
- management of vehicles directed to the port of Trieste using a customs corridor.

For the FZ areas connected to the railway network, the module integrates the management of the Train Freight Manifest (CH30) and additional train-related documentation to access data concerning trains, wagons, tracks and shuttle services.

Once selected the Free Zone area where the logistic activities are going to be performed, the preparation of the pre-arrival notification requires the fields displayed in the figure below to be filled:

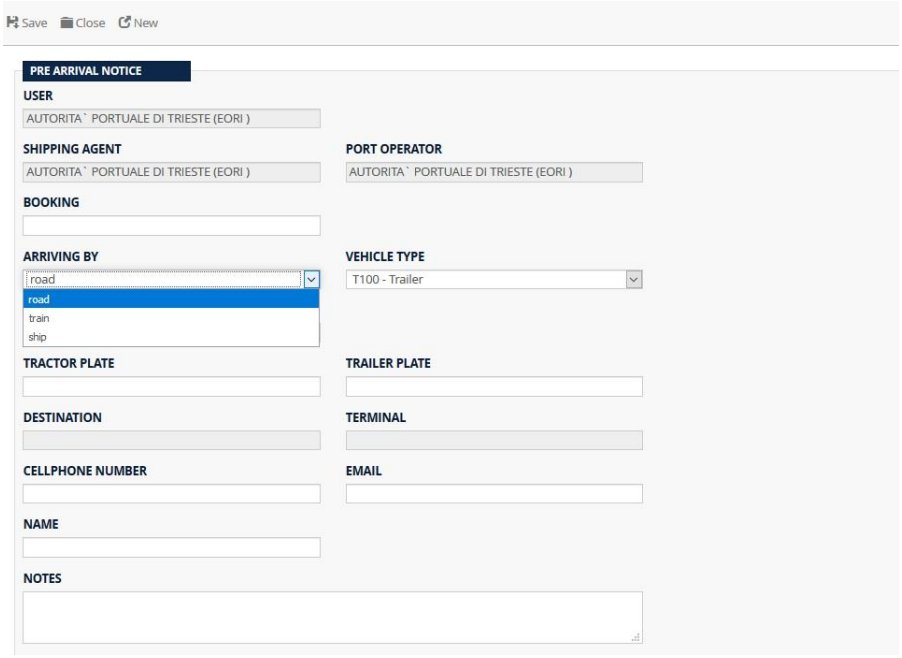

Figure 11 – Pre-arrival notification

Since the pre-arrival notification involves several stakeholders, this notification is automatically created for and accessible by the logistic operators working in the selected FZ area, as shown in the detailed forms depicted in figures 14-15-16 included in the Annex following Section 5.

In order to test the results of the action, an operator based in the so-called Old Free Zone area and specialised in metal logistics (Genoa Metal Terminal S.r.l., GMT) has been selected. The following figures show all the data that can be extracted from the pre-arrival notifications of vehicles within the company's area, including the status of the transfer authorization to a different logistics area (green/red light).

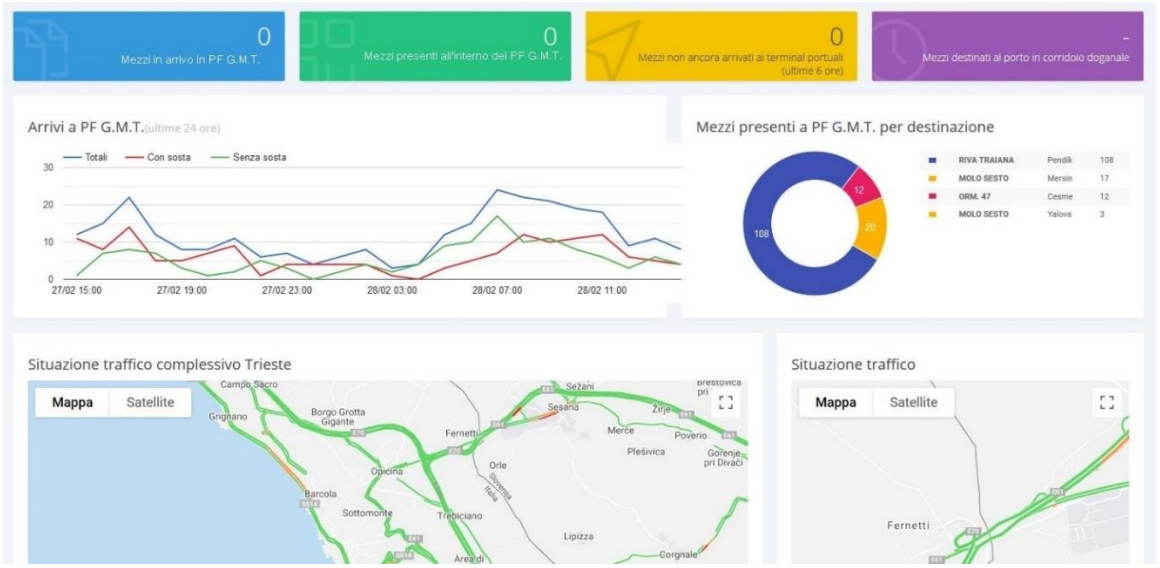

Figure 12 – Vehicles in the test FZ area

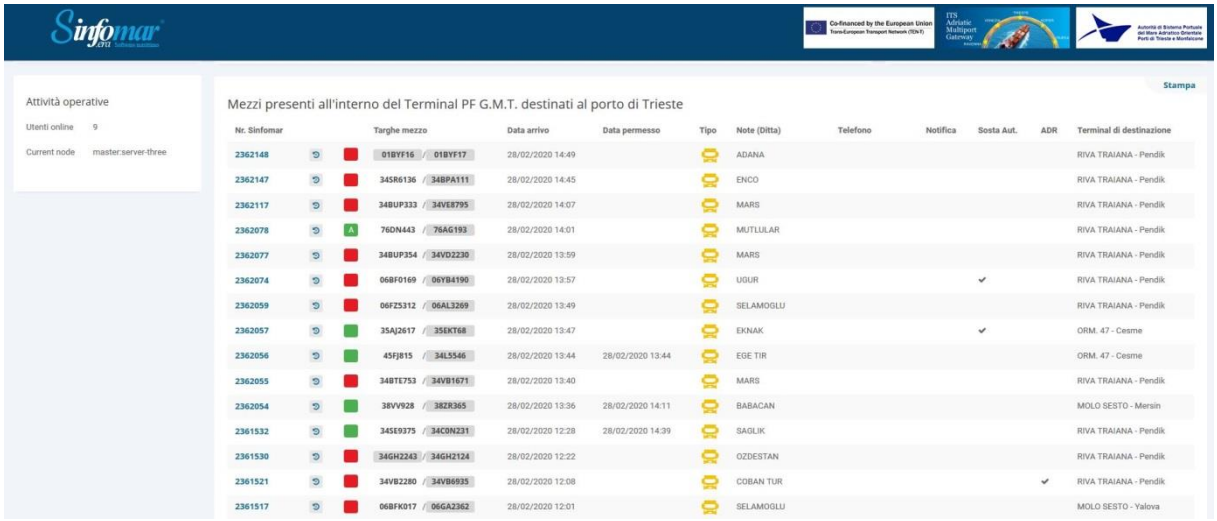

Figure 13 – Details concerning vehicles in the test FZ area

The results obtained in the ISTEN project, are capitalised in another project, "PROMARES – *Promoting maritime and multimodal freight transport in the Adriatic Sea*", co-financed by the Interreg Italy-Croatia 2014-2020 Programme. In particular, within the PROMARES project a new PCS module is currently being developed, to address the management of cargo movements between external FZ areas, using data captured from already installed cameras and ensuring freight traceability both for rail and road transport.

Complementary to the ongoing and future upgrading of the ICT tools in use in the Port Network Authority is the need to ensure that its staff are adequately prepared to use each and every of their functionalities, according to the respective roles and tasks required. To this end, a specific action aims at providing training on the new PCS modules, namely those devoted to rail traffic, and in general make the employees more digitally knowledgeable and aware of the potential of such tools.

3.2.4 Aims

This strand of actions aims at enabling the real-time management of inland warehousing and logistics areas, at the same time ensuring the visibility of freight movements between Free Zones.

3.2.5 Problems faced during the implementation of the CAP

No particular problems arose from this activity.

3.2.6 Timescale for implementation

After the design phase, which took place during the first half of 2019, the tender for the pilot action was awarded in October 2019. As foreseen, all the activities concerning the ISTEN project were finalised in February 2020, while the other (PROMARES) is expected to be completed by October 2020.

3.2.7 Risk analysis

As for actions described in section 3.1 above, the main risks are linked to possible delays in public procurement procedures and to the very fast pace at which available technology advances.

3.2.8 Funding sources

EU funding:

- Interreg ADRION Programme, ISTEN project: 48,000 euros;
- Interreg Italy-Croatia Programme, PROMARES project: 85,000 euros.

3.2.9 Impacts on identified bottlenecks

These actions further extend the scope of the Sinfomar PCS to provide the technological tools required to play the role of an integrated port-hinterland system, taking into consideration the limited space available for port expansion and responding to the need to avoid congestions in the road network by optimising the use of existing infrastructure and facilities. Similarly to actions described in section 3.1, these improvements represent pieces of a bigger picture towards the objective of an efficient and sustainable integration of infrastructure, processes and actors in the port-inland hub.

4 Conclusions

Needless to say, most of the actions included in this Action Plan will be more effective as long as carried out jointly with the others: solutions, like problems, are often linked and interdependent. At the same time, further bottlenecks to those closely addressed in this AP are positively affected by the implementation of the measures analysed.

The actions focusing on the railway hard and soft infrastructure of Port of Trieste, resulting in a further shift of traffic flows from road to rail will alleviate the congestion of the road network, increasing the competitiveness of the port-hinterland system and the environmental performance of the local logistics chain.

The ICT innovations concerning electronic data interchange with railway undertakings and inland facilities, will improve the communication and coordination among several key stakeholders in the intermodal and logistics chains, optimising the use of existing infrastructure and therefore contributing to the realisation of an efficient and sustainable port-inland system. As these measures are adaptable and transferrable to other terminals and facilities, they also benefit the implementation of an integrated network at regional level with other terminals and facilities the Port of Trieste is working or is willing to develop relationships with.

Overall, these actions contribute to the removal of bottlenecks and the bringing of missing links within transport infrastructures, to the optimal integration and interconnection of transport modes, especially maritime-rail and rail-road, and to the efficient use of existing infrastructure, thus being entirely in line with TEN-T policy objectives. Furthermore, Regulations (UE) no. 1315 and 1316/2013 set interoperability as one of the main EU targets.

In particular, the Global Project comprising albeit not limited to the actions described in section no. 2 of this Action Plan responds to the objectives of:

- removing a bottleneck in the further development of railway connections to/from the Port of Trieste;
- increasing the cargo total handling capacity of the Port of Trieste by streamlining cargo flows by train, overcoming the lack of space dedicated to storage;
- improving the competitive advantages of the southern route to Central and East Europe markets via the Port of Trieste, offering a valid alternative to North European ports, supporting a balanced European regional development and a reduction of north-south disproportions;
- valorising the role of the Port of Trieste as strategic factor for the growth and competitiveness of the Adriatic-Ionian area;
- developing the TEN-T core port of Trieste by improving hinterland accessibility;
- improving the integration of the Port of Trieste into TEN-T Core Network, mainly with the Baltic-Adriatic and Mediterranean Corridors;
- enhancing the development of multimodal hinterland connections of the Port of Trieste;
- increasing efficiency and reducing the environmental impact of transport systems, notably by providing alternative, sustainable and environmentally friendlier, as well as combined transport solutions.

The measures included in this AP, especially those focusing on the operational/innovation cluster are also fully coherent with key macroregional strategies, namely for the Adriatic-Ionian and Alpine regions. In fact, the Action Plan of the Strategy for the Adriatic-Ionian Region (EUSAIR) envisages actions such as:

- (maritime transport) developing ports, optimising port interfaces, infrastructures and procedures/operations; improving and harmonising traffic monitoring and management;
- (intermodal connections to the hinterland) developing Motorways of the Sea.

Complementary to these, the Strategy for the Alpine Region (EUSALP) foresees in its plan of action, the "promotion of intermodality", with specific reference to "optimising existing infrastructures between regional ports and terminals by new governance models and ICT tools", as agreed at the meeting of the Action Group no. 4 on mobility of 14th February 2017.

5 CANVAS Action Plans (CAPs)

In accordance with the common methodology for local action plans (DT2.2.1), CANVAS models have been used to outline, with the cooperation of local stakeholders, the main actions to be implemented in order to overcome the bottlenecks that are deemed to be high priority among those identified in the local context analysis – DT1.1.4.

For this reason, two separate CANVAS tables have been drafted, with reference to each of the clusters of actions identified, addressing infrastructural bottlenecks, on one hand, and operational and innovation ones, on the other.

5.1 Infrastructural bottlenecks

- Port infrastructure inadequate, incomplete or in poor condition.
- Inadequate capacity of hinterland transport networks.
- Inadequate soft infrastructure.

<table>
<tr><td>Stakeholders involved</td><td>Key actions</td><td>Aims</td><td>Problems faced</td><td>Timescale for implementation</td></tr>
<tr><td>- National infrastructure manager
- RRTs
- Terminal operators
- Railway shunting company
- RUs</td><td><u>TSCM</u>:
- Upgrade of the railway last mile connection
- Infrastructural and technological upgrade of the port marshalling yard
<u>Port railway network</u>:
- Reactivation of stations/railway lines serving the industrial port and inland terminals</td><td>- Full automation of the port marshalling yard
- Direct connection with all the New Port terminals
- Composition of 750-meter long trains
- Direct connection with Industrial Port and inland terminals</td><td>Matching priorities with available resources</td><td>2023 - 2025</td></tr>
<tr><td colspan="2">Funding sources</td><td colspan="3">Risk analysis</td></tr>
<tr><td colspan="2">Government allocations (RFI actions):
EUR 112,000,000
EU funding (PNA EAS actions):
EUR 45,500,000</td><td colspan="3">- Lack of funding
- Delays in joint project designing</td></tr>
</table>

5.2 Operational and innovation bottlenecks

- Not aligned operational processes of port-hinterland actors.
- Not aligned operational processes between operational & public (e.g. customs) actors.
- Limited breadth (or inadequate quality) of services provided by the port and/or the hinterland actors (e.g. logistics service providers, inland terminals).
- Inadequate cross-border coordination of port-hinterland corridor.
- Low innovation content in the services provided.
- Differentiated levels of digital skills of staff within the same organization or between different organizations or absence of adequate digital skills.

Stakeholders involved	Key actions	Aims	Problems faced	Timescale for implementation
- Customs Agency - RRTs - Logistics services providers - Terminal operators - RUs	- EDI with rail undertakings - Upgrade of the PCS functionalities for streamlining inland freight flows - Training activities concerning the IT tools in use to the PNA	- Reduced time to handle train-related processes - Track&tracing of cargo movements via rail - Real-time management of inland facilities - Visibility of freight movements among FZ areas	/	2020 - 2022
Funding sources		Risk analysis		
EU funding: - ISTEN project: EUR 48,000 - PROMARES project: EUR 85,000 - COMODALCE project: EUR 80,000 - SMARTLOGI project: EUR 90,000 - AlpInnoCT project: EUR 58,000 - PORTIS project: EUR 19,000 (training)		- Delays in public procurement procedures - Technology evolving very quickly		

Annex – Detailed forms available within the External FZ areas PCS module

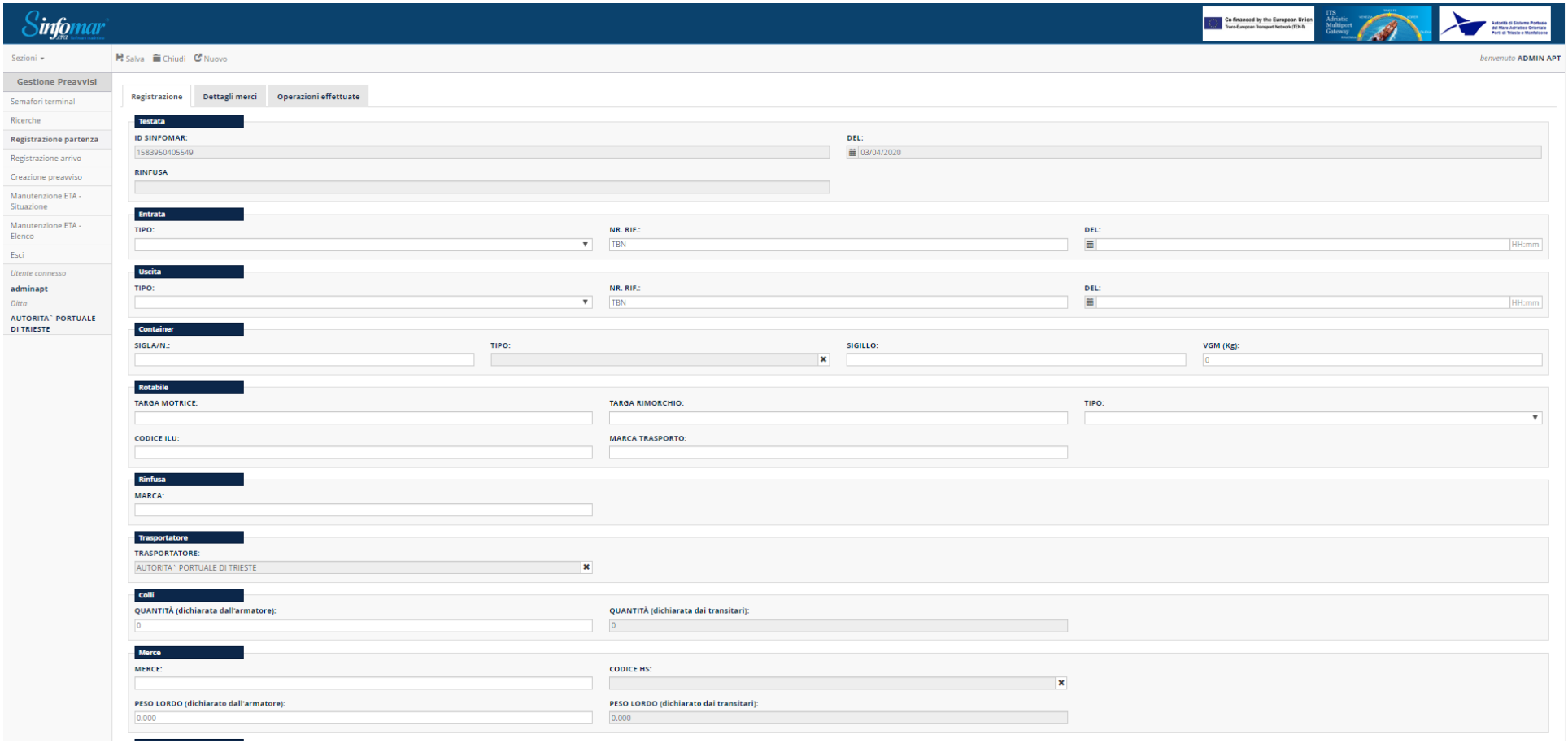

Figure 14 – External FZ areas: registration of vehicles in a pre-arrival notification

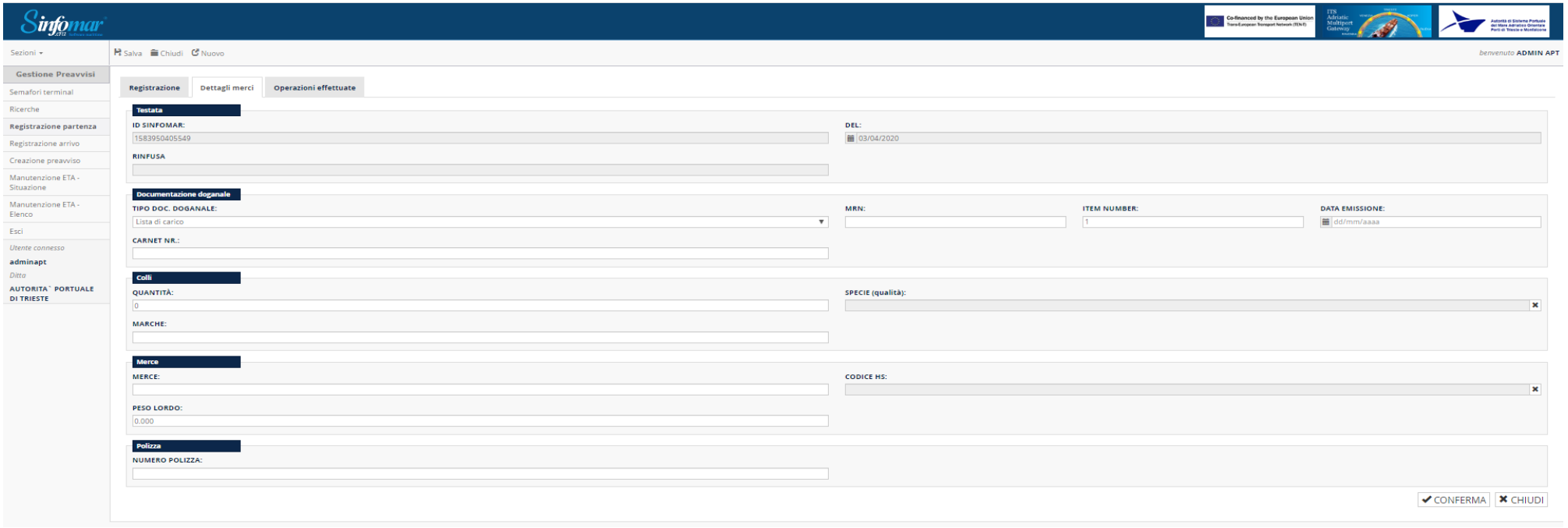

Figure 15 – External FZ areas: cargo details in a pre-arrival notification

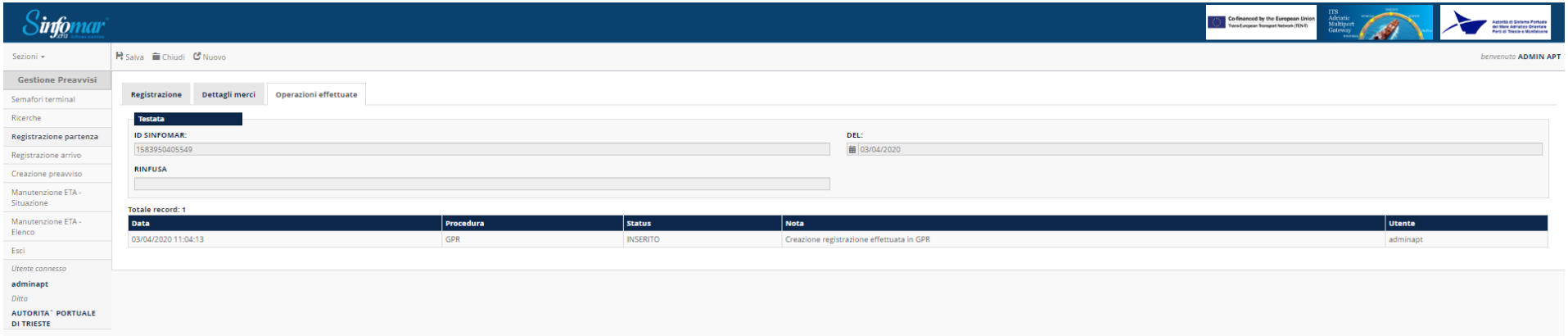

Figure 16 - External FZ areas: performed operations