PROMOTING MARITIME AND MULTIMODAL FREIGHT TRANSPORT IN THE ADRIATIC SEA (PROMARES)

Activity 3.3 - Analysis of the current situation on maritime and multimodal freight transport

D3.2.12. Analysis of the current situation on maritime and multimodal freight transport

D.3.3.3, Cross-border action plan for enhancing maritime and multimodal freight transport

Rijeka, Croatia, November 2019.

Interreg Italy - Croatia PROMARES

EUROPEAN UNION

Title: D.3.3.3 Cross-border action plan for enhancing maritime and multimodal freight transport

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Table of contents:

1 INTRODUCTION

This best practice analysis is compiled according to contract stipulated on 23.04.2019. between University of Rijeka, Faculty of Maritime Studies as a client and Aksentijević Forensics and Consulting, Ltd., as a contractor.

Project PROMARES – *Promoting maritime and multimodal freight transport in the Adriatic Sea* is facing challenges disrupting development of the sea and multimodal cargo transport in the program area. They are mostly caused by imbalance in development of multimodal traffic systems, weak coordination and communication between stakeholders and policy makers and non-alignment of measures and tools on cross-border level, leading to increase of road traffic with negative implications in form of pollution, greenhouse gas (GHG) emissions and noise pollution.

Goal of PROMARES project is to enhance sea and multimodal cargo traffic in all ports of interest that generate intermodal and multimodal transport flows, facing the same type of challenges of accessibility of multimodal transport and efficiency of TEN-T corridor in the region (from the port to inland), and increase level of cooperation and stakeholder cooperation. Focus of cooperation of PP11[1] is research of elements of multimodal transport system with final goal of creating a solid set of KPIs and testing models of their measurement.

Project duration is 30 months from January 2019., and cross-border action plan for enhancing maritime and multimodal freight transport until 30th October 2019.

Activity 3.3 of Promares project foresees the elaboration of a cross-border action plan for enhancing maritime and multimodal freight transport.

PP11 has therefore compiled a cross-border action plan for enhancing maritime and multimodal freight transport.

[1] PP11 is abbreviation for „Project Partner 11“, University Of Rijeka, Faculty Of Maritime Studies Rijeka

This cross-border action plan has been created after intermediate results of the territorial needs assessments and best practice analysis were discussed at the 2nd PSC[2] meeting, when a training seminar was also held by the WPL on the most recent policies and practices for enhancing maritime and multimodal transport, also outside the Programme Area.

Based on the results of the territorial needs assessments, the best practice analysis and the training session, WPL has drafted a cross-border action plan for enhancing maritime and multimodal freight transport, containing guidelines, priority measures and KPIs, to be tested in pilot actions (WP4) and laying the basis for the cross-border strategy

Envisaged deliverables of Activity 3.3 are the following:

1. D.3.3.1, best practice analysis: PP11 provides an analysis on the best practices on ICT tools and policies for enhancing maritime and multimodal transport. The scope will cover EU and international experiences.

2. D.3.3.2, cross-border training seminar: PP11 holds a cross-border training seminar, back to back with the 2nd PSC and open to stakeholders and invited institutions on the most recent policies and practices for enhancing maritime and multimodal transport, also outside the Programme Area.

3. D.3.3.3, cross-border action plan for enhancing maritime and multimodal freight transport: based on the results of the cross-border study (D.3.2.11) territorial needs assessment and the best practice analysis on ICT tools and policies (D.3.3.2), PP11 elaborates a cross-border action plan for the enhancement of maritime and multimodal freight transport, including KPIs, to be tested through the pilot actions (WP4) and serving as a basis for the crossborder strategy (WP5)

[2] PSC is abbreviation for „Project Steering Committee“

Cross-border action plan for enhancing maritime and multimodal freight transport is based on aforementioned:

1. the results of the cross-border study (D.3.2.12), and
2. territorial needs assessment and the best practice analysis on ICT tools and policies (D.3.3.2)

During study phase, by using means of e-mail, a request for suggestions for concepts to be encompassed by the dross-border action plan for enhancing maritime and multimodal freight transport was addressed towards the following identified stakeholders and participants in the project indicated by PP11:

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Feedback on the request was received and used as a guideline and indicated concepts and technologies have been included in the analysis.

The following TNAs and stakeholder involvement reports have been gathered and used as a foundation for the cross-border action plan:

1. D.3.2.2 TNA for the port of Trieste (final),
2. D.3.2.3 TNA for Port of Venice (draft),
3. D.3.2.4 TNA for Interporto di Trieste-Fernetti (final),
4. D.3.2.5 TNA for port of Ravenna (final),
5. D.3.2.8 TNA for port of Rijeka (final),
6. D.3.2.9 TNA for port of Ploče Authority (final),
7. D.3.2.10 Strategic analysis for Italian TNA, and
8. D.3.2.11 Reports on stakeholder involvement - elaborate reports on the feedback received by select stakeholders.

This cross-border action plan for the enhancement of maritime and multimodal freight transport, also includes KPIs, to be tested through the pilot actions (WP4) and serving as a basis for the crossborder strategy (WP5).

As metioned before this cross-border action plan consists out of two documents:

1. the results of the cross-border study (D.3.2.12), and
2. territorial needs assessment and the best practice analysis on ICT tools and policies (D.3.3.2)

D.3.2.12. Analysis of the current situation on maritime and multimodal fright transport was made by Venice International University basis Territorial Needs Assesment information provided by each project partner.

2 CROSS-BORDER ACTION PLAN FUNDAMENTALS

The following themes, challenges and chances are taken into consideration when developing the planned PROMARES cross-border action plan with KPI identification:

1. Keep individual stakeholders' tradition (traditional vs. new technological development approach),
2. Analyze involved ICT systems in order to adopt/react according to market needs identified in supply/demand section of submitted TNAs,
3. Encourage stakeholders to undergo change by implementation of new ICT systems, interconnections and synergies,
4. Highlight benefits for PPs & external stakeholders,
5. Improve existing networks / motivation of stakeholders,
6. Offering incentives,
7. Adopt requirements of changing (legal) rules & regulations,
8. Include the topic of intermodal shift in strategies (i.e. sectoral policies),
9. Cross-border cooperation between PPs,
10. Set the cross-border action plan as promotion campaign for the next WP,
11. Find right group of stakeholders who should be involved during execution of the cross-border action plan and creation of the strategy,
12. Take advantage of already implemented and ongoing ICT and digitalization projects,
13. Screening of ongoing projects to identify realistic possibilities.

A performance indicator or key performance indicator (KPI) is a type of performance measurement that evaluates the success of an organization or of a particular activity (such as projects, programs, products and other initiatives) in which it engages. In this context, it will serve as a measure for success of the future key pilot actions.

Considering there is an inherent need to understand what important, various techniques is to assess the present state of the project, and its key activities, are associated with the selection of performance indicators. These assessments often lead to the identification of potential improvements, so performance indicators are routinely associated with 'performance improvement' initiatives. As PROMARES project is relatively short and fast-track, propose KPIs will not be formally proposed as a part of wider management framework such as the balanced scorecard, that would otherwise be advisable.

Key performance indicators define a set of values against which to measure. These sets of values, which can be fed to systems that aggregate the data, are called indicators.

There are two categories of measurements for KPIs that could be used within context of the PROMARES project:

1. Quantitative facts without distortion from personal feelings, prejudices, or interpretations presented with a specific value - objective- preferably numeric measured against a standard.
2. Qualitative values based on or influenced by personal feelings, tastes, or opinions and presented as any numeric or textual value that represents an interpretation of these elements.

All proposed KPIs will be quantitative fact-based KPIs, as they are most suitable for identified purpose.

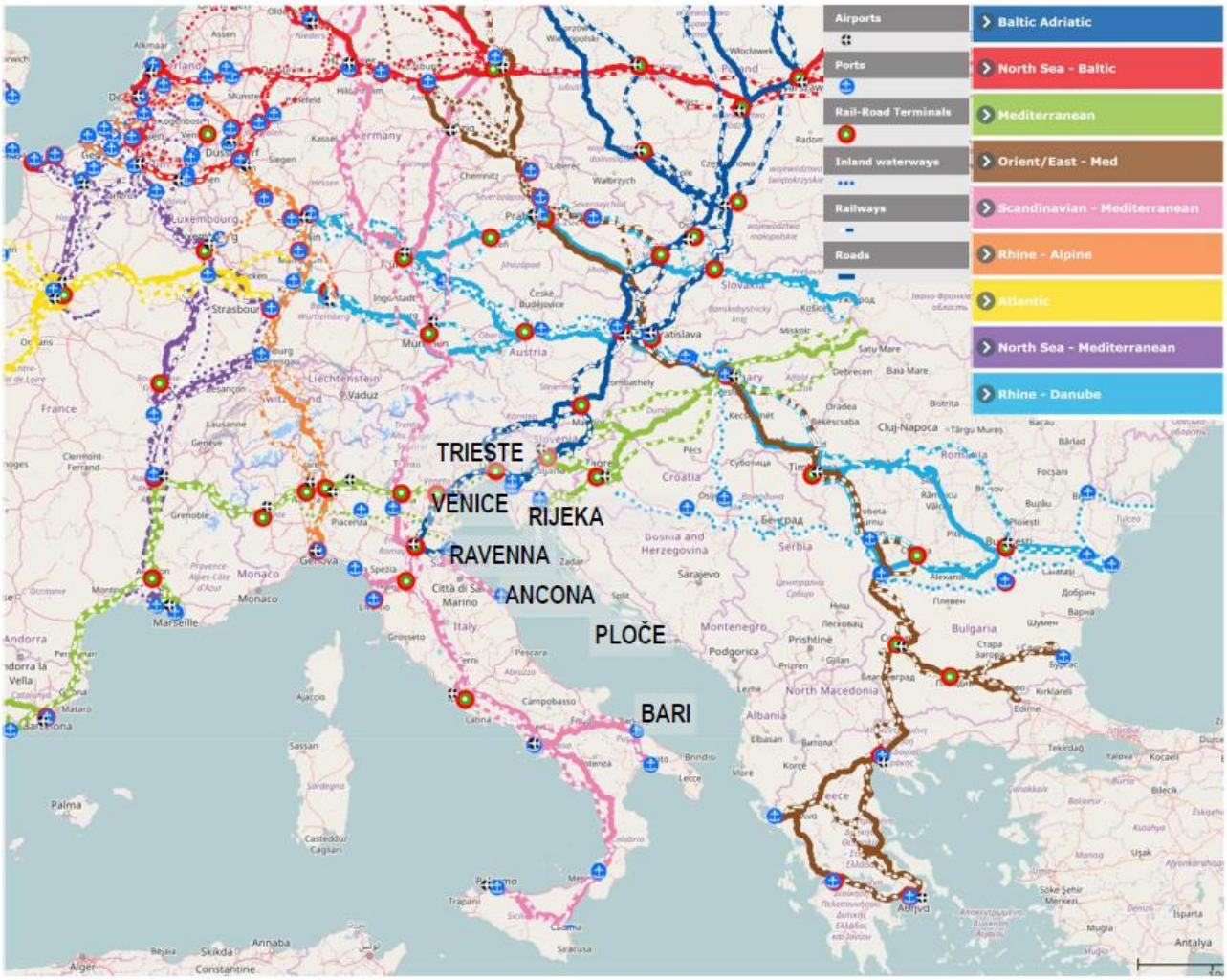
An 'indicator' can only measure what 'has' happened, in the past tense, so the only type of measurement is descriptive or lagging. Any KPI that attempts to measure something in a future state as predictive, diagnostic or prescriptive is no longer an 'indicator' it is a 'prognosticator' - at this point it is analytics (and it could possibly base on a KPI).

Proposed KPIs will follow widely adopted SMART criteria. This means the measure has a Specific purpose for the project, it needs to be Measurable to really get a value of the KPI, the defined norms have to be Achievable (as otherwise, proposed KPIs would not make sense), the improvement of a KPI has to be Relevant to the success of the PROMARES project, and finally it must be time phased, which means the value or outcomes are shown for a predefined and relevant period that can be successfully measured for the limited duration of the Interreg PROMARES project.

In order to be evaluated, KPIs are linked to target values, so that the value of the measure can be assessed as meeting expectations or not.

3 CROSS-BORDER STUDY ON MARITIME AND MULTIMODAL FREIGHT TRANSPORT

3.1 SUMMARY OF TERRITORIAL REQUIREMENTS AND COVERAGE



3.5.1 3.1.1 Interporto di Trieste-Fernetti / Port of Trieste

The Port of Trieste is the main port of the Region dealing with a vast range of traffic. The public body in charge of its management is the Port Network Authority of the Eastern Adriatic Sea, whose primary task is to direct, plan, coordinate, promote and control port operations and commercial and industrial activities in the port (according to the Law no. 84/1994 as amended by the Legislative Decree no. 169/2016).

The Port of Trieste is also terminal of regular and direct oceanic connections with the Far East, with calls in several ports in the Mediterranean basin, carried out by the main world shipping companies.

More than 200 trains per week connect Trieste to the productive and industrial areas in North-East Italy and in Central Europe, with several destinations, like Germany, Austria, Luxembourg, Slovakia, Hungary, Belgium and Czech Republic serving an extremely varied economic hinterland with a growing development. To reach the reference markets in Central and Eastern Europe highly specialized logistics services have been developed, in particular direct trains organized by the company Alpe Adria S.p.A., a neutral multi-costumer operator that arranges “all-in” packages.

The main favorable features of the Port of Trieste are briefly listed as follows:

- Deep seabed and optimal nautical accessibility (18 meters depth).
- Availability of disused industrial sites that can be reconverted.
- High operating margins for the container traffic, Ro-Ro and various goods sectors.
- Multifunctionality of the port, operating in all traffic sectors.
- Excellent location with respect to the markets in Central and Eastern Europe.

Shortcomings concern primarily:

- Insufficiency of parking areas.
- Limitations of the internal and backbone railway network.

The Port of Trieste operates in several areas:

- Old Free Zone: this is the "historical" port of Trieste. This area has been assigned to the ownership of the Trieste Municipality.
- New Free Zone: this is the heart of the "new port" with two Ro-Ro terminals (Pier V and Pier VI) and one container terminal (Pier VII).
- Timber Terminal: it is currently dealing with various goods in packages. After completing the construction of the so called "Logistics Platform" this terminal will be converted into a mixed container&Ro-Ro terminal and will act as basement of the future Pier VIII.
- Oil Free Zone: dealing with the arrival of mineral oils that, routed through pipelines, reach several destinations in Central Europe.
- Industrial Free Zone: dedicated to the industrial zone of Trieste, managed by the Consortium for the Local Economic Development of the Giulian Area; the Port of Trieste is its majority shareholder.

Within context of the port of Trieste, there are also other ports and operating terminals of micro-locational importance, described as follows.

The Port of Monfalcone is located in the most northern part of the Mediterranean Sea and overlooks the inner part of the Gulf of Trieste. The access channel is 4500 meters long and 11.70 meters deep. The Portorosega pier is 1460 meters long with a variable depth from 6.5 meters of the old part to 11.70 of the new one.

According to the Regional Law n. 12/2012 the Region has acquired competence in the field of granting concessions of sea State property and authorizations to the undertakings operating the port field. In the port area there are also a Special Agency for the Port of Monfalcone dealing with promotion and infrastructures and the "Consorzio per lo Sviluppo Economico del Monfalconese" with competence in infrastructure matters. The main goods treated are cellulose, paper, timber, forest products, steel products, kaolin, marble, coal, cereals and cars.

The railway connection to the Venice - Trieste and Tarvisio - Trieste lines is ensured by a special railway siding. Moreover, an additional railway ring has been built, that allows the formation of trains already inside the port.

Trieste intermodal terminal located close to the Italian - Slovenian border of Fernetti (Trieste), is an infrastructure dedicated to intermodal logistics. It plays an important role as dry port of Trieste, Monfalcone and Capodistria and its second shareholder is the Port of Trieste.

Terminal areas has a total of 350,000 square meters: 160,000 square meters are covered by infrastructure areas, 30,000 square meters of covered warehouses, both domestic and foreign for storage of goods under ADR and HACCP, 50,000 square meters of aprons and 80,000 square meters of parking areas for heavy vehicles. For railway services, six tracks are available, divided into two operational beams

Cervignano del Friuli Intermodal terminal is the biggest one in the Region, with the ambition to become the dry port area for all the three regional ports - it is 11 km away from Porto Nogaro, 29 km away from Monfalcone and 48 km away from Trieste.

Its main features are listed as follows:

- Structured area of 464,000 square meters.
- Warehouses (24,000 square meters): two covered connected warehouses (12,000 square meters each).
- Intermodal parking area (160,000 square meters, 1,000 meters long, about 150 meters wide).
- 6 railway tracks, each 750 meters long.
- Roof for freight shelter (covers over 17,500 square meters), partly equipped with an overhead crane with 12.5 tons capacity.
- A parking area for heavy vehicles.
- Total length of the railway siding: 3.5 kilometers.
- Capacity of 20 intermodal trains per day plus 6 conventional ones.

Two railway lines cross the terminal:

- Venezia - Trieste – Mediterranean Corridor
- Cervignano del Friuli - Palmanova - Udine - Tarvisio – Adriatic-Baltic Corridor.

Autoporto di Gorizia – Gorizia terminal's logistics infrastructure is owned by SDAG, the public company managing the Gorizia freight terminal, comprises the freight terminal and the border station of S. Andrea. Autoporto of Gorizia extends on an area of 600,000 square meters and offers a wide range of logistics and transport services from and to Central Europe.

The Autoporto was designed in order to become a service center for goods, for the storage and consolidation of cargoes, while the Station S. Andrea represent a modern and equipped system for safe stop services.

Intermodal terminal - Centro Ingrosso di Pordenone - With its 160,000 square meters the Intermodal terminal of Pordenone has an infrastructure for the railway and terminal activities. There are 7 rail tracks, 3 of which are electrified (each is 800 meters long) and 4 are operating tracks (700-750 meters long). The potential operability of the area is up to 8/10 trains per day and 34,000 Intermodal Transportation Units (UTI) per year (approximately 24,000 trucks).

The platform is designed for receiving Ro-La trains and is set up for the installation of gantry cranes. In the warehouses connected by sidings (40,000 square meters) long term or short-term storage of Intermodal Transportation units is possible.

The parking areas are designed in order to allow all the operations of management of vehicles and transport units in total security.

3.5.2 3.1.2 Port of Venice

The Port of Venice is also the northernmost terminal of the Motorways of the Sea that cross the Eastern Mediterranean and connect Central Europe with North Africa and the Middle East. The Port of Venice is one of the major European ports for project and general cargo, and one of the main ports in the Adriatic for the number of containers handled. A leader in many traffic segments, it is the only port in Italy to benefit from a river port providing freight transport by barge along the Po river.

Given its the location, the Port of Venice, plays a relevant role as a gateway and logistics service provider to the North of Italy and more specifically the Eastern Lombardy, and other international destinations, such as Central and Eastern Europe (e.g. Southern Germany, Austria, Switzerland, etc).

The role of the Port of Venice as key interconnection node of transport flows between the South-Eastern countries and the Central-North countries is recognized by the inclusion of the port in the list of "Core seaports" of the new TEN-T Regulation (EU Regulation n. 1315/2013). The Port is a crossroads of three out of the nine multimodal TEN-T Core Network Corridors:

1. the Mediterranean Corridor, that links the Iberian Peninsula with the Hungarian-Ukrainian border, including also the Po river and other inland waterways in Northern Italy; it allows the connection of Venice with the North of Italy and with the Balkans;
2. the Scandinavian-Mediterranean Corridor, that is connected with the previous corridor in Verona allowing the flows of goods and passengers towards Germany and Scandinavian countries;
3. the Baltic-Adriatic Corridor that connects the Baltic and the Adriatic Sea, linking Venice with the Central Eastern European countries.

The port has been also considered as "core inland port in the TEN-T core network.

The Port of Venice is defined by the EU Regulation n. 913/2010 as a node of the:

1. Freight Corridor n.5 (Gdynia-Katowice-Ostrava/Žilina-Bratislava/Vienna/Klagenfurt-Udine-Venice/Trieste/Bologna/Ravenna/ Graz-Maribor-Ljubljana-Koper/Trieste).
2. Freight Corridors n. 6 (Almería-Valencia/Madrid-Zaragoza/Barcelona-Marseille-Lyon-Turin-Milan-Verona-Padua/Venice/ Trieste/Koper- Ljubljana-Budapest-Zahony.

The river network Padano-Veneto is an important alternative to reach the markets of origin/destination centre north (Lombardia and west Veneto areas). The river system is an alternative to the road network infrastructure that is currently being used to serve the areas of origin/destination of the goods in view of the excellent road accessibility of the port of Venice, directly connected to the main roadways of the northeast. The inland waterways connections, the Idrovia Padano – Veneta, has been included in the TEN-T network and it is part of multimodal Mediterranean Corridor. The main ports of this "network" are Venice, Chioggia, Porto Levante and Mantova.

3.5.3 3.1.3 Port of Ravenna

The port of Ravenna is the main maritime harbor of the Emilia-Romagna region, in Northern Italy. Its location in the Central-North Western side of the Adriatic Sea and in one of the most dynamic economic regions of the Country has favored its infrastructural and economic development. Unlike other Italian ports, Ravenna has the advantage of not being completely included in the urban context.

Over time, the port of Ravenna has been transformed from an industrial to a commercial port, distinguishing itself with the development of shipbuilding and the transport of solid bulk.

Nowadays, the port of Ravenna is one of the largest ports in Italy for the handling of solid bulk: it is a leader in the landing of raw materials for the ceramics, cereals, fertilizers and flours industry. It is also an important point of arrival for various goods, such as timber and metallurgical products, in particular coils.

Within the port, along the two banks of the Candiano Canal, there are also various refineries and petrochemical industries, linked to the methane fields present some miles away from the coast. In fact, one third of the methane gas consumed in Italy is produced by the Ravenna offshore plants.

The main traffic basin of the port of Ravenna consists of the Eastern Mediterranean Sea and the Black Sea, where it is a leader in container traffic. It is also relevant for the RO-RO cabotage services, especially with Sicily.

The European Commission has appointed the Ravenna seaport "Core port" of the TEN-T Networks.

The port of Ravenna extends along the entire state-owned area of a canal, the Candiano Canal, that connects the town centre of Ravenna (which is inland) to the sea. The Candiano Canal is 14 km long. Its maximum depth is currently 11.5 m. It offers 14.5 km of docks and operational quays, currently used by 27 terminal operators.

The port of Ravenna hosts shipyards, multipurpose terminals, bulk cargo terminals and a containerized cargo terminal. Ten port terminals are connected to national railways by means of various bundles of tracks, that inside the port reach the length of 35 km. In economic terms, the result is that approximately 12% of the goods transiting in the port continues by train.

The total area of the port is 21 square km, its storage capacity consists of more than 600 thousand square meters of warehouses and 1.3 million cubic meter of storage tanks. Yards occupy an area of 1,350 thousand square meters.

The port of Ravenna is connected to the main Italian and European road by motorways and highways and to rail networks by the railway station of Ravenna city. It is connected to road networks by the Ravenna ring road (composed by parts of the national highways SS16 Classicana, SS309 Romea, SS67) that links it to the motorways A14 and E45.

The last mile connections of the port of Ravenna to the national road network are Baiona Street and the last section of the SS67 Romea road. They run along the two sides of the Candiano Canal. Baiona Street is on the north side of the canal, it is a two-lane carriageway. The SS67 Romea is on the south side of the canal, it has two carriageways and two lanes per direction.

Both road accesses are directly linked to the urban ring road, and through it to the regional and national intercity road network.

The Port of Ravenna is connected to the national and international railway network by four rail lines: the Castel Bolognese – Bologna line, some alternative routes that are connected to the Ravenna-Ferrara line, the Ravenna – Rimini line, the Ravenna-Russi-Granarolo-Faenza-Rimini line. The first two lines link up the port with the rest of northern Italy, the Brenner, northern and eastern Europe. The last two lines connect the port with southern Italy.

They are four electrified single-track lines that allow the connection of the port to the national railway system. Two of these lines (i.e. Ravenna – Granarolo/Faenza and Ravenna – Castel Bolognese) are used for freight transport as a double-track line to connect Ravenna with the Adriatic railway line between Bologna and Rimini.

Despite the relevance of rail transport, the port of Ravenna cannot benefit from an optimal connection to the national network, which causes long train operating times. These are further penalized by the interferences occurring in the urban areas, especially on the line south of the Candiano Canal and due to the need of trains to transit through the city station.

In the Emilia-Romagna region there are numerous areas used for logistics, cargo handling and modal interchange. These are generally large areas in which several operators in the logistics sector work for third parties. The strategies of regional territorial planning are oriented to support these areas.

One of the declared objectives of regional territorial planning is the integration of logistic nodes and transport networks. So, in 2009 the Emilia-Romagna Region and the FS Group signed a Program Agreement with the aim of rationalizing the transport services of goods managed by RFI. Local authorities and operators agreed to concentrate activities in 9 plants on the RFI network, in addition to the main private connections already active.

3.5.4 3.1.4. Port of Ancona

The Port of Ancona is located in the middle of the Italian Adriatic coast, precisely in the Gulf of Ancona, between two hills. Its natural position allowed since roman period to be a strategical point of reference and a natural safe shelter for navigators and sailors. The city is situated between the slopes of the two extremities of the promontory of Monte Conero, Monte Astagno and Monte Guasco and it represents the main economic and demographic center of Marche Region. Ancona area is characterized by a hilly landscape with numerous valleys and by the presence of several beaches, both rocky and sandy. Ancona area is classified as medium-high seismicity zone (level 2) by the Italian civil defense.

Figure 1: Layout of Ancona and its port

In the following table distances between Ancona area and the main Italian metropolitan areas are reported. Looking at the figures, it is clear to understand that the ports which are easier to interact with for the Port of Ancona are the Adriatic ones (Trieste, Venezia, Ravenna, Bari).

DISTANCE FROM ANCONA	DISTANCE (in a straight line)	DISTANCE (BY ROAD)	DISTANCE (MARITIME)
ROMA	206 km	300 km	/
MILANO	400 km	428 km	/
TORINO	491 km	545 km	/
FIRENZE	183 km	321 km	/
NAPOLI	311 km	417 km	700 NM
VENEZIA	225 km	362 km	125 NM
TRIESTE	230 km	509 km	128 NM
RAVENNA	138 km	163 km	71 NM
BARI	390 km	461 km	209 NM
GIOIA TAURO	609 km	845 km	519 NM
GENOVA	376 km	506 km	1010 NM

Table 1: Distance between Ancona area and the main Italian metropolitan areas

Regarding road infrastructures, Ancona is directly connected to the A14 highway, while the port is linked with the highway through the national road SS16.

The city of Ancona is connected to the national railway network, precisely to the Adriatic railway line, through the central station situated near the port along via Flaminia.

Figure 2: Railway network of Marche region

Ancona area is served by Ancona-Falconara airport, situated at 18 km west from the city of Ancona, with which is connected through a bus service and an airbus service. Moreover, the Castelferretti-Falconara Aeroporto station links the airport and the city of Ancona through the railway network, while by road there is a connection between the airport with the A14 highway through the State Road 76.

The current markets of the Port of Ancona are mainly related with passenger transport and cargo transport. Indeed, the port is the main logistic hub of central Adriatic coast and it is one of the main Italian port for international passenger traffic by ferries. The main market is represented by Ro-Ro traffic, with intense traffic flows of trucks and therefore Ro-Ro freight. The main routes involve the Adriatic Sea and the Adriatic ports. Precisely, intense relations for cargo and container traffic are entertained with the ports of Trieste and Gioia Tauro in Italy, and with Piraeus in Greece. For international routes, intense traffic flows are recorded with Igoumenitsa and Patras (Greece), Split and Zadar (Croatia) and Durres (Albania), especially regarding passenger transport and Ro-Ro freight transport. To summarize, Port of Ancona current markets mainly include:

- Passenger traffic (ferry and cruise);
- Freight traffic (bulk, general cargo, container);
- Fishing;
- Shipbuilding;
- Pleasure boating.

Beyond the maritime routes, the Port of Ancona has intense freight traffic flows towards the hinterland, especially in Marche region and central Italy (Abruzzo, Umbria, Romagna).

From the point of view of infrastructures, the Port has 26 quays, including wharfs, piers, docks, layovers and a first inner harbor. Most of them are used for passenger traffic and freight traffic. The average draft is around 11.80 meters, while the allowed maximum length of the ships is about 275 meters.

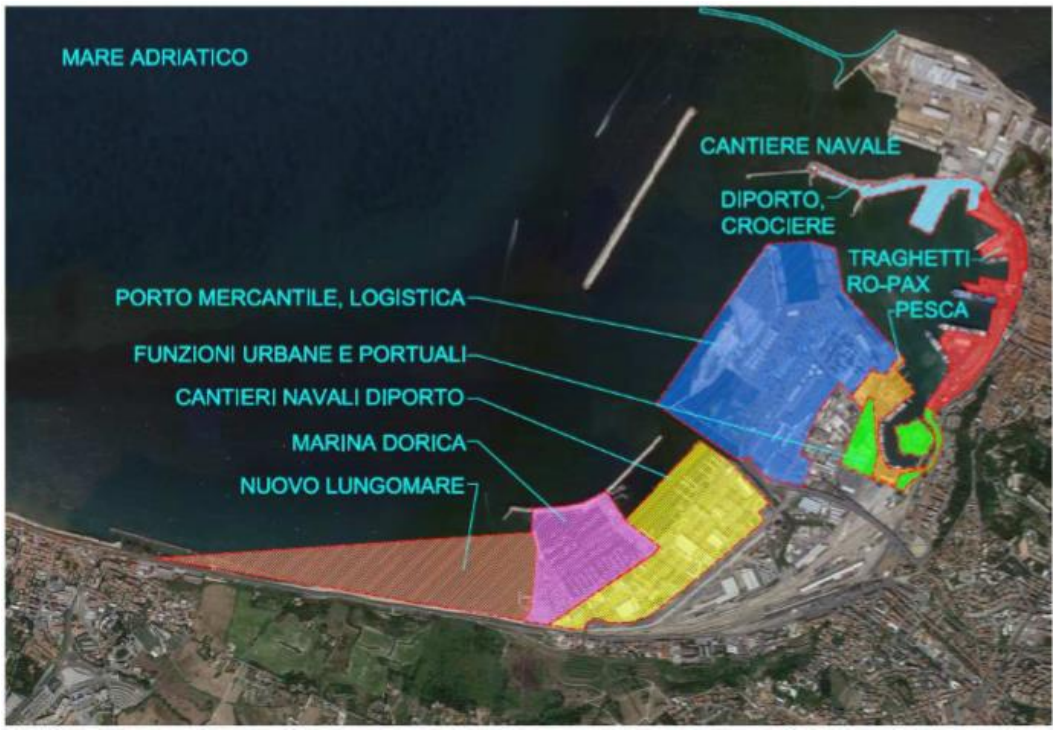


Figure 3: Port areas split according to the use destination

The quays are equipped with stationary cranes, unloading cranes, electric mobile cranes, hydraulic mobile cranes, pneumatic grain elevators.

The shipyards involve more than 1,000 workers which are operative in activities with over 700 units mainly deal with the oceanographic research ships, ferries, tugboats, supply vessels, fast luxury yachts and coastal fishing vessels.

The Port of Ancona is equipped with medical facilities and ICT tools like a VTMIS system, an ICT system for traffic information, an app for the passengers in transit, free wi-fi for port users, a monitoring system for customs activities and the check of sediments and excavations in the port area, and a tracking system for boarding and disembarking of ferries.

Thanks to intersection between Maritime/Ro Ro traffic, rail traffic and road traffic, the intermodality potential in the Ancona Area is intense. This highly qualifying situation gave the possibility to Port of

Ancona to be included as core node in the TEN-T network, specifically in the Scandinavian-Mediterranean (ScanMed) Corridor. Moreover, the requalification of Italian Motorways of the Sea (Autostrade del Mare) has allowed to consider the Port of Ancona as a strategic point for the trade between South West Europe and West Mediterranean countries, of which imports and exports are foreseen to increase, and Italy, Central and North West Europe.

This intense traffic and high consideration of the last years for the Port of Ancona highlighted the pivotal necessity to find out a sustainable solution for handling and faster these traffics to their destinations, without negative impacts in urban area, mainly related to congestion and pollution.

The shift from ships to trains of trucks and trailers is possible directly inside the port through a short path (about 2 km) from the docks to the railway area passing inside the port area. In order to avoid congestion because of overlapping with other port activities (particularly passenger traffic) usually the vehicles which need the railway transportation are the last ones to be unloaded from ferries. Once on the railway Adriatic line, the trains arrive to Bologna where they can head towards north of Italy and northern Europe.

3.5.5 3.1.5. Port of Bari

Apulia is a region in Southern Italy bordering the Adriatic Sea to the east, the Ionian Sea to the southeast, and the Strait of Otranto and Gulf of Taranto to the south. The region comprises 19,345 square kilometres (7,469 sq mi), and its population is about four million. Puglia is the easternmost region of Italy and one of those with the greatest coastal development with an extension of the coasts of about 865 km. Its territory is flat for 53%, hilly for 45% and mountainous only for 2%, which makes it the least mountainous region of Italy, and has a typically Mediterranean climate.

Southern Italy, favours maritime traffic which is 60% of the entire transport chain, with a value significantly higher than the national average. The overall movement of solid (46%) and liquid (47%) bulk represents on average 43% of the entire national movement, with a positive impact on the presence of maritime enterprises equal to 33% of the national figure.

The production equipment of Puglia have for many years taken on particular importance not only for the economy of southern Italy, but for the entire country. The overall dimensions of the total added value of economic and industrial activities in the region in 2015 were the following:

- Total economic activities (€ million) 64,665.3
- Value added industry (€ million) 11,253.3

The existence of a massive infrastructure system serving the movement of goods and passengers in the region - six major ports in Puglia (Bari, Brindisi, Manfredonia, Barletta, Monopoli, Taranto), four international airports in Bari, Brindisi, Grottaglie, Foggia and three military airports operating in Gioia del Colle (BA), Amendola (FG) and Galatina (LE), the Interporto of Bari, logistic platforms, railway networks of FS and Railways under concession, highways and state roads). This system needs completions, technological improvements, functional connections, 'last mile' interventions, but it is already endowed with a significant consistency, thanks to massive investments made over the last thirty years, underway for some time or just started, in ports and on roads, airports and railways - and of intermodal articulations of increasing use. Most of the movement of goods produced in Basilicata, moreover, gravitates on port and railway nodes of Puglia, while a smaller part - but no less significant for some goods, such as cars built in S. Nicola di Melfi and destined for export to the United States - gravitate towards the ports of Civitavecchia, Naples and Salerno.

The Southern Adriatic Sea Port Authority gathers together the Ports of Bari, Brindisi, Manfredonia, Barletta and Monopoli all along the western Adriatic coast of Italy. The five-port infrastructure includes 57 quays of approximately 10km of total quay length, all connected to the rail and road network and served by two major international airports.

The newly formed Southern Adriatic Sea Port Authority is a public body having as its primary task to direct, plan, coordinate, promote and control port operations and commercial and industrial activities in the port. Located in the Puglia region, the Authority’s geographical scope comprises several ports: Bari, Brindisi, Manfredonia, Barletta, and Monopoli.

The carriers calling these ports ensure, among other things:

- Feeder, ro-ro and ro-ro pax connections for regional and extra-regional export imports;
- Transportation of cars and passengers to and from countries on the other Adriatic shore;
- Transit and embarkation of foreign tourists on cruise ships;
- Loading and unloading of raw materials and energy sources, as well as of various materials.

Port of Bari is traditionally considered Europe's door to the Balkan Peninsula and the Middle East, and is a multipurpose port able to meet all operational requirements. It is located in the city center between the historic city center and the San Cataldo area and covering area of about 260 thousand square meters. Historical port and rich in historical and cultural relevance including the Bourbon dock.

The main features of the port of Bari are the following:

- 285 hectares of basin.
- Docks equipped for all types of commercial traffic (dry and liquid bulks, containers, goods in packages, steel products, etc.)
- Docks serving ro-ro and ro-pax ferry boats (Albania, Greece, Croatia and Montenegro)
- Docks serving cargo (from/to Mediterranean Sea and Black Sea)
- Docks serving cruise ships and related accommodation
- Port Core along the Helsinki-Valletta corridor
- Services of mooring, pilotage, security, and other services related to passengers
- Port Community System (GAIA)
- PMIS - Port Management Information System
- Collection and disposal service for ship-generated waste and cargo residues

The current configuration of the Port of Bari is the result of a series of interventions that have followed over time as new needs arose or particular trends emerged in the sector maritime transport.

The port area extends for about 285 hectares with a total development of operational docks of approximately 3,800 ml, affected by different and heterogeneous types of traffic in transit, which have the exchange both of goods (conventional, black and white bulk, Ro-Ro and cars and steel products), both of passengers (cruises and ferries), increased in recent years thanks to the new Terminal structure Cruises, and ferry traffic with Croatia, Montenegro, Albania and Greece.

The port area is separated from the rest of the city by a perimeter fence, which delimits the basin.

The stretch of water of the Port of Bari of approximately 209 hectares is artificially protected by the Molo Foraneo dam (breakwater), which opposes the actions generated by the marine weather climate of the neighbourhood, and in particular by the waves coming from the main wind. In the Port of Bari the following docks are identified in Darsena di Levante, Darsena di Ponente, Darsena Interna and Darsena Vecchia.

The Port of Bari is not connected to the national railway network, so its modal share is represented by 100% of road transport. To encourage rail transport, the Interporto Regionale della Puglia offers to logistics companies and freight forwarders the opportunity to use its intermodal terminal. This comprises of 4 tracks used to organize trains to transport all types of containers, swap bodies and semi-trailers on national and international routes. The terminal also offers a storage area for containers and other facilities (groupage, maintenance, etc.).

3.5.6 3.1.6. Port of Rijeka

Port of Rijeka is a multi-purpose port whose manipulations include all kinds of cargo along with the passenger movement. Its geographic gravitates towards central European countries, covering the following countries: Croatia, Bosnia and Herzegovina (especially northwest), Serbia (especially central and northern part), Hungary, Slovakia, the Czech Republic, Poland (especially the southern part), Romania (especially the western part) and Germany, the province of Bavaria.

In March 2010, the port authorities of Trieste, Ravenna, Venice and Koper established the North Adriatic Ports Association (NAPA) based in Trieste with the aim to enhance the position of the ports in the European Union and its transport patterns. The Port of Rijeka joined the NAPA in November 2010. aiming to harmonize information systems and organizational setup of the member ports in order to attract shipping. Except the NAPA, the Port of Rijeka is also a member of the EcoPorts network of the European Sea Ports Organisation, the International Harbour Masters' Association, Association Internationale Villes et Ports, the Croatian Association of Port Authorities and the International Association of Ports and Harbors. NAPA has a common goal of transport container development and becomes a multifunctional bridge between Asia and the economies of central and eastern Europe.

The port system is organized within the Kvarner Bay through several basins that are dislocated and, in some cases, remote. Therefore, port of Rijeka is dispersed in multiple locations, with more entries to the ISPS area and a significant basin parts (Rijeka and Sušak) situated in the very city core.

Rijeka is predominantly oriented towards Central European countries and in a strong competitive environment with other Northern Adriatic ports (mostly Koper and Trieste). As far as logistics in Rijeka is concerned, there are several types of processes (e.g. transfer of livestock and wood in Raša port), and with larger traffic there is a greater amount of information in the exchange.

All of this has an impact on the technological level of the solution, its complexity and price.

Port of Rijeka is the largest and most important port in the Republic of Croatia and has a direct impact on all modes of transport. It is located in well-sheltered Gulf of Rijeka and due to its favorable geographic position, this port has become an important traffic and industrial headquarters and the main transit port in Croatia. Rijeka has the opportunity to attract transit cargo from the hinterland and to set up the foundation for its future successful development. The gravitational zone includes the entire territory of the Republic of Croatia, taking into account the transit significance of the port of Rijeka, while the land areas (gravitational zones) cover the following countries: Croatia, Bosnia and Herzegovina (especially northwest), Serbia (especially central and northern part), Hungary, Slovakia, the Czech Republic, Poland

(especially the southern part), Romania (especially the western part) and Germany, the province of Bavaria. In addition to the land gravitational area, in the case of the port of Rijeka, accent should be made of the smaller ports in the Adriatic that cannot accept large container mother ships (Split, Ploče, Durres, Ravenna, Ancona) and are in regular sea connection with the port of Rijeka. This opens the possibility for the port of Rijeka to be a transshipment port for end-destination cargo (import) or departure (export) in these smaller Adriatic ports.

Rijeka is the port of the European Union, open to domestic and international traffic. Port's vision is to become a port of high efficiency and a key hub for connecting the Far East and Central European markets due to its favorable geographic position.

Thanks to its geographic position, the port of Rijeka has a strategic advantage over the ports of the North Sea as it connects Europe with the Far East via the Suez Canal. The distance to the main Asian ports is shorter for 5 to 7 days compared to the North Sea ports (eg. Hamburg, Rotterdam), which reduces the length of travel time or transit time from Far East ports to destinations in Central Europe.

Rijeka is a multifunctional port for handling almost all types of cargo. It is equipped for handling all types of goods in seven locations (described below), which include terminals specializing in containers, general cargo, cereals, air - conditioned cargo and wood in Rijeka basin, bulk cargo and Ro - Ro terminal at the Bakar Pool, oil terminal and petroleum products and also liquefied petroleum gases (LPG).

Bakar (INA), oil and oil derivatives terminals in the port of Omišalj and general cargo, livestock and wood terminals in the port of Raša.

Port of Rijeka belongs to the Mediterranean transport corridor, an important transport route connecting the port of Rijeka with the European rail and road network.

Equally important is Corridor X connecting to Zagreb by connecting Austria (Salzburg and Graz) to the port of Rijeka. Along with road and rail connections, oil pipeline is important, which enables connecting

refinery capacities in Croatia, Hungary, Austria, Bosnia and Herzegovina, Serbia, Czech Republic and Slovakia. The international airport is located near Rijeka, on the island of Krk.

The port area of the port of Rijeka consists of the following terminals for the transshipment of goods:

- terminal for general cargo - Rijeka
- grain terminal - Rijeka,
- wood terminal - Rijeka,
- frigo terminal - Rijeka,
- bulk cargo terminal - Bakar,
- Bršica terminal,
- container terminal - Rijeka,
- liquid cargo terminal - Omišalj (island of Krk),
- industrial port Bakar,
- logistic terminal Škrljevo,
- logistic terminal Kukuljanovo.

3.5.7 3.1.7. Port of Ploče

The Port of Ploče is situated at the Central Adriatic coastline, approximately 120 km south from the city of Split and 100 km North from Dubrovnik. The ports central-Adriatic location, as well as its position in the south of Croatia (HR) leads to an international hinterland, covering the Dalmatian coastline, as well as Bosnia and Herzegovina (BiH), Serbia (SR), Montenegro (MNE) and Hungary (HU).

Through a 24 km railway line and road, the port is linked with its immediate hinterland of BiH and further to the North-East of Croatia and Central Europe. Further, it is the end/starting point of the Corridor Vc (Budapest-Osijek-Sarajevo-Ploče). Through the Adriatic Highway (as part of the European route E65), it is connected to the Northern cities of Split, Rijeka and Trieste; and to Montenegro in the South.

The Pelješac peninsula to the South and West of the port provides for a natural breakwater.

Equally important is the connection to Corridor X via Corridor Vc, connecting the Port of Ploče also with Serbia to the East and even Austria to the North-West.

The Port of Ploče is also connected to international inland waterways. They are the Sava River from Sisak to Belgrade and the Danube River, constituting pan-European transport Corridor VII. Through the latter, a connection to other European inland waterways, such as the Rhine is possible via the Rhine-Main-Danube Canal.

The nearest international airports are located in Mostar (70km), Dubrovnik (120 km) and Split (150 km).

The port is an EU port and open to domestic and international traffic.

Other ports in the eastern Adriatic region and with similar catchment areas, in particular landlocked Serbia, and therefore potential competitors are:

- Port of Durres (Albania)
- Port of Bar (Montenegro)
- Port of Rijeka (Croatia)
- Port of Koper (Slovenia)

Outside the Adriatic regions, the Greek and Black sea ports can also be considered competitors when it comes to markets of the land-locked Serbia and Macedonia.

An integral part of the Port of Ploče is the Port of Metković. Situated 25 km upstream on the banks of river Neretva in the town of Metković, situated along the BiH-HR border. The terminal disposes of a connections to the rail and road systems and provides facilities for the transshipment of cement (silo), cinder and granulized stone.

Port of Ploče is geographically the biggest cargo port and the second largest cargo port in Croatia in total throughput volume, after Rijeka, and it is a classical landlord port. The capacity of the port is presently

estimated to be at approximately 10 million tons per anno for dry bulk and general cargo and amounts to 1.2 million tons for liquid bulk.

3.5.8 3.1.8. Italian program territory

The main references of this paragraph are then the 2011 White Paper “Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system” (COM/2011/0144), adopted by the European Commission in 2011 and Regulation EU nr. 1315 and 1316/2013. The first document outlined a wide-ranging policy aimed at making the transport system competitive, able to increase mobility, remove the main obstacles in the essential areas, and boost growth and employment. By 2050 one of the key goals of the White Paper include a 50% shift of medium distance intercity passenger and freight journeys from road to rail and waterborne transport. Within the scenario outlined by the White Paper, with Regulation 1315/2013 of the European Parliament and of the Council of 11 December 2013, the EU reviewed the TEN-T networks establishing its development guidelines according to a "double-layer" structure:

- a core network, of greater strategic importance for the EU internal market, to be completed by 2030.
- a comprehensive network to be completed by 2050.

Both are multimodal transnational networks (rail, road, ports, airports, waterways) which interconnect themselves to create a dense network between the different European regions and between the main nodes of it. The aim of the network is to increase the efficiency and sustainability of transport systems, their capacity to contribute to the cohesion of territories and communities and to improve mobility services and their accessibility to travelers and goods.
Within these two networks, and specifically for the implementation of the core network, nine multimodal Core Network Corridors (CNC) have been identified.

Among these nine Corridors, four of them are partially located in Italy:

· **Scandinavian Mediterranean Corridor** covers from the Russian-Finnish border and Finnish ports of HaminaKotka, Helsinki and Turku and crosses, with a section from Oslo, Southern Sweden, Denmark, Germany (connections with the ports of Bremen, Hamburg and Rostock), Western Austria, Italy (connections with the ports of La Spezia, Livorno, Ancona, Bari, Taranto, Naples and Palermo) and reaches Malta. The corridor includes railways, roads, airports, ports, rail-road terminals (RRTs) and sections of the motorway of the sea. The main projects within this corridor are at the moment the fixed connection of the Fehmarn Belt in the Northern section and the Brenner Base Tunnel in the Southern section involving directly our Country.

· **Mediterranean Corridor** connects the ports of Algeciras, Cartagena, Valencia, Tarragona and Barcelona in the Iberian Peninsula, with Hungary, passing through the south of France, northern Italy and Slovenia, with a section in Croatia. The corridor includes railways, roads, airports, ports (Venice and Trieste) and rail-road terminals (Torino, Novara, Verona, Padua, Cervignano) and, in northern Italy, also the inland waterway constituted by the river Po. The main projects of the corridor are the UIC standard gauge railway lines in Spain, the Turin-Lyon railway tunnel and the Trieste/Capodistria-Ljubljana connection through the Karst region.

· **Baltic-Adriatic Corridor** encompasses from the Polish ports of Gdansk, Gdynia and Szczecin/Swinoujscie and, passing through the Czech Republic or Slovakia and eastern Austria, reaches the Slovenian port of Koper and the Italian ports of Trieste, Venice and Ravenna. The corridor includes railways, roads, airports, ports and rail-road terminals (RRTs). The main projects are the Semmering base tunnel and the Koralm railway line (Graz-Klagenfurt) in Austria.

· **Rhine-Alpine Corridor** connects the ports of the North Sea and the Italian port of Genoa crossing the Rhine valley, Basel and Milan. The corridor includes railways, roads, airports, ports, rail-road terminals and the Rhine river as inland waterway.

In addition to the above-mentioned Core Network Corridors, it seems useful to remind that, according to Annex I Part. I chapter 1. of UE Reg. 1316/2013, the European transport planning foresees also the development, through dedicated budget allocation, of the transport “horizontal priorities” in Member

States such as Innovative management & services (SESAR, RIS, VTMIS, ERTMS and ITS), Motorways of the Sea programme, Safe and secure parking and new technologies and innovation in transport.

The latest "Allegato Infrastrutture", issued in May 2019, provides the most recent framework on transport and logistics national strategies.

The definition of the strategic guidelines, also in terms of transport infrastructures, is based on an extensive analysis of the territorial needs, that could be synthetically enumerated in the completion of the missing links, on passenger and freight safe mobility improvement, on environmental sustainability, improvement of commuters mobility and enhanced accessibility for economic competitiveness. Having said that, the document identifies 4 main strategic pillars in order to pursue the above-mentioned general objectives:

_ Safety and Maintenance infrastructural programmes, by paying particular attention to the safety aspects for the ordinary mobility, through the implementation of an extraordinary maintenance programme and the preservation and enhancement of the existing infrastructural stock;

_ Digitalization and Innovation, through the establishment of a governance process able to ensure a full development of the digital transformation currently undergoing in the transport sector and in the business model of the market operators;

_ Alternative Mobility: promotion of new mobility means and new mobility services, also by planning the development of the electric mobility in the urban nodes through agreements with the infrastructure managers;

_ Simplification of the regulatory framework by defining a smooth and clear legislative environment for the realization of the infrastructural works, for the development of innovative mobility services and the data standardization.

Moreover, the implementation of those strategies is designed to be reached through the establishment of several horizontal tools as graphically described in the figure below.

Since 2016. the Italian government has started a deep revision of the regulatory and legislative framework affecting national transport planning, aiming at establishing a more efficient, connected and sustainable mobility system, both for passenger and freight transport.

The main strategic planning documents have been the Annexes to the Economic and Finance Document, released since 2016, depicting the long-term strategy "Connecting Italy" and identifying the major objectives (intermodality and modal integration, sustainable urban development, useful, smart and shared infrastructures as well as enhancing the use of existing infrastructures) and a tool-box of operational measures – infrastructures, administrative simplification and incentives schemes – to achieve those goals.

Connecting Italy is first of all but not limited to that, an infrastructural programme for the development of internal and international accessibility of the national territory and of the production and consumer markets, for passengers and for goods.

The General Plan for Transport and Logistics (PGTL) contains the strategic guidelines for the mobility of passengers and freight as well as the infrastructural development of the country. The PGTL constitutes the reference framework of the set of interventions to be implemented on the Italian transport system, whose purpose is to improve the infrastructure of the country and make its use more efficient.

In order to define the addresses of the transport policy, the PGTL starts from an analysis of the National transport sector, in which the infrastructural needs are highlighted, together with the managerial and organizational ones, and the quality assessment of the offered transport services, on the basis of a current and forecasted demand and supply models at national and international level.

The last edition of the 2001 PGTL defined the strategic objectives of the System National Integrated Transport (SNIT) and established a degree of priority among the largest national infrastructural projects.

From the analysis of traffic volumes, several critical elements emerged such as:

1. The strong incidence of road transport both in passenger traffic (over 88%) and in freight traffic (almost 66%);

2. the non-homogeneous transport services in the different areas of the Country, and therefore the high levels of congestion in the Central-Northern Regions, and the low levels of accessibility in the Southern Regions.

The Multiannual Planning Document (DPP), according to Legislative Decree 228/2011, is issued by the Italian Ministry of Infrastructure and Transport. It contains the list of transport and logistics interventions that have to be financed after a positive feasibility study, in accordance with the Italian Transport Masterplan (PGTL). The DPP contains indications about the procedural, physical and financial status of each project.

After the Legislative Decree 228/2011, the new regulatory and legislative framework introduced by the Legislative Decree 50/2016 (i.e. the new public procurement code), identified the DPP as one of the two main instruments for planning and programming transport infrastructures in Italy, together with the Transport Masterplan (PGTL). Specifically, the DPP assesses the current infrastructure needs (with the so-called Project Review), defines the program of interventions and selects the related sources of financing through a comprehensive technical and economic analysis of single project. In fact, the Decree 50/2016 allows also reviewing existing projects basing on the re-assessment of current needs, updated demand forecast, and current budget available.

The project review of existing infrastructure would help to improve the effectiveness and the efficiency of public spending by avoiding over-designed and un-needed projects and, the same time, it would guarantee the already undertaken legal and political commitments of the public administration. Two kind of project reviews are possible:

· first, a substantial reconsideration of financing the project which could lead to project exclusion from the DPP list;

· second, a project optimization (i.e. technical/technological revision) which would maintain the project in the DPP list but with possible revised cost.

The National Strategic Plan for Ports and Logistics (PSNPL) released by the Ministry of Infrastructures and Transport and approved by the Council of Ministers in July 2015 sets the priorities and activities at a national level, to optimize the added value of the sea as a resource for the marine, port and logistics cluster, and for the entire economy of our Country.

The Plan is the instrument of strategic planning of the port sector, finalized to the improvement of the competitiveness of the port and logistic system;

· the increase of the traffic;

· the promotion of intermodality in freight traffic;

· the reform of the harbor governance.

It is meant to empower the transport sector and the general Euro-Mediterranean policies, in synergy with the priorities set by the European Union. The implementing phase of the National Strategic Plan for ports and Logistics has conducted the Transport Ministry and the other involved public administrations to issue a series of norms and measures to implement the strategic objectives of the Plan.

Rete Ferroviaria Italiana (RFI) is a public company 100% owned by Ferrovie dello Stato Italiane Group (FSI) with act as Infrastructure Manager of the national railway network. The Framework Contract is aimed at regulating the infrastructure investments related to safety and compliance with legal obligations, technologies for circulation and efficiency, "light" interventions, for the

increase in existing line performances, and to "heavy" interventions, for the construction of new railway infrastructures and development of the network.

The new Framework Contract was approved by CIPE on August 2017 and by the Court of Audit in May 2019.

This contract appoints 13,3 billion of euro for rail investments in the period 2017-2021. In detail the following intervention are planned and being implemented:

· Safety Programmes and compliance with legal obligations (for 2 billion);

· technologies for incrementing efficiency of lines, stations and equipment (688 million);

· development of regional/local networks (1.3 billion);

· upgrading and development of railways in metropolitan areas (885 million);
· multimodality development (ports, inland terminals and airports) (700 million);
· investment in upgrading and development of infrastructure in the main axis (EUR 5 billion);
· continuation of projects to be carried out for construction lots (EUR 2.6 billion).

In this Contract particular attention has been paid to measures on regional and local networks for commuter/local transport and to any kind of investment aimed at transferring freight from road to rail. These two pillars of the contract were developed in a general framework of greater safety, implementation of ICT innovation on trains, stations and lines, increase of quality of the services and intermodal connections for passengers and freight.

ANAS (originally acronym of "National Autonomous Road Company") is an Italian public limited company integrated since January 2018 into the Ferrovie dello Stato Italiane Group. The Anas is legally qualified as a body governed by public law. Moreover, within the European System of Accounts, Anas is one of the institutional units belonging to the sector of Public Administrations and, in particular, it is one of the companies in consolidated profit or loss of the Italian State budget.
With the Framework Contract ANAS 2016-2020 a new concept of road intervention has started. Greater emphasis has been put on the completion of axis, integration of routes and focus on safety and maintenance programmes. For the first time a fully financed multiannual investment plan has been established, permitting thus to have a long-vision certainty on investments and projects to be implemented. The new Plan activates interventions on more than 60% of the network of over 26.000km. The multiannual scope determines a more efficient and productive investment planning than in the past. The interventions planned over the 5 years amount to 29.5 billion euro.

The Marebonus, has a budget of EUR 118 million and is intended to encourage freight transport by sea rather than by road, and to reduce pollution and congestion on the roads. In line with the relevant provisions, public support is limited to financing some of the additional costs of switching to more environmentally friendly modes of transport.

The Marebonus aims to support maritime shipping companies that forecast a three-year investment plan for the realization of new maritime services or the upgrading of existing Ro-Ro and Ro-Pax lines. The bonus it is useful even for maritime shipping companies of the European Economic Area, for the multimodal transport of freight or the improvement of the same services on existing routes, arriving and departing from ports located in Italy, connecting ports located in Italy or in the Member States of the European Union or the European Economic Area, in order to support the improvement of the intermodal chain and the decongestion of the road network.

The Ferrobonus is the incentive set up by the Law of Stability for the three years 2016-2018 to support of the arranged transport and transshipped on rail. The objective is the displacement of the traffic of the freight from the road to the rail through an incentive of the use of the intermodal transport and the transport transshipped from and towards logistic nodes and interposing to you Italian, by means of an incentive for railway undertakings and multimodal railway operators.

The incentive is addressed to the users of intermodal rail transport services and/or to multimodal combined Transport Operators (MTO) which buy complete trains from railway undertakings and which undertake to maintain traffic volumes in terms of trains*kilometer and to increase them during the incentive period. The MTOs benefiting from the contribution shall be required to overturn a share of the incentive received to rail users.

The Ferrobonus measure, which has a budget of EUR 58 million for a two year period, is therefore intended to facilitate the transfer of freight traffic from road to rail, by granting subsidies to railway operators and, specifically, in southern Italy where the imbalance between the use of the railways and that of the road is much more marked. In accordance with the guidelines, the level of support that beneficiaries may receive under the scheme is based on a reduction in the infrastructure and external costs incurred by rail transport operators compared to road transport.

So called “Sconto Traccia” (Art.47. c. 11quinques DL 50 del 24/4/17, updated with L 96 del 21/6/17) is an incentive schemes targeted to intermodal operators that respect rail loads threshold for 5 years.

The authorized measure for the 2015-2019 period has an annual budget of around 100 million per year. The beneficiaries are the railway companies and the amount of the contribution is proportional to the trains / km covered on the national network by each company and is divided into two rates:

- one part is aimed at offsetting the extra costs of access to the railway infrastructure estimated in the national peripheral regions (South Italy and Island);
- one part is calculated on the environmental benefits attributable to the use of the railway mode rather than road.

The "Sconto Traccia" rule is one of the measures supporting intermodal freight transport. This measure supports rail traffic by compensating for the charges for the transport of goods and the fee for using the infrastructure due by the railway companies.

3.2 SUMMARY OF FUTURE SCENARIOS

3.2.1 Interporto di Trieste-Fernetti / Port of Trieste

Railway traffic in the Port of Trieste hugely increased in the last four-year period. In the near future this trend should continue, thanks to the efforts by the Port Network Authority towards modal switch. Yet, such an important increase in a relatively short period risks leading to a saturation of the railway network. The Port of Trieste is linked to the national railway network, and therefore to the TEN-T network, through the nodes listed below:

1. Campo Marzio, which serves Piers V, VI (RoRo) and VII (containers), where most of the traffic is currently concentrated.
2. Servola, which serves the industrial port, i.e. a terminal for various goods and one of the most important steel production sites in North Italy.
3. Aquilinia, which serves the Trieste industrial area.

Railway traffic in the Port of Trieste hugely increased in the last four-year period. In the near future this trend should continue, thanks to the efforts by the Port Network Authority towards modal switch. Yet,

such an important increase in a relatively short period risks leading to a saturation of the railway network.

The Port of Trieste is linked to the national railway network, and therefore to the TEN-T network, through the nodes listed below:

1. Campo Marzio, which serves Piers V, VI (RoRo) and VII (containers), where most of the traffic is currently concentrated.
2. Servola, which serves the industrial port, i.e. a terminal for various goods and one of the most important steel production sites in North Italy.
3. Aquilinia, which serves the Trieste industrial area.

Therefore, the main infrastructural investments for the Port of Trieste aim at extending the capacity of cargo handling, in particular the railway capacity and the intermodality.

EU project funding is a great tool to be leveraged towards these objectives. The most relevant recent or running European projects, co-funded by the TEN-T / CEF Programme, in which the Port of Trieste is involved are the following:

1. NAPA STUDIES (2013-EU-21017-S): feasibility studies for the upgrading of the railway infrastructure in the Port of Trieste and the development of the Port Community System (total budget: 325,000 EUR, European funding 162,500 EUR). Project concluded.
2. NAPA4CORE (2014-EU-TM-0343-M): construction of the so-called “Logistic Platform” within the general cargo terminal, which will be the basement of the new Pier VIII (total budget: 79 million EUR, European funding: 15.8 million EUR). Project ending in 2020.
3. Adri-Up (2015-EU-TM-0310): technical and functional renovation of Pier VI (total budget: 6.6 million EUR, European funding 1.98 million EUR). Project ending in 2020.
4. TriesteRailPort (2017-IT-TM-0092-W): Upgrade of the railway infrastructures of the port of Trieste (total budget: 32,700,000 EUR, European funding 6,540,000 EUR). Project ending in 2023.

Considering the above-mentioned investment plans, and those of the terminal operators, the demand for railway traffic will considerably increase in the coming years.

In this context, the Global Project (2018-2025) concerning the railway infrastructure of the Port of Trieste consists of its upgrading, in order to adapt it to the double-digit growth trend of the rail freight flows.

The Global Project consists of four main sections:

1. Upgrading of the last mile railway connection.
2. Infrastructural upgrading in order to reactivate the railway track linking Aquilinia station to Campo Marzio.
3. Upgrading of the existing railway infrastructure and of the new station Scalo Legnami.
4. Infrastructural and technical upgrading of the railway marshalling yard which connects Piers V, VI (RoRo transport) and Pier VII (containers) to Campo Marzio station and, therefore, to the national railway network.

Italian government has already funded most of this global project, but only for the sections owned by the company managing the national infrastructure (Rete Ferroviaria Italiana – RFI S.p.A.).

3.2.2 Port of Venice

The shipping business is a very competitive business with low (and declining) margins. As such, shipping lines are strongly focused on cost-efficiency of their services. The cost-efficiency of shipping lines is positively affected by the following factors:

1. - The use of larger (and wider) vessels (economies of scale)
2. - The reduction of turn-around time in ports (time efficiency);
3. - Increased cooperation between shipping lines due to lower freight rates and selection of efficient ports and reduced number of port calls.
4. Next to the main global trend of attaining economies of scale by increasing vessel sizes, a second major development is the focus on reducing the idle time of vessels. In order to reduce the idle time of vessels, the total turn-around time of the vessel need to be improved. The turn-around

time of a vessel depends on three factors: time at anchorage, towage (in and out of the port) and time at berth.

5. These shipping trends could represent a challenge for the Port of Venice due to the impact that the new vessels dimensions could have on the port's infrastructures and on its efficiency.

In order to respond to these new logistic needs and improve its multimodal terminal efficiency, the port of Venice has planned a series of investments aiming at upgrading the existing port infrastructures in order to increase its logistic and multimodal efficiency.

The Port of Venice has planned, with Railway National Infrastructure Manager (RFI), a series a new investments aiming at optimizing rail operations within the port rail network and last mile connections. The investments foresee to improve the shunting network with new tracks to directly connect the south-west backbone of the port and new terminal of Montesyndial with the Venezia Marghera Scalo station and doubling some part of the existing line.

The upgrade of the port rail network and last mile connections will allow to:

- eliminate to interfere with Mestre railway station in shunting phase;
- improve both the capacity and the safety of port railway system;
- reduced drastically the number of interferences between road and rail network within the port area;
- reduce drastically the rail shunting time in the southwest area of the port in which is generated about the 40% of the total rail traffic of the port.

These investments are part of NASPA's strategy aiming at improving the port infrastructures and enhancing the railway accessibility services as indicated in the National Strategic Plan for Ports and Logistic and stated in the Port Operational Programme 2018-2020.

With reference to the multimodal transport, the Port of Venice has planned a several investments with the scope of increase it railway traffic flows. In particular, these investments are focused on the

enhancement of railway telematics systems for shunting operations (SIMA) and its integration with PCS and information systems of other subject involved in developing rail services.

The SIMA IT system retrieves, processes and stores data during the maneuvering 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. SIMA comprehends the following functional modules:

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

SIMA offers the following macro-functionalities:

- Data acquisition, i.e. during the start-up phases of the maneuvering procedures, through the insertion of the annual, weekly or daily schedules of the single maneuvers, 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;

The most critical aspects concern above all the non-intuitive graphic interfaces, the absence of wizards, the absence of some useful correlations between the different modules of the system and the presence of unused data and functions. In addition to the critical issues on the use of the system, there is also the need to update the technologies used for development.

It is also necessary to introduce a component with process optimization and decision support functions that, through the processing of time series of data stored by the system and data received in real time, give indications on the most effective solutions to process management problems.

The system architecture, to date based on the RESTful model, will have to be updated to more effective models such as micro services-based architecture. At the very least, the architecture will have to be rethought for an easy future migration. As for the user interface, it must be subject of a careful analysis on usability and user experience, ensuring an easy startup of the system in the environment where it will be used. Interfacing with the new external systems is another critical aspect to consider, for more details regarding these systems.

In particular, the interfacing with the railway system should be useful for:

- The possibility to create and manage the M.53 of District (called “M53 di Comprensorio”) model. The M.53 of District model will replace the M.53 Integrated model (now done by the Infrastructure Manager) and contains some additional useful data concerning operation of the Shunting Operator. These additional data could be used by the system to improve planning procedures efficiency through an optimization of train placement in the railway yard and their relative movements using machine-learning techniques and logistic algorithms;
- The possibility to interact with the PIC system of RFI that allows real-time communication of changes to the general planning of 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 Mercitalia Rail SIM system that allows the management of waybills through an XML protocol.

-The possibility of interfacing with the Railway Undertakings IT systems (such as SIR system of Mercitalia Rail) for the recovery of information regarding train composition (list of wagons and containers carried by each wagon), useful for the automatic management of wagon groups through an XML protocol or similar one.

- The insertion of a new software component for the automatic calculation / optimization of the precedence on single tracks as Decision Support System, which assists maneuver planners in logistic decisions regarding train movements on the tracks beam by the proposal for the entire daily maneuvers scheduled respecting both operational and infrastructural constraints using machine-learning techniques and logistic algorithms.

- The possibility to manage the shunting personnel through the system to assign each shunting team to their respective loco automatically.

3.2.3 Port of Ravenna

The Global Project, included in the 2007 Port Master Plan, and in the project lists of the Baltic-Adriatic and Mediterranean Corridors equals to about € 383 million. It consists of two phases which are independent under the technical scope of works and functional stand points. They are complementary in keeping and further developing the port of Ravenna as an efficient multimodal platform.

Stage I is aimed at solving a physical and operational bottleneck at the port of Ravenna. The port is currently constrained by a low draft of the harbor which limits the efficiency of terminal operations with reference to all types of cargo, but particularly regarding dry bulks. Considering that the port of Ravenna is the first in Italy and in the Adriatic basin for dry bulks and that it is one of the main ports in Europe for this type of cargo, the need to solve this critical issue is paramount. The increase in vessels sizes and the fact that most if not all other ports in Europe registering dry bulks traffic volumes higher than 10 million tons have drafts deeper than those currently available at Ravenna, makes it more urgent to implement the works.

Stage I of total value of € 235 million, includes dredging the canals (marine, Candiano and Baiona) up to -12,50 meters and the front port area up to -14,50 meters, upgrading the existing quays and constructing the New container/multipurpose terminal quay and the re-use of dredged materials to raise the level of areas located in the proximity of the port, so as to develop them as logistics platforms.

Stage II includes additional dredging works in several parts of the canal harbor up to -13,50 / - 14,50 meters (inner parts); and up to -15,00 m (approaching canal), as well as further development of multimodal platforms. These works are more dependent on the further expansion of global trade traffic.

The Action co-funded by the European Commission through the CEF Blending instrument consists mainly of Stage I and specifically:

● Dredging the marine, Candiano and Baiona canals to -12.50 meters;

● Upgrade of existing operational quays affected by the proposed interventions and construction a new container/multipurpose terminal quay;

● Setting the ground for new areas for logistic activities: the materials derived from the dredging works will be mainly used to raise the level of the areas located in the proximity of the port, so as to develop areas for logistic activities for temporarily storing inbound-outbound freight.

Together with this strategic project, other interventions are foreseen in Ravenna. These projects clearly show that the strategy of the Port of Ravenna is fully aligned with the targets and objectives of the new TEN-T policy, namely implement CEF pre-identified section projects which directly contribute to the development of the Baltic-Adriatic and Mediterranean corridors as interoperable and intermodal infrastructure for long distance sustainable traffic:

● A project by the Italian National railway infrastructure Manager, which includes actions that will improve the railway last mile connections to the existing terminals; thus, further contributing to the on-going growth of rail modal share at the port;

● The other initiative is aimed at improving the Ro-Ro terminal, supporting the traffic growth trends in the Motorways of the Sea segment.

Other initiatives are also worth mentioning which are either on-going or planned for implementation at the Port of Ravenna, which include the Stage II of the development of the port, part of the Global Project as well as additional actions for the development of port interconnections and improvement of e-Maritime services and development of alternative clean fuels.

3.2.4 Port of Ancona

In September 15th of 2016 entered into force the national law n. 169/2016 regarding the Port Authorities reorganization.

Since different decades it was clear the necessity of a reform regarding the port's organization, but this became even more urgent when it was adopted also in Italy the new rules about the Trans-European network for transports (1315/2013).

The main topics treated by the new reform are:

- Institution of the "Port Network Authority" (Autorità di Sistema Portuale - AdSP), under direction and vigilance control of the Ministry of Infrastructure and Transport, in a reduced number compared with the former Port Authorities, from 24 to 15;
- Reduced size of management structure;
- Implementation of competent Unique Customs Office and Unique Administrative Office.

New AsDP are public entities not economic with national relevance, with special organization and with administrative, regulatory and financial autonomy.

Their main task is the addressing, planning, coordinating and control provision of port services and operations, as well as promoting partnerships and cooperation with port and interport logistics systems.

The new governance system is simpler, it is in charge to adopt the three-year operating plan, and to develop logistics and port strategies.

Another important element of the new institutions is the creation of new Unique Customs Office, under control of State Customs Agency, that will allow, in a centralized and coordinated way, the realization of all control activities in a shorter time.

In the Three-Years Operative Plan the Port Authority considers different actions for the implementation of Ro-Ro and Ro-pax traffics.

To improve the quality of service and face the traffic growth, the Central Adriatic ports authority and the Customs Agency decided to launch an innovative project aimed at shifting the customs parking outside the ferry port customs gate.

A feasibility study identified the former railways yard “Scalo Marotti” as the best solution to set up the new customs parking.

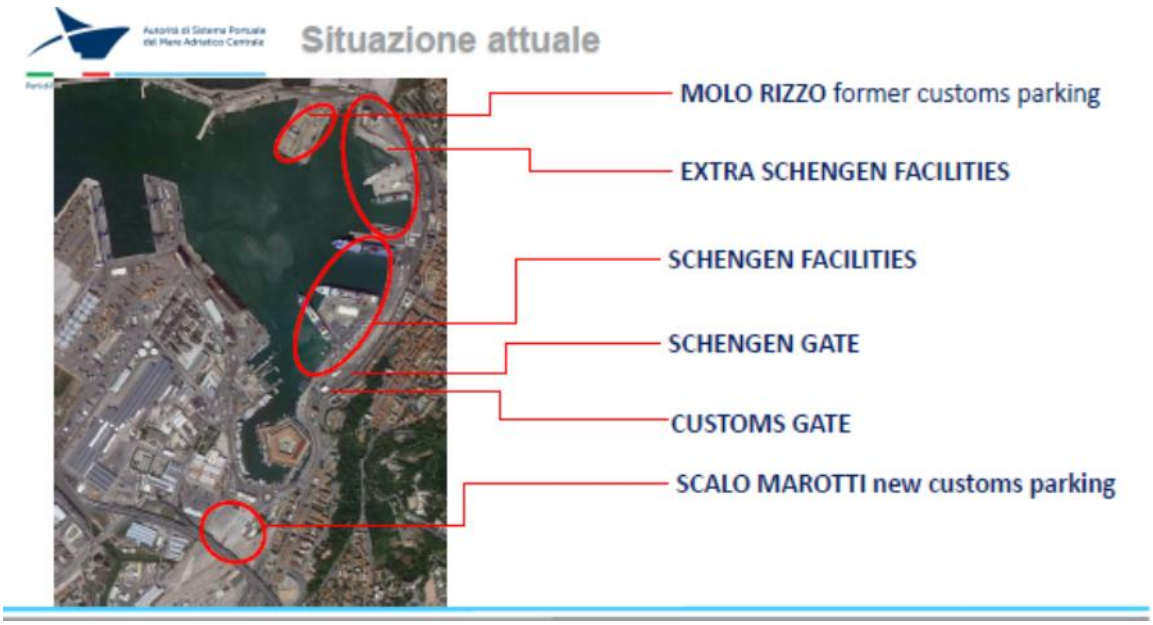


Figure 4:Ancona ferry port infrastructures and location of Scalo Mariotti

The Scalo Marotti is a former railway yard, and it was already available for port operations. In August 2018 it became property of Central Adriatic Ports Authority (31.000 sqm). The Customs Agency included the Scalo Marotti as customs storage facility (procedure 16242/RU).

The Central Adriatic ports Authority equipped it with fences and the basic facilities to allow the testing as customs parking.

The main challenge was how to ensure a secure transfer of trucks between the customs gate and the Scalo Marotti customs parking. In June 2018 the Customs Agency, the Port Authority and the Customs Police (Guardia di Finanza) started the testing phase.

Following the positive testing, the Port Authority, the Financial police and the Customs Agency jointly decided to proceed with the implementation of the second phase of the innovative Scalo Marotti project.

The second phase consists of the following steps:

- Improvement of the scalo Marotti parking infrastructure;
- Transfer of the Financial and Customs police offices in the buildings close to Scalo Marotti;
- New facilities for truck drivers and freight forwarders;
- Set up of the ICT system for the tracing and tracking of the vehicles along the road linking Scalo Marotti and the Customs gate of the ferry terminal.

The IT action called SMART-C (Scalo MArotti viRTual Corridor) targets the latter step.

Total costs and timetable for SMART-C:

- Total cost assessed:4,5 million Euro;
- In 2019-2020 the improvement of the parking infrastructure will be implemented as well as the works for the new offices and facilities for the Custom Agency, the Custom police, freight forwarders and truck drivers.

- The ICT system is expected to be in operation by June 2020 at the latest, to complete in 2020 the testing and fine-tuning phase.

The expected results of the Action are the following:

- Increased automation: video as well as other type of content will be georeferenced in a 3D setting and rendered to the user in a virtual reality interface eliminating the need of monitors and dedicated personnel;
- Increased security and reaction: the artificial intelligence system on which it will be based performs a deep analysis of the data received reducing the number of false alarms to irrelevant levels, but targeting all the suspicious behaviors, making available tools to countermeasures in case of dangers and alerts. The system also will make available relevant data for investigations and training;
- Increased management capacity: port operators as assistance staff and Customs police will be able to control and manage in real time the ferry related traffic flows in- and outbound the port. The capacity won't be limited to the vehicles implementing customs formalities; it will be rather extended to all the vehicles and people passing through the virtual tunnel;
- Replicability: testing and validation of a best practice to optimize vehicle traffic monitoring, tracking, tracing and control with specific reference to international ferry traffic servicing also neighbor countries.

The Action will include the economic, juridical, operational and environmental studies aimed at providing the Port of Ancona and the Customs Agency the information on the overall costs and benefits of the project, the best practices to reply in other ports or customs facilities and the added value for a port authority deriving from the deployment of an AI (artificial Intelligent) technology in terms of data management, port infrastructure management, traffic flow control, safety and security. An in-depth analysis will also be implemented to assess the positive impact in terms of reduced pollution coming from the reorganization of the customs related services for the ferry traffic of the port of Ancona.

The development of interoperable and interconnected ICT systems for the exchange and monitoring of freight traffic information will be realized within the node and its hinterland allowing the "horizontal integration" between the users and the traffic management systems. Increased level of interoperability and interconnection will improve the competitiveness and the quality of freight transport services along the North-South Axis.

Finally, the Action will be able to reduce the logistic costs linked to administrative procedures and reduce the gap with the northern sections of the EU Corridor, characterized by a higher level of "horizontal integration" between the logistics, the transport users and the network platforms.

3.2.5 Port of Bari

In the context of the detailed analysis of the individual ports, the POT, especially with reference to the priorities to be given to the infrastructure investment policy, has been able to grasp some specificities / critical issues that are intended to be presented below, albeit in addition:

- Lack of dedicated berths for container ships.
- Insufficient state-owned areas for temporary custody of containers.
- Impossibility of handling containerized dangerous goods.
- Critical issues in the simultaneous management of traffic flows, lengthening of control times on passengers (extra schengen), insufficiency and inadequacy of the pre - boarding areas, insufficient reception facilities for cruise passengers.

Rail transport

Figure 5: Rail junctions improvement plans in Bari

The priority objectives of the investments of the fundamental railway structure, contained in the PON Infrastructures and Networks (Priority Axis I, with 1.094 billion Euros by 2023) or in the MIT-RFI Program Contract, contribute directly and primarily to the improvement of the Area Integrated Logistics Puglia Basilicata, as they represent the main corridors of communication of the ALI for exchanges outside the region. The priority investments are for:

1. Strengthening and improvement of the High Speed / High Capacity of the Naples-Bari ridge (TEN-T network and main hub for the Tyrrhenian ridge);
2. Efficiency of the Adriatic backbone aimed at increasing capacity and overcoming the limitations of shape and module for freight transport

Road transport

Particular attention must be paid to terrestrial integration with the railway network in order to intercept long-distance traffic that currently mainly uses the road system consisting of the Adriatic highway backbone linking Lecce, Brindisi, Bari, Foggia with northern Italy but also that towards Naples , Rome, Florence.

Figure 6: Network connecting Bari and ports covered by same governing entity

Higher-level planning. Port planning and its implementation status

The final choice of the necessary adjustments and the feasibility and sustainability study of the same will be carried out downstream of the discussion with stakeholders and with local authorities, in order to metabolize and share the choices and development objectives.

- infrastructure adaptation to keep pace with the rapid evolution of the needs of the carriers (dredging of the backdrops, strengthening of the docks, rearrangement of rear - dock spaces, improvement reception of passengers, raising of intermodality.
- integration, development and accessibility of support services through the use of new technologies.
- strategic and operational marketing for the cruise and sea highways sectors.
- joining with energy and environmental planning

The road interventions, in correspondence with the access to the port in the Marisabella area, for the connection to the "Camionale di Bari", a strategic work on infrastructure and transport, in order to connect the port to the retroport areas, to the intermodal logistic nodes as well as to the main road system by facilitating the movement of passengers and vehicles and eliminating the critical issues currently existing in some, albeit limited areas of the city, for the transit of heavy vehicles in large quantities.

GAIA – future scenarios

Recent and future developments of GAIA include:

1) Interoperability with AIDA Customs IT service

   The project was designed by Port Authority with the aim to develop interoperability services between AIDA Customs system and GAIA Port Community System, in order to:

   - Speed up the transit of goods in port logistic nodes
   - Digitalize customs procedures linked to the transit of goods
   - Manage in real time the goods flow in port facilities, working on actual critical moments
   - Automate the ports procedures of goods gate-in/out
   - Get information about customs payment and tracking of goods status

2) Testing of 5G

Bari will be the first 4.0 port in Italy able to improve security, access control and logistics by using IoT solutions coupled with digital automation, which are important steps specifically for cloud robotics and intelligent transportation systems.

Use cases examples:

- Security services (face recognition)
- Information services (people counting and density estimation)
- Port logistic services (container IoT)

3) Installation of eGates

In order to improve security at the border (European entry exit system EU EES 2017-2226) a EES border control solution will be experienced in the port of Bari able to:

- verify and collect departing passengers identity with the cooperation of Border Police;
- enable fast and convenient border clearance process for any type of travelers as traveler pre-check;
- Give real-time information to Italian Authorities and VIS system (Visa Information System);
- Cooperate with PCS GAIA

4) GAIA 2.0 evolution

The PCS GAIA 2.0 project is composed by 5 actions which will allow the Port Authority to upgrade the application/system infrastructure:

- PCS software and hardware technology upgrade, extension to Brindisi and Manfredonia ports;
- Front office system development in order to simplify the administrative procedures between port and business users;

- Gate expansion with automated access control barriers, plates recognition and container tracking;
- Public (passengers) and business (port operators) WiFi newtork expansion to all ports of Authority network;
- Security and operative video surveillance extension in ports of Bari, Manfredonia, Barletta e Monopoli.

3.2.6 Port of Rijeka

The Government of the Republic of Croatia, in cooperation with the International Bank for Reconstruction and Development (IBRD), has initiated the Rijeka Gateway Project. Rijeka Gateway is the most comprehensive project since the founding of the Republic of Croatia, which has led to a comprehensive revitalization of part of Rijeka's coastal area.

Pursuant to the Guarantee Agreement signed on 12 July 2003. between the Republic of Croatia and the International Bank for Reconstruction and Development and the Loan Agreement between the Port of Rijeka Authority, Croatian Roads and Croatian Motorways as the Borrower and the IBRD, funds were provided for the implementation of the Project.

The total value of the port component of Rijeka Gateway Project I and II amounts to 187 million EUR, of which 144 million EUR relates to the World Bank loan funds (IBRD) and 43 million EUR to the domestic share from the Republic of Croatia budget funds. The Rijeka Gateway program is not intended solely for the construction and modernization of the port but also as a support to the Croatian economy, making it more dynamic and more competitive.

The first projects that were fully realized from the World Bank loan were the reconstruction of the Vienna Pier and the construction of the new road bridge on the breakwater that preceded the construction of the maritime passenger terminal.

Construction of the maritime passenger terminal - The Port Passenger Terminal was completed on October 6, 2009. Located on the Rijeka breakwater, it was designed to improve service to domestic and international maritime passenger traffic. In addition, it has created a beautiful image of the city and enabled citizens to see and experience their city from a different perspective. The construction of a passenger terminal building as well as the reconstruction of the operational pier and the complete arrangement of promenade were not the only purpose of reconstruction. With the launch of the connecting motorway, the quality of the maritime passenger terminal and touristic services increased significantly. An important component of the passenger terminal is a modern equipped port control center for vessel traffic monitoring. Terminals funding through Rijeka Gateway project amounted to HRK 95 million.

Extension of the Adriatic Gate Container Terminal - The most important values created by the expansion of the The Adriatic Gate Container Terminal at Brajdica relate to the increase of sea depth along the pier to 14 meters, the possibility of servicing container ships of up to 370 meters long and the maximum capacity of the 600,000 TEU. The second stage of construction of the Adriatic Gate Container Terminal has enabled the mooring of significantly larger ships, while simultaneously increasing the efficiency of container transshipment. In order to increase the capacity of the Adriatic Gate Gateway terminal, according to the planned increase in traffic, the 2nd stage of the terminal was built, including the extension of the pier for another mooring, an adequate increase of the storage areas and the construction of a new entry-exit point. The terminal extension goal was also to enable the reception of significantly larger ships and the doubling of the transshipment capacity. With the same goal, the concessionaire Adriatic Gate j.s.c. installed new coastal and storage equipment and installed cranes for the carriage of wagons. Works on the construction of a new pier were completed in May 2013.

In 2013, container transport equipment worth EUR 23 million was delivered to the container terminal Adriatic Gate. The new equipment includes two Panamax high-capacity cranes, six container bridges and two container freight trains, making the Adriatic Gate container terminal fully equipped to meet the modern standards. The new equipment has allowed a significant increase in the speed of goods

disembarkation, after Croatia's entry into the European Union and the time of transport to the final destination within the Union, as all border and customs controls will be carried out at the terminal. The Port of Rijeka Authority invested in the extension of the terminal for as much as 320 meters and the increase of the available storage space for containers thus increasing the capacity of the terminal ot 600,000 TEU per year.

A Border Inspection Point (BIP) was built as part of the Container Terminal since Port of Rijeka is one of the seven border crossings that is to be used to control products entering the EU from third countries. Its obligation is to apply a border traffic regime in accordance with EU regulations for which a container terminal at the port of Rijeka must have a veterinary, sanitary and phytosanitary control station at its disposal.

The value of completed investments in construction – works on the expansion of the container terminal Adriatic Gate in the framework of the Rijeka Gateway Project (RGP I & II) reached EUR 30 million.

Project implementation of video surveillance - The project encompassed the implementation of the video surveillance system. The project aimed to increase the safety of the port area under the management of the Port of Rijeka Authority, and to provide better access control facilities and the possibility of reconstruction of events through video and access control databases. The purpose of the new modern control system, comprising continuous video-control over all major points as well as control of the vehicle and persons entering the port area, is to provide for an improved control of the port area – in fact, the marine border crossing. The control of the port area is affected from the modern control centre which, with the help of patrol car (0-24 h), ensures prompt intervention in case of any unforeseen events.

The control of people and car traffic within the port area is performed using modern system whose main elements are RFID cards and corresponding software. The vehicle entrance to the port is equipped with electrically driven ramps activated by the card reader devices. The railway port entrance is provided with metal doors also opened by the card reader devices. All pedestrian entrances are provided with turnstile

that are also RFID card activated. The implementation of the control system, as described above, has considerably contributed to the improved safety and protection within the port area.

Construction of state road D-404 - Two most important preconditions of the development of the Rijeka transport route is the construction of state roads D-403 and D-404 in order to connect the western (D-403) and eastern (D-404) part of the port basin Rijeka and Sušak to the Croatian motorway network. Road D-404 connects the center of the city of Rijeka from Delta to the eastern part of the Rijeka Bypass and provides connections with the motorways towards Zagreb, Ljubljana and Dalmatia. There are two tunnels, one bridge, five viaducts, one exit to the shopping center, and two exits for pedestrians. The state road was released in 2013.

Road D-403 will connect new Zagreb Deep Sea Container Terminal with the western part of Rijeka Bypass. The Grant Agreement for the DC-403 State Motorway Construction Project provides funds for the construction of a new state road that will connect the future Zagreb Deep Sea Container Terminal and the port of Rijeka directly to the main Croatian road corridors further towards Europe. This link to the port in Rijeka, defined as the core port of the Trans-European Transport Network TEN-T, connects with the rest of the transport network, which, along with the rail linkage with the hinterland, is an important prerequisite for its efficiency and competitiveness. the construction will be completed until 2022. It is funded by Hrvatske ceste ltd, Ministry of Sea, Transport and Infrastructure and Central agency for financing EU programs and projects.

Construction of the new Zagreb Deep Sea container terminal - In order to achieve competitiveness, the Port of Rijeka Authority has initiated the realization of the new Deep-Sea Container Terminal, which guarantees new modern port facilities. This is the most important component of the Rijeka Gateway Project, a terminal designed as a straight pier with a final length of 680 m and an average width of 300 m. The planned depth of the sea at the pier is at least 20 m and allows for the reception of container ships of all sizes. The terminal is built in two phases, with the first phase involving the construction of a 400 m long pier and the second phase the construction of an additional 280 m. At the end of both phases, the Port of Rijeka will boast a pier with a total length of 680 m. The construction of the first phase of the pier is in its

final stage, and parallel to the construction of the pier the railway interface of the terminal will be reconstructed and the connecting road D-403 will be built. The continuation of construction of the remaining terminal phases is the obligation of the future concessionaire. The concessionaire, selected in an international tender, will receive a concession for the management, construction and use of the new container terminal.

The Zagreb Deep Sea Container Terminal (ZDSCT) will cover a total surface area of approximately 20 hectares (680 m long and 300 m wide). Part of the area is occupied by the existing working areas of the port (piers, roads, tracks, warehouses, installations, energy facilities, facilities for employees, etc.), with a total area of approximately 10,3 ha. The second part of the terminal area of approximately 7,2 ha is obtained by building the new pier and backfilling the sea.

With the construction of the new pier in full length, a 680 m long and 20 m deep wharf can be obtained, with the possibility of mooring container vessels of more than 165,000 DWT and of lengths over 366 m (last generation ships with a capacity of more than 14 000 TEU). Additionally, the pier length of 680 m allows simultaneous mooring of a smaller ship up to 50,000 DWT and up to 250 m in length (vessels with a capacity up to 4 000 TEU).

The new pier is made of reinforced concrete caissons, founded on a submarine stone embankment. The ground beneath the embankment is reinforced by gravel pillars and jet grouting. The general height level of the pier (pier zone about 40 m wide) is +4,05 m. This is the boat mooring and container cranes operation zone (35 m track gauge). By backfilling the stone material into the zone behind the pier structure, the operating and storage surface of the terminal is arranged, all the way to the boundary of the project i.e. to the marshalling tracks in the north. The storage area with the associated roads is 680 m long and 170 to 250 m wide. The warehouse plateau descends from the pier to the north, where it fits into the surrounding operational area of the existing port and marshalling tracks (+3,55 m).

The container terminal will be connected to the new state road D-403 linking the Port of Rijeka, namely the Zagreb Deep Sea Container Terminal, to the Škurinje junction, currently under construction. This way,

the Zagreb Deep Sea Container Terminal will be connected to the network of Croatian motorways i.e. the main TEN-T corridor network. The length of the road D403 from the Port of Rijeka (ZDSCT) to the Škurinje junction on the Rijeka bypass is approximately 3 km with a branch for connection to the network of city roads.

At the same time, European Project "Upgrade of the Rijeka port infrastructure – Zagreb Deep Sea Container Terminal (POR2CORE-ZCT)" is to contribute to the development of the Port of Rijeka as one of the core ports in the Mediterranean through ensuring the efficiency, sustainability and multimodality of freight transport. The project was applied to the second call of the Connecting Europe Facility (CEF) Traffic 2015, Cohesion envelope. Grant Agreement no. INEA/CEF/TRAN/M2015/1138367 was signed on 18 November 2016 between the Innovation and Networks Executive Agency and the Port of Rijeka Authority, thus ensuring 85% of co-financing from the European funds. The total value of the project is 31,6 million EUR.

The significance of the construction of the container terminal on the Zagrebačka obala (Zagreb Deep Sea Container Terminal) was recognized by the Government of the Republic of Croatia, which at its session in May 2014 adopted the Decision on the designation of the container terminal on Zagrebačka obala. It is the most significant investment in transport infrastructure in the Rijeka area at this time and one of the largest in the Republic of Croatia.

Specific objectives include renovation and modernization of the port area, improvement of the financial status of the port of Rijeka, improvement of the port / urban infrastructure and improvement of the environmental conditions in the port of Rijeka. Major construction works, reconstruction of terminals, moorings, reconstruction of operational, road and railway areas and other construction works are planned. With these investments and European projects, we have accessed, port facilities will be modernized, the private sector in port will be modernized, the financial management of the Port Authority Rijeka will be improved, and Port of Rijeka will be integrated into the international traffic corridors.

The contract for the design and construction of the dock on Zagrebačka obala was signed on April 17th, 2012 with the joint venture Grandi Lavori Fincosit - Nuova CoEdMar - Impresa Costruzioni Giuseppe Maltauro. Under this contract, EUR 70.6 million worth will be built for a 400-meter-long dock. The project encompasses a wider area of the future container terminal with the possibility of extending the coastal wall to a maximum length of 680 meters. Supervision over the implementation of the contract, stipulated by FIDIC rules, over designing and in the next stage of construction, is carried out by a business association of Croatian and Dutch consultants - Investigation engineer from Zagreb and Haskoning DHV B.V from Rotterdam.

The first stage predicts the construction of a 400 m long waterway at a depth of minimum 20 m. The mooring is dimensioned to accommodate ships of 14.000 TEU and the installation of a container STS crane with 22 and, if necessary, 23 rows of seaplane access. Because of the extremely difficult construction conditions, contracting method for design and construction was accepted, enabling the contractor to choose the cost-effective structure of the dock.

The second stage predicts the extension of the terminal up to the total length of the 680 m long port, which would result in a capacity of 400.000 TEU per year in the first stage, or 650.000 TEU per year when the terminal is fully built.

It is important to note that designing and solving property-legal issues related to the construction of the D-403 road, as well as preparations for the significant modernization of the railway infrastructure that will function as a cargo transport from the port of Rijeka, are being carried out along with the design of the container terminal.

It is anticipated that about 1.1 million cubic meters of material will be planted at the base of the future terminal, which would have 20 meters depth, that should have technical characteristics that cannot be found in any single port on the Adriatic, and allow the largest container ships in the world.

Long-term plans for stage 3 predict the maximum length of the terminal of 1.250 m. The entire project is planned to be financed by the World Bank loan, private investors' funds (future concessionaires), as well as European Union funds.

Building of the new main state road D-403 and railway terminal - The project involves connecting the terminals with the E61 highway by building a new road D403.

Considering that the full functionality of the container port requires a railway with the appropriate characteristics, the project also plans to build the required railway infrastructure. The second rail terminal will be directly connected to the container terminal on the Zagrebačka obala.

Vision 2020.-2030. for the port of Rijeka - By completing a series of capital projects that include infrastructure projects for the construction and improvement of the railway infrastructure at the port, Rijeka will become a strong intermodal centre in the northern Adriatic and one of the most important transit ports for European markets that naturally gravitate toward it, thereby improving the connectivity of the port and the hinterland and increasing intermodality in the Rijeka transport route.

By the end of 2020, the period of the investment cycle in the Port of Rijeka will end with the realization of six development projects funded by the European Fund CEF in the total value of 115,5 million EUR. The whole investment cycle will include not only the realization of European projects, but also the realization of ongoing capital projects.

Firstly, by 2020, the Port of Rijeka Authority will complete the construction of the Zagreb Deep Sea Container Terminal within the Rijeka Gateway Project, start the works on the road D403 by combining funds from European funds and the state budget, and finally, enable a tender for the future concessionaire at the new container terminal, which will have a major impact on the capacity and efficiency of the Port of Rijeka in the transshipment of containers and a significant increase in the share of rail transport of containers on the railway line.

One of the subcomponents of the Rijeka Gateway Project is Port City Interface: Redevelopment of Delta and Porto Baroš, with the goal to develop this area into a modern business-residential and public space. Due to the difficult implementation of the project as a whole in an area with a maritime property status, the project is divided into two parts. The area of Porto Baroš is separated from the port area and has acquired the status of a port of special purpose, thus aligning with the Spatial Plan of the City of Rijeka, which anticipates the development of a nautical port is in this area.

In accordance to the plan, at the beginning of 2019, the Ministry of the Sea, Transport and Infrastructure will launch the concession procedure for this area and the development of a modern marina in the very centre of Rijeka.

By 2030, the Port of Rijeka will preserve the role of the most important intermodal centre and the main entry/exit port for Central and Eastern Europe in the Republic of Croatia. The port will exploit its potential and advantages of its position on the Mediterranean and Baltic-Adriatic TEN-T corridors, remove bottlenecks and upgrade the previously identified infrastructure projects within the European Union transport sector. By 2030, new opportunities for gradual expansion and construction of the container terminal on the island of Krk will be explored, as well as preservation and development of the projects implemented to improve the existing port infrastructure and the extension of port facilities to build a new infrastructure for the reception of large cruise ships.

3.2.7 Port of Ploče

The road network in Bosnia and Herzegovina covers more than 8,000 km, more than 1,000 km of which are European routes. Most of this network has been designed to accommodate a two-way single carriageway with a maximum speed of 80kph. Traffic lane width varied from 3.50 to 3.75m, and road shoulders from 0.5 to 1m wide. As average daily traffic volumes grew to over 9,700 vehicles, with a corresponding increase in freight volumes, Bosnia and Herzegovina embarked on a motorway construction program in cooperation with its neighbors. It has been actively supported by the European Union and its partners, particularly under the Western Balkans Investment Framework.

Under the newly extended TEN-T Core Network a first concrete measure will to upgrade the road connection between Svilaj – Odžak.

The Svilaj – Odžak section is part of the motorway designed and partially built by Bosnia and Herzegovina along the Mediterranean Corridor Vc to Croatia. The route will accommodate 2x2 traffic lanes and speeds of 120kph. Construction works are ongoing for this section. The new bridge over the Sava and the border crossing facilities funded under this project will allow even increased traffic volumes to flow smoothly. Relying on existing infrastructure would undoubtedly have resulted in serious bottlenecks.

In terms of bottlenecks, the only relevant physical restriction is the parking/waiting space for lorries and busses which is mostly due to administrative (non-physical) barriers.

The lack of parking space and the waiting time at the borders is rather the result of the success of international road transport in the SEETO region to the detriment of international rail transport that has not managed yet to efficiently organize its border crossing.

It is considered that the major physical bottleneck within the port is the insufficient length of quays to accommodate large ships, especially on container terminal and on liquid cargo terminal. With development plans for new liquid cargo berth already ongoing, it is expected that this physical bottleneck will be annulled by 2020, when the construction of new jetty is scheduled to be completed.

Container terminal quay is 280 meters long and it is not able to accommodate mother vessels carrying 5000 TEU and more. Second phase of construction of container terminal should overcome this obstacle, but in order to commence construction, there should be enough throughput of containers, which is currently low (around 21.500 TEU's in 2015, expected to be 23.000 TEU's in 2016).

In terms of passenger terminal, major bottleneck is non adequate width of RO-RO ramps, which results in inability of simultaneous operating of ferry line Ploče – Pelješac peninsula and possible ferry line Ploče – Italy. This bottleneck is planned to be removed by extending the width of one RO-RO ramp so it could accommodate bigger ferries.

Also, the passenger terminal suffers from congestion in summer months, but that bottleneck is due to spatial restrictions and it can't be overcoming. It is expected that a bridge connecting Pelješac peninsula with mainland should be completed in next 5 years and it should remove this bottleneck.

Other physical bottlenecks within the port are:

- There is a road and pedestrian crossing on the railway;
- Road and railway crossings but railway has priority;
- Parking spaces at terminal are not adequately signposted;
- non-existence of areas adequately arranged, with different areas for waiting and pre-embarkation and the interior traffic (will be done till end of 2015);
- not existence of dedicated Ro-Ro passenger terminal.

Port of Ploče Authority has created a questionnaire for local port stakeholders with aim to address the bottlenecks and drawbacks on the Trans-European Transport Corridor Vc in connection with its starting/ending point at the Port of Ploče. Its aim is to explore the current situation of the Port of Ploče and the Corridor Vc from the angle of private stakeholders and discuss their requirements towards the Port of Ploče and the Corridor Vc.

The questionnaire was delivered to total of 20 stakeholders, including major stevedoring company Luka Ploče d.d., forwarding agencies, maritime agencies, rail cargo operators and other local stakeholders. It was answered and delivered back to Port Authority, who systematized the answers and created a prioritized bottlenecks list.

With this questionnaire, the most important barriers, physical and non-physical, as well as the requirements of the private stakeholders towards a more operable, reliable, customer friendly and economically attractive port, respectively hinterland corridor, should be identified.

The results from the questionnaires show, that the stakeholders mostly consider non-physical barriers as the greatest obstacles to their businesses - and as such, to the development of the Corridor Vc and the Port of Ploče.

On top of the prioritization, the participants also named the following points to be barriers:

- Terminals in Port of Ploče are incapable when it comes to undertake unloading while it is raining,
- Without authorization of railways, ships are being manipulatively bargained between the user and Port of Ploče,
- Problem of goods storage in port,
- Problem of wagons detention due to immediate ship loading.

As a logistic node, port of Ploče is situated on the eastern coast of the Adriatic Sea and because of its location it is of great importance for the economy of the neighboring Bosnia and Herzegovina, whose state border is only 25 km from the port of Ploče.

It is located in a bay that encloses the Pelješac peninsula on the south and southwest sides, thus representing a natural breakwater. Luka Ploče is directly connected with its hinterland in Bosnia and Herzegovina, further to the north-eastern part of Croatia, and with Central Europe the railway line and the roadway (E-73) stretching along the line C (Budapest - Osijek - Sarajevo-Ploče) of the Fifth Pan-European Corridor (Venice - Trieste - Budapest - Uzgorod - Lvov). This roadway is also one of the most important branches of the TEM / TER project and in a broader sense connects the European North (Baltic) with the Adriatic and is of vital importance in economic connections and the traffic of people and goods.

Since Međugorje, Bosnia and Herzegovina, a major destination for Italian tourists, is located only 40 km from port of Ploče, we should focus on this market. According to statistical data from B&H, there was 1 million of tourists in Međugorje in 2017., and almost all of them arrived via road, with Italian tourists being the vast majority.

This situation was closely monitored, and a result is a permanent catamaran line between Ploče and Termoli, Italy, which should be established to provide fast connection between central and southern Italy and Međugorje.

The line should be operated by a 36-meter-long catamaran, with capacity of 330 passengers, with projected duration of voyage at 4 hours and 45 minutes, meaning that transit time from Termoli to Ploče is decreased by almost 10 hours.

Since there is an existing ferry line between Split and Ancona, it is not likely that another ferry line between Ploče and central Italy will be established so we will not consider this possibility.

It could be said that for the current cargo flow, Port of Ploče has satisfactory infrastructure. The problem with congestion on the road can be seen only in summer months with the influx of tourist. However, since city of Ploče is not a great touristic destination, congestion is not a major problem in city itself, but it can be a major problem on the motorway A1 and the surrounding roads and border crossings.

Port of Ploče has a connection to a highway A1 that is connecting capital with the south of the country. It is also part of the corridor Vc that stretches from Budapest and includes the road connection from Hungarian border through Osijek, Sarajevo and Mostar to Metković and Ploče (road E65). The road connection is very good, and with the building of new entrance terminal, there is a direct access from main port gate to highway.

The problem with congestion mostly manifested at state border with Bosnia and Herzegovina, since Port of Ploče is major transit port for Bosnia and Herzegovina. Picture below shows main border crossings in that area:

It could be said that port of Ploče has a good infrastructure, especially if we took into consideration soon to be new entrance terminal, that will be directly connected with highway network. Railway infrastructure is also in good condition in the port, and the only problem is the connection and cooperation between two countries – Croatia and Bosnia and Herzegovina.

The main problem that port of Ploče now consider is lack of information exchange. At the moment, there is still paper information exchange between actors. Also, main problem is information exchange from the seaside – between ships and port. Because of that problem, in the last few years, there were few accidents where ships made a collision with the terminal and made a huge damage to the operation of the port. Because of that, main focus of the port should be in informatization of operations and information exchange.

3.2.8 Italian territory future scenarios

In the ten-year period 2009-2018, characterized by the economic crisis of 2009 and the sovereign debt crisis of 2011, it can be seen from the chart below, with values indexed 100 for the year 2009, that the real Italian GDP grew by only 2.3 basis points and reached pre-crisis levels only from 2016. In detail, the slow recovery of GDP can be ascribed substantially to the increasing degree of internationalization of the Italian economy and therefore to export which were the counterpart of the still low levels of domestic consumption and investments.

As a corollary to this, it can be seen that the highest growth rates over the decade have been recorded by the intermodal railway traffic and by the air cargo, although they represent a very limited market share of the Italian freight transport. On the other hand, conventional rail freight transport is still significantly lower than in 2009 and the trend of the last years shows no sign of reversing.

With regard to maritime cargo traffic, despite two years of negative rates between 2011 and 2013, it has resumed a slow growth that seems to have stopped in the last year. Just like long-haul freight transport in the motorway sections, these two modes seem, at different rates, to trace the trend of the real GDP.

In the period analyzed (from 2014 to 2018) there is a steady growth of the freight transport, except for the last six months of 2018 since there are some treats that are scaring the Global market (e.g. Brexit). The best performance in this period are scored by the air transport, followed by the road transport, especially for the express courier sector. This trend is pushed by the e-commerce since the Italian customers are buying more and more on national and abroad websites. In addition, the maritime

transport is growing but its performance is under the pre-crisis level, especially for the negative results of Cagliari, Gioia Tauro and Taranto ports. After a positive trend of the first two years (2014 and 2015), the railway transport is scoring a performance quite negative (-0.4%) in the 2018. The negative trend of the last years affects the forecasts that foresee steady results for 2019.

The positive trend of the Italian goods sector detected in the first half of 2014 has been strengthened in the second half year, keep increasing year after year with positive results both in terms of traffic and turnover in all the transport modalities. The air cargo scored the best results (+6.7% weight carried, +4.1% number of shipping and +4.7% turnover), overcoming the pre-crisis results. On the other hand, the liquid bulk (-6.4%) and solid bulk (-1.1%) achieved the worst results of the sector. The substantial increase of the national transport market (+2.1% of FTL and +1.3% of Groupage) seems to be the sign of a recovery of the internal consumption of the families and of companies' investments.

It is important to point out that the recovery of the rail freight (+600,000.00 train/km that means +1.4%) is due to the growth of different railway undertakings, which are absorbing the Trenitalia's market shared. In addition, the steady increasing of the courier sector is notable (+3.8% volumes and +3.5% turnover), towed by the e-commerce that is keeping a double-digit growth, doubling its value in only four years. The positive trend of the freight traffic is confirmed both by the ratio traffic/revenues that is basically balanced and by

the decrease of the days sales outstanding (79 days against 87 in 2013) and of the unpaid debts (1.2% against 2.4% in 2013). In the international shipping sector, not only the air transport is grown. In fact, both the road (+2.5% volumes and +2.8% turnover) and maritime transport (+1.9% volumes and +1.7% turnover) are increased.

The positive values collected by Confetra confirm the data coming from the Alpine passes (where the Brenner performance of +3.8% is closed to the Monte Bianco one) and of the airports where Malpensa with a result of +9.1% has strengthened its leadership on a static Fiumicino (-0.3%). In addition, the

motorway traffic reached a result that is finally again positive, after a three-year decline. The growth of the container traffic of Port of Genova (+9.3%) and of the RO-RO port of Livorno (+7.8%) is noteworthy.

For the second consecutive year, in 2015 the Italian traffic trend of the goods is positive both for the carried volumes and for the revenues, except for the transshipment that is moving back (-10%). Air cargo (+5.1%) and courier sector (+8%) keep increase thanks to the unstoppable development of the ecommerce.

Other good results are given by the road transport, both national (+3%) and international

(+2.7%), confirmed both by the raised motorway traffic (+3.3%) and by the Alpine passes traffic (+2.5%). In addition, the rail freight transport scored a positive result (+2.6%). Then, the international shipments raised both in the maritime (+3.4%), road (+3.1%) and air (+2%) sector. However, the trend of the all transport modalities keep being worrying compared to the maximum levels reached in 2007. Only the air cargo has overcome those values while road and sea transport are 13% and 40% below respectively.

The recovery of the freight transport sector is carrying on slowly in 2016. For the third consecutive year, the traffic trend raises in all its modalities although only the air transport scored a real higher performance compared to pre-crisis levels (2007). In particular, the growth of the air transport (+7.4% in 2016) has reached the highest levels of the second half year, showing that the peak season is in the last months when the provisions of goods raise for the Christmas period. This data is confirmed by the number of aerial shipping that scored a +4.5% compared to 2.3% of the first half year. There is a reverse trend for the road sector despite its significant growth (+4.4% in the international FTL, +4% in the groupage and +2.6% in the domestic market) because had a slowdown compared to the first half year. The same goes for the maritime transport because the growth of the first months has not continued except for the transshipment sector,

thanks to the positive results of the Gioia Tauro port (+9%). The liquid bulk had a slight decrease compared to 2015 (-0.4%) but it seems linked to the turnover of the oil product stocks rather than a real reverse trend. Conversely, the growth of the rail transport is noteworthy since it has increased in the first half

year from +3.8% to +4.1%. It is a sign of the recovery of the sector thanks to the incentive of the Govern that is showing the will to foster the rail transport through the so-called “iron-care”. Good performance for the courier sector that scored +3.5 on the national shipments and +6.5% in the international market. These results are coherent to the productive trend to reduce the stocks, to promote the just in time and to increase the e-commerce.

Analyzing the revenues, the road transport and the courier sector show a recovery that can mean the end of the crisis. However, the international shipments, especially the air and the maritime ones are undergoing the contraction of the rental fees. From the financial point of view, the ratio between unpaid debts and turnover is getting better (1% more than +1.2% of the first half year) but the days sales outstanding (DSO) are increased a little bit from 78.5 of the first half to 79.4 days at the end of the year.

The Periodic Economic Note of 2017 shows overall increases both of traffic and of turnover compared to 2016 that has been a positive year. The only negative results regard the transshipment sector since the bad performance of most important ports operating in this sector that are Gioia Tauro and Cagliari. In addition, there is a negative performance of the solid bulk caused by the port of Taranto involved in the Ilva’s crisis.

On the other hand, there is an increase of the revenues of the maritime and air sectors, thanks to the positive stabilization of the rental fee level. Good performance of the express couriers, thanks to the steady growth of the E-Commerce that in 2017 benefitted of the increase of Italian web shoppers (+10%) and of the purchases from Italian sites (+17%).

The Periodic Economic Note of 2018 shows a slowdown of the growth of all the transport modalities. This trend started in the middle of the first half year and followed the industrial production trend detected by the ISTAT: in the first six months, the average growth was +2.7% and in the second half of the year -1.3%.

Therefore, the annual average growth was +0.7%. Simultaneously, the forecasts of Global Trade have been weakened since the last evaluations of the Italy Bank foreseen 3.5% in 2019, more than 2 percentage point less of 2017. This negative performance is due to several factors, like the business negotiation

between USA and China, the Brexit and the slowdown of China's economic activity that produced a growth of +6.6%, the lowest from 1990. In the first half year, the sector that have suffered less of this trend is the road transport despite its growth is decreased. The transport performed by truck scored +2.4% in the groupage and +2.5% in the international FTL (in 2017 the performance were respectively +6.1% and +6.5%), confirmed both by the motorway traffic raised of 2.6% in the first eleven months and by the crossing growth in the Alpine passes of 3.3%. On the other hand, the transport performed by van scored +2.5% in the domestic shipments (in 2017 was +3.5%) and +4.0% in the international routes (in 2017 was +6.9%) that

is due to the steady growth of the e-commerce. In fact, the online purchases in Italy on national and international sites reached 27.4 billion of euro. Unfortunately, both the railway (-0.4 trains per kilometer) and the air cargo (-0.4 tons) scored a negative result, producing a sharp breaking compared to the forecasts. For instance, Malpensa has a negative result of -3.2% while Fiumicino had a growth of +11%. Moreover, the sea transport got worse than 2017 and 2016. The container traffic in 2018 was +4.8% (+7.4% in 2017). The Ro-Ro traffic reached +2.5% in 2018 but in the first six months was 4.7% (in the same period of 2017, it was 8.1%). Furthermore, the liquid bulk (-1.0%) and solid bulk (-4.6%) scored negative results but the worst performance is reached by the transshipment (-10.1% in 2018, -10% in 2017). In fact, both Cagliari (-56.3%) and Gioia Tauro (-4.9%) keep scoring negative trends. In fact, in the transshipment ports there is only the movement of the loading unit from a vessel to another one, so this type of traffic represents only a marginal part of the national freight transport throughput. For the same reason, the focus of the analysis was the containers traffic since they represent the most significant part of the maritime activity.

On the other hand, the railway diagram represents the entire railway sector. Deepen into the analysis, it is possible to split the intermodal and the conventional railway traffic. From 2015, there is an important growth of the intermodal sector. It is a positive signal since Europe is pushing this sector to reduce the use of the road transport. In fact, the loading units carried by truck can be easily loaded on a train using cranes. In this way, a clean vehicle like the train will perform the longer stretch of the route. Lastly, the road and the air transport have a similar trend. After a positive 2015, the 2016 recorded a slight reduction

in 2016 due to the raising of the e-commerce and of the reduction of the stocks. Then, 2017 was the best year thanks to the steady good performance of the e-commerce sector. Unfortunately, Brexit and China slowdown has affected negatively the market, reducing the growth and the performance of the both transport modalities.

3.3 SUMMARY OF IT SYSTEMS ANALYSIS, IMPACT ON OPERATIONS AND STAKEHOLDER INVOLVEMENT

3.3.1 Interporto di Trieste-Fernetti / Port of Trieste

The port of Trieste is multimodal, with freight and logistics units arriving and leaving by ship, train and road.

In 2014, the Port Network Authority of the Eastern Adriatic Sea, within a co-financed EU TEN-T Programme project named "ITS Adriatic Multiport Gateway", launched the design of a dedicated ICT platform, developed with the collaboration of all prominent actors in the Trieste maritime transport activity, achieving the implementation of "Sinfomar", the Port Community Systems. Focus of the system in on intelligent and secure exchange of information between both private and public organizations, with the main aim to improve the competitiveness of the port of Trieste.

"Sinfomar" is an online platform for the management of all procedures regarding administration, taxation and customs related to port logistics.

In the design of "Sinfomar" it was necessary to consider the special legislative situation due to its position as a Free Port. The Free Port of Trieste currently includes five distinct Free Zones, three of which reserved for commercial activities (Old Free Zone, New Free Zone, Timber Terminal) and two used for industrial activities (Mineral Oils Free Zone, Zaule Channel Free Zone). As regards the customs regime, the Free Zones of the Port of Trieste enjoy the legal status of customs clearance exemption, which

involves a whole series of beneficial operating conditions for the Free Port of Trieste. This is undoubtedly the biggest area of difference between the regulations of the Free Port of Trieste and national and EU ones.

The areas in the port are divided in common areas (under the control of the Port Network Authority) and areas given in concession (under the control of terminal operators and private companies).

The "Sinfomar" project involved fully the local and regional maritime world. In particular, among private operators, Shipping Agents, Freight Forwarders, Fleet Operators and Terminal Operators. On a lesser level, also some Fleet Operators and the surveillance companies were involved. Regarding the institutions, the following actors were involved in the project: Customs Agency, Harbor Masters, Finance Police, Sanitary Inspection Authority and the regional dry ports. Particularly, Fernetti's dry port in Trieste has become the strategic intermodal terminal for the port. In addition, some particular actors were involved, such as Società Alpe Adria (regional Multimodal Transport Operator), Rail Cargo Austria (railway undertaking), Adriafer (society of railway maneuver) and the University of Trieste (interested in the analysis of logistics data regarding the port of Trieste).

"Sinfomar" is active since 2014. The private operators enter in real time all the data present in the system. Subsequently the relevant public authorities, such as the local Customs Agency or Finance Police offices, validate the data while performing their checking operations. Such verifications certify the reliability of data. The information and data, further elaborated by Sinfomar software, are important not only for the daily management of port operations but also for statistical information, driving strategic decisions.

Another relevant IT platform in production on the local territory is "Sinfosec", the system currently in use at the Interporto di Trieste "Fernetti" dry port area. Progressively developed and deployed in the last five years, Sinfosec has the following modular structure:

Sinfosec has the following modular structure:

A) Back office

B) Security Guard 1 & 2

C) Other Programmes

D) Timers

From the technical point of view, Sinfomar is structured in modules and sub-modules and is based upon free and Open Source international languages and standards. In particular, it relies heavily upon technologies linked to web services and use of XML.

A fundamental aspect of the software is that it is in constant development, in order to guarantee the adaptation of its functionalities to the dynamic changes occurring in the various transport systems and the freight volumes in the Port of Trieste. The constant effort in adapting the "Sinfomar" also has the priority objective to ensure full conformance of the software to current national regulations and to international rules and guidelines regarding customs, sanitary and security.

Since January 1st, 2018 a further step was taken towards total dematerialization of check and authorization operations for train movements. Train movements were considered equal to ship movements, with common and uniform rules for customs, logistics and security through standardization and automatic generation of all documents for train arrival or departure.

In order to allow the full tracking of any container/vehicle/cargo arrived by train and departed by ship or vice versa, the railway undertaking company (or its representative) must show, for each train to/from the Port of Trieste, a customs manifest of all freight on it using the, so called, CH30 module. It is the instrument that will allow the creation of logistic and (when regulations will allow) customs corridors between the Port of Trieste and intermodal terminals in Central Europe. Preliminary test activities towards this were developed in other Interreg projects and are already in an advanced stage.

Sinfomar system is currently widely used by all stakeholders involved in the supply chain in the port of Trieste and its network. In fact, also nearby dry port of Fernetti uses it and in current and future

developments it will connect also the port of Monfalcone and will be used to exchange information with all the logistic nodes and dry ports which have train connections with the ports of Trieste and Monfalcone.

Currently users from over 150 different companies and private or public bodies are registered users of the system. On average about 750 single users connect daily to the system in working days (about 250 also during weekends).

3.3.2 Port of Venice

In order to respond to these new logistic needs and improve its multimodal terminal efficiency, the port of Venice has planned a series of investments aiming at upgrading the existing port infrastructures in order to increase its logistic and multimodal efficiency.

With reference to the multimodal transport, the Port of Venice has planned a several investments with the scope of increase it railway traffic flows. In particular, these investments are focused on the enhancement of railway telematics systems for shunting operations (SIMA) and its integration with PCS and information systems of other subject involved in developing rail services.

The SIMA IT system retrieves, processes and stores data during the maneuvering 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. SIMA comprehends the following functional modules:

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

SIMA offers the following macro-functionalities:

- Data acquisition, i.e. during the start-up phases of the manoeuvring procedures, through the insertion of the annual, weekly or daily schedules of the single manoeuvres, 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;

Actually, SIMA does not fully meet the operational management needs. The most critical aspects concern above all the non-intuitive graphic interfaces, the absence of wizards, the absence of some useful correlations between the different modules of the system and the presence of unused data and functions. In addition to the critical issues on the use of the system, there is also the need to update the technologies used for development.

It is also necessary to introduce a component with process optimization and decision support functions that, through the processing of time series of data stored by the system and data received in real time, give indications on the most effective solutions to process management problems.

The system architecture, to date based on the RESTful model, will have to be updated to more effective models such as micro services-based architecture. At the very least, the architecture will have to be rethought for an easy future migration. As for the user interface, it must be subject of a careful analysis on usability and user experience, ensuring an easy startup of the system in the environment where it will be used. Interfacing with the new external systems is another critical aspect to consider, for more details regarding these systems.

In particular, the interfacing with the railway system should be useful for:

- The possibility to create and manage the M.53 of District (called “M53 di Comprensorio”) model. The M.53 of District model will replace the M.53 Integrated model (now done by the Infrastructure Manager) and contains some additional useful data concerning operation of the Shunting Operator. These additional data could be used by the system to improve planning procedures efficiency through an optimization of train placement in railway yard and their relative movements using machine-learning techniques and logistic algorithms;

- The possibility to interact with the PIC system of RFI that allows real-time communication of changes to the general planning of 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 Mercitalia Rail SIM system that allows the management of waybills through an XML protocol.

-The possibility of interfacing with the Railway Undertakings IT systems (such as SIR system of Mercitalia Rail) for the recovery of information regarding train composition (list of wagons and containers carried by

each wagon), useful for the automatic management of wagon groups through an XML protocol or similar one.

- The insertion of a new software component for the automatic calculation / optimization of the precedence on single tracks as Decision Support System, which assists maneuver planners in logistic decisions regarding train movements on the tracks beam by the proposal for the entire daily manoeuvres scheduled respecting both operational and infrastructural constraints using machine-learning techniques and logistic algorithms.

- The possibility to manage the shunting personnel through the system to assign each shunting team to their respective loco automatically.

3.3.3 Port of Ravenna

In 2011 the port operators operating in the Port of Ravenna and in particular Shipping Agents and Freight Forwarders solicited the Port Authority to design and realize an IT system that could support the coordination of the different operators involved in the process for the customs formalities and in particular in the preparation and submission of the goods manifests. Thus, the design and fulfilment of the Port Community System for the Port of Ravenna began.

The system during this time has been implemented with many functionalities related to the logistic processes, the data exchange with the National Maritime Single Window and the formalities that the operators must respect in their relationship with the Port Authority.

The main concept has been always the same: the share of data and documents in order to realize the “only one submission” objective, according to which the user must communicate the data only once and reuse them sharing and exchanging data and documents with all the other operators and administrations involved in the port processes.

The PCS of the Port of Ravenna is designed according to the "central hub" architectural model. In this model the system operates as a data sorter that implements the specific process' logics for each port activity.

Specific attention was paid to grant the maximum flexibility concerning the technics to share data among the system users preferring, whenever it was possible, the machine-to-machine data exchange via web services that is considered the most efficient way to share data and documents.

Another central focus point is the function that the PCS could fulfil supporting the coordination of the processes and the collaboration among the different subjects, publics or privates, involved in a specific process. Unfortunately, in this context the Port of Ravenna faces since the begin the low disposition (that often became a total closure) of the ICT systems and of the organizational models. Moreover, from the side of the competent Authorities, there is often lack of active participation to share data and documents and to consider the PCS as a "partner" that represent the entire port community and an aid through which make the processes and all the supply chain more efficient and secure.

The system architecture must directly reflect itself into the governance model. The PCS of the Port of Ravenna is governed by a so called "Organismo di regia" (control body) composed by the delegates of the main operators' categories in addition to the Port Authority and the delegates of the company that manage the system. That control body wants to represent the port community, that is the plural subject that must address the system's management and development choices because is from the debate among the operators that can emerge the criticalities of the processes to which the PCS can give an answer in terms of innovation and efficiency.

Overall, PCSs save money in port operations and add value to these and to logistics and transportation chains. As an example, it has been estimated that the Valencia port PCS in Spain saves around € 23 million each year across the whole port community. Similarly, Portnet, the PCS currently operating in Singapore, has reportedly generated savings of over $80 million over a three-year period (Port Strategy, 2012).

The goal of a PCS is not simply to support port operations—it is more about supply chain trade facilitation through shared information flows. PCSs are designed to increase the visibility of core operations among the interdependent members of a supply chain, enabling better network optimization for individual operations/operators and the sector. Modern logistics chains demand efficiency at each step of the supply chain. Unlike traditional chains, they envision an uninterrupted flow of products and information, which eventually helps minimize inventories. Logistics operations should be able to cover all steps in the logistics chain, in which ports are positioned as intermodal transportation nodes and logistics centers enabling the integration of the information across the entire supply chain.

Leading ports have reacted to this challenge by investing in technology, which is less expensive than infrastructure. PCS solutions can contribute to the creation of modern logistics chains as they are a "one-stop shop" where the whole port community can share information.

The main benefits of a PCS are based on a network effect and are exponential to the number and role of the stakeholders connected to the system. The motivations for implementing a PCS include many potential benefits. For example, PCSs can:

- reduce the administrative costs of documentation, communication, and information flows;
- enable timeliness, accuracy, and make information available 24/7;
- enhance the efficiency and productivity of port operations;
- increase a port's national, regional, and global competitiveness;
- foster intermodal competitiveness leading to more balanced modal distribution;
- fulfil customers' and stakeholders' requirements (eventually leading to increased satisfaction levels);
- fulfil the ports' policy requirements;
- enable the optimal use of expensive and often physically constrained port infrastructure;

● increase the security of vessel and cargo flows and improve monitoring of these by public bodies; and

● increase customers' satisfaction by monitoring and tracking container flows.

A PCS is commonly regarded as a strategic asset rather than a profit-oriented initiative. The complexity of PCS solutions and the number of stakeholders involved mean that traditional cost-benefit analysis is not the best way to assess their value. Direct and derived costs and benefits are attributed to a wide range of SCPs and hence are not easily quantified. Typical indirect economic benefits include:

● the decreased cost of information access;

● lower communication costs for shipping lines;

● more accurate taxation and overall additional government revenue, namely through more transparent information, thus boosting revenue from taxes and user fees;

● prevention of smuggling; and

● prevention of illegal activity.

In addition, the flow-on benefits are not exclusively financial and hence are difficult to anticipate. PCS solutions also provide increased competitiveness, increased information quality, improved operational performance, and safe paperless document exchange procedures for port authorities. All these gains have the potential to reduce time and cost to trade and contribute positively to country indicators for international benchmarking initiatives such as the World Bank's Doing Business index.

3.3.4 Port of Ancona

In the last years the Central Adriatic Port Authority has invested constantly in developing information systems with the aim to support the efficiency and competitiveness of Ancona, getting even more than what planned in the former developing programs regarding the Port Community System.

Actually, the PCS "LISy" is able to communicate with the Customs Agency ICT system called AIDA, the Port Management Information System (PMIS) of the Corps of Port Captaincies and the TRAMAR system of ISTAT (Italian National Institute of Statistics).

LISy has been one of the first systems at national level able to interface and acquire available data from the open data service of the PMIS.

Furthermore, it is still a system fully interoperable with software utilized by different shipping agents and customs freight forwarders for giving them the possibility to exchange data regarding customs procedure without the mandatory necessity to use the system of Port Authority (modular distributed plug&play architecture). Despite the success, the system is continuously under developing in order to guarantee the adaptation of its functionalities to the dynamic changes occurring in the world of transport and logistics.

As stated in the dialogue between Customs Agency and Assoporti (Italian ports association) everything will be integrated with the functionalities necessary for the telematic interaction between public administrations, and will be developed in order to adapt interface at the progressive development of the National Logistics Platform, of the Corps of Port Captaincies and of the Customs Agency.

The system is under developing with the aim to increase the principle of data reuse and automatic availability once it is in the system. A further developing line is the gate control system for simplify and assist activities carried out by the guards present to port gates, both to ferry and cargo terminals.

One of these developments in particular regards the modality for remote control of heavy cargo vehicles for removing parking areas from historical port quays to external port circulation area where carrying out customs performance.

Architecture models.

Since 2015, thanks to Project MEDNET, Port Authority of Ancona has bought and developed the web application LISy for the telematic interface with Public Administration in charge of the port logistics activities.

The application was developed for answering to all new technical innovations and regulations taken by the competent administrations for freight controls and maritime traffic monitoring - in particular: Customs Agency, Corps of Port Captaincies, and ISTAT.

The software is a user friendly application able to interact with all the different internet browser and systems. The System is articulated in four modules, all connected and able to reuse all data already in the PCS:

1. Central module for authentication, user profiling, common system interface and notification center. The other modules depend from this central module;
2. Module "vessel"
3. Module "freight"
4. Module “ISTAT”

In consideration of the core role of Ancona as one of the main terminals for the motorways of the sea in the Adriatic basin, being the northern terminal of the SCANMED corridor in the Adriatic sea, ICT systems of the Port are going to be improved with the Action SMART-C.

The project consists in the implementation of artificial intelligence technology based on correlation and merging of simultaneous information coming from multiple sensors located in 3D space to manage and control vehicle flows along the road, between Scalo Marotti and the Customs Gate, with possible interferences and entrance/exits to ensure that vehicles follow the assigned path and do not exit from it.

The goal is to significantly increase security and management capacity of vehicles flows related to ferry traffic inside the port facilities and the surrounding areas, with particular reference to customs formalities, realizing a virtual customs tunnels linking customs facilities without onboard units for the tracing and tracking of vehicles in short distance paths.

Implementation stage

In the design and implementation of ICT systems, four stages have been identified from literature:

1. Project initiation: consists in the reorganization of all the information and data that all the involved stakeholders need to share for intelligently set up the new system network. As already happens with the actual ITS and PCS operating in Ancona, the aim of the new systems in developing require the common participation of all the partners for sharing their information and operational activities with other companies.
2. System analysis and design: consists in planning the system architecture. It is a delicate phase because the new operational structure requires the necessity to be the lightest possible in order to avoid any radical change in present working procedures and being the most acceptable possible by the stakeholders.
3. Pilot implementation: pilot action and tests realized for demonstrating the real usefulness and the benefits deriving from the adoption of new operational system. The positive results have led to the realization of the following implementation steps.
4. Implementation and adoption: consists in the maintenance following steps that will be responsibility of all the companies involved for the realization of the hardware and software components of new system. The success of the system developed in Ancona will give the possibility to have realized a "best practice" exportable in other ports and transport applications. Development of the system will be continuous and constant: stages listed above will be followed again for every new implementation.
5. Maintenance and growth.

Usage and impact on freight agents

Due to positive results and reaction derived by the pilot action, operators working in the port of Ancona will be invited to apply and use the new systems in their procedures.

The Port Authority is already conscious that no coercive action will be necessary between partners thanks to the positive operative simplifications deriving from the adoption of the new systems for all the companies involved.

Future developments and expansion of the systems are already under considerations for connecting the other Ports of Central Adriatic Authority (Pesaro, San Benedetto del Tronto, Pescara and Ortona) to the new ITS infrastructure.

3.3.5 Port of Bari

The Port Community System (PCS) of the Port of Bari is called GAIA – Generalised Automatic exchange of port Information Area – and was developed within the GAIA project co-funded by the Interreg Italy-Greece Cross-Border Cooperation Programme 2007-2013.

GAIA is the Port Community System of the Port of Bari with which some port processes are managed digitally and with which innovative information services are offered to passengers and operators. GAIA constantly monitors the entire port process in real time, for each ferry ship departing from the Port of Bari, from the Security Card issuing procedure until the ship arrives at the destination port. It provides information on the status of boarding, weather conditions, the arrival and departure times of ships and, through the tracking function, notifies passengers of the exact position of ships during navigation and arrival times. All travel information is thus displayed directly on users' mobile devices, such as smartphones, tablets, notebooks, allowing constant and timely updates on boarding times and any ship delays, free of charge, making the travel experience and stay in a more peaceful city.

Detailed information, in particular on road conditions, is also made available to road hauliers who, through these services, can decide on the best possible route to reach their intended boarding, as well as request online authorizations for access to the port and areas. of security. All the information generated by Gaia is also accessible in the port through special interactive kiosks. The use of GAIA has, in fact, revolutionized port activities by improving the work of operators, information management and the movement of passengers and vehicles, facilitating security checks by the police force.

Within the project, seven modules were activated:

- GATE, access control system for passengers and vehicles. The Gate module, with the introduction of the Security Cards and Access Authorizations equipped with barcodes, has speeded up the

procedures for boarding passengers and vehicles, has regulated the access of authorized personnel to the port, increased navigation safety and improved the effectiveness of border controls;

- PASS, functionality dedicated to port operators for the online management of requests for access to port areas subject to the regulation of security plans. Using PASS, it is no longer necessary to go physically to the Port Authority or PFSO offices and no more paper requests and / or copies of documents are required. With PASS, shippers and dealers can make online requests on behalf of third parties who receive access authorization directly on their smartphone via email. This service, also available for all UIRNET-affiliated vehicles, has drastically reduced the average time for receiving a port access authorization, has completely eliminated the circulation of paper forms and copies of documents and simplified the control procedures at the gates .
- SHIPS, ship tracking system. Using the AIS data provided by the ships, also thanks to the cooperation with the national system of the Port Authorities, the system allows to elaborate in real time the arrival and departure forecasts of the ships in the Ports of the Levant both for the benefit of passengers and port services. .
- IRIS, multichannel information system. It publishes the information processed and generated by the various GAIA subsystems on the LED information panels, kiosks, touch screens, TVs as well as on the public portal of the Body.
- TRAVEL, support portal for passengers in transit in the Port of Bari. With the functionality, itineraries and tourist routes are available in the province of Bari and in Puglia.
- eGAIA, App for mobile devices (iOS and Android smartphones). This service makes the information published on the Travel portal and in the Iris form available on mobile devices. The navigator, selecting the topics of his interest, will be updated with push notifications on the latest information published or on any changes to routes and itineraries and will be able to consult the detailed map of the port of Bari to easily reach the rest areas and the embarkation docks.

- Data Warehouse, business intelligence tool. It is a digital archive which, through innovative semantic analysis techniques, allows the processing of all the data of the GAIA system in order to assist, suggest and dynamically support the decision-making processes of the local, regional and national authorities in the field of maritime transport and of intermodal logistics.

Also, GAIA has the following features:

- ALERT, it is a real-time notification system of events generated by GAIA PCS. Through Alert module, Coast Guard and Border Police activate automatic searches of people and vehicles present in the system.
- DATA TRAFFIC, it enables the electronic submission of administrative information relating to passengers and vehicles (arrivals and departures from Bari). Allows Port Authority to use the data for statistical and billing purposes.
- STATISTICS, Automatic analysis on integrated data/archives retained by GAIA sub-systems, real time elaboration of ESPO data models, Data Warehouse

Concerning the interoperability with other IT systems and related upgrades, GAIA connected to:

- 2011: shipping companies
- 2013: document management system
- 2014: Uirnet – Italian Logistic Platrom
- 2015: intelligent gates
- 2016: container terminal
- 2017: Port Management Italian System (PMIS – Coast Guard)
- 2019: AIDA customs

The communication between GAIA and other systems is made by web services based on ESB. The system has been certified since 2014 by Italian Agency for Digitalization.

GAIA interoperates with heterogeneous systems by means of orchestration services (modelling processes inside the system).

All in all, GAIA can be interpreted as a big data warehouse for the following functions:

- Data volumes - Databases for GAIA PCS and services working
- Data sources - Unstructured and unconventional data, linked to GAIA PCS (eg. IoT and environment sensors, anpr cameras)
- Pelagus - Italian Coast Guard Headquarters connection for Vessels automatic identification system (AIS system)
- ISMAEL - Prediction system of environment impact of logistic activities on ports
- S.D.I. - Interoperability with inter-force police national system
- TAPIN - Data warehouse and data exchange with Greek ports (Igoumenitsa, Patras, Corfu)

GAIA – future scenarios

Recent and future developments of GAIA include:

1) Interoperability with AIDA Customs IT service
2) Testing of 5G
3) Installation of eGates
4) GAIA 2.0 evolution

3.3.6 Port of Rijeka

Port of Rijeka Authority and identified stakeholders utilize standard Ethernet 10/100/1000 MBps network and WiFi for connectivity in office areas and areas where operative business is conducted. Rules for access, authentication, information security and identity management are managed using Microsoft Windows server Group Policies and Active Directory. Data sharing is achieved using shared network storages and Sharepoint document management system. Systems are regularly upgraded to new versions as the old ones expire and updated, under maintenance contracts. Architecture uses mixed on premise, hybrid cloud and cloud solutions and development and management of IT systems is achieved both by using internal resources and IT subcontracting and external consulting, when possible, as a part of co-financed projects and initiatives. There is a separate organized and funded IT department employing several full-time

employees and head of department directing initiatives, budget, providing project management services and escalations towards Board of directors, when necessary.

VTS system operated by Port of Rijeka Authority is upgraded regularly and the most recent upgrade of legacy system was performed in 2015. Legacy AIS system is made by developer Kongsberg Norcontrol IT, existing radar was product of Consilium, VHF system was made by Elman while meteo system was product of Vaisala, and all those products were integrated using 3D VTS aggregator component. Final layout of the system consists of the VHF and radar antennas situated at grain silo in Rijeka grain terminal in the center of the city, connected to the radar processor over network switch that connects the sensing equipment with VTS operator center located in the passenger terminal central building.

The second location houses VTMIS operator's workstation connected to VTS server and VTS data storage. Legacy ELMAN VISUS VHS subsystem and VAISALA meteo subsystems are used. Two locations are connected using existing network infrastructure and 8-port standard switches.

Port of Rijeka Authority also operates **VHF system** with antennae installed at the top of the grain silo in the grain terminal situated in the center of the city. The system has been expanded late in 2018. for piloting purposes (external stakeholder) by means of additional base station and additional operator's station. Added value of the upgraded system is direct and private data and voice connectivity with port control center without using radio channel and added ability to play audio recordings. Port of Rijeka Authority has given approval to use location under their area of remit to install the upgrade equipment and also use underlying network infrastructure. This project has enabled direct connection of the pilot with the Port of Rijeka Authority and further enhancements in the process, among which are the most important:

- Overview of the radar situation
- Overview of all available sensor information (AIS, meteo)
- Transfer of the information to tablet devices using preinstalled Navi-Pilot application

Embedded VHF FM IMM receiver/sender, model RTV-1124, is configured to support RF operative band 156-162 MHz, works with maximum power of 25W, has DSC functionality and VoIP subsystem. It is connected to VISus operator's terminal.

Access control for persons in business premises and areas of oversight of Port of Rijeka Authority is achieved using Siemens Granta access control. This is a proven industry standard solution that has been on the market since 1992 and typically used for high criticality access control venues like hospitals, universities, ports, government buildings, educational facilities and multi-tenanted buildings and campuses.

The system is designed to be used by security professionals and not only IT specialists. Based on Microsoft SQL database, the system is modular and enables growth of the port facilities, locations and concessionaires. Access control can be expanded to include proximity, smart card, magnetic stripe and biometric technology readers, including third party equipment. It can also integrate digital video management systems, CCTV, intruder alarms and other systems, all accessible via Port Authority's internal network from regular desktop or mobile workstations.

The system uses customizable software that can be used by operators having different privilege levels set according to their function and seniority. Distributed monitoring and reporting are also among default options. It is connected to controllers that can be readers (two offered options) and modular controllers (eight possibilities). Reading head technology is integrated with the controller.

A dedicated system is also installed to suit the needs for control of vehicles, drivers and containers entering port of Rijeka / AGCT j.s.c. container terminal.

CCTV in oversight area of Port of Rijeka Authority is achieved using commercial solution provided by Geutebrueck G-Core Security Management Software.
G-Core is the management software of the G-Scope. It has three integrated wizards:

1. *Connection Wizard* – used to create, manage and verify connections to the media servers

2. *Media Channel Wizard* - Used to monitor, report and manage all available CCTV networks in the system installed in the port of Rijeka

3. *Event/Alarm Wizard* – Used to create and manage triggered events and alarms

G-Scope system uses G-View as a playback client, a uniform user interface for all system components and supports all functions of picture playback, from the reaction to alarm events to support of recorded picture sequences.

CCTV system supports also continuous (permanent) recording and live streaming.

There is an ongoing CEF-cofinanced project of **PCS implementation** in the port of Rijeka that started in April 2018. and will be fully completed by end of 2020.

Using electronic data exchange, the PCS is an effective real-time information system; fast, focused, flexible and multi-faceted, it aims to improve efficiency at all stages of the process of manifesting, through vessel discharge and loading, Customs clearance, health and phytosanitary control. PCS offers also improved security, cost reduction and potentially more competitiveness for each user.

Therefore, PCS is a platform that allows smart exchange between public and private operators in a port, by creating efficient processes, reducing procedure time and minimizing the use of paper documents. PCS is also a digital solution for the optimization of port's commercial activities, and in Croatian context, it should represent an intermediary between all the users, CIMIS (Croatian Integrated Maritime Information System) and the Customs system of the Republic of Croatia, if it is given the role of local Single Window under prescribed conditions and with appropriate authorization and certificates for such purpose. The definition of PCS determines the role of the system in port activities as support to all the commercial processes and activities within given process regulations. Its utilization generally increases the use of electronic communication in port cluster's business. The PCS's role is not management or administration by nature, in fact, it provides support to the commercial aspect of all stakeholders involved in seaport business. The final goal of the PCS implementation is enhanced exchange of information, maintaining set

standards of quality, reliability and timeliness. Implementation of PCS results in significant improvements to the time consumption of ship's arrival to port that can be expected after process reengineering and especially after introduction of Port Community Systems that would result in increased efficiency and variable labor cost reduction. For example, scientific research in Croatia, using real administrative processes in the port of Rijeka, has shown that only administrative labor savings related to ship processing can amount to 48,5 % if proper reengineering is used and PCS is implemented.

PCS needs to be connected to the surrounding systems (such as CIMIS) with underlying goal being avoidance of multiple data entry and facilitation of data exchange between stakeholders. Along with all the other systems enabling electronic communication in maritime traffic, PCS forms an important constituting and participating element of the NSW platform. The "Project of setting up a single national Port Community System" is currently underway, with the Ministry of the Sea, Transport and Infrastructure being the bearer of the project. Cooperating parties in this project are, among others, Port of Rijeka Authority and Port of Ploče Authority. Once the mentioned project is completed in early 2021., all the Croatian port authorities will have a fully functional PCS system at their disposal that will be adaptable to all Croatian cargo ports with minor changes and adaptation dependent on local characteristics of each individual participating port. Port of Split Authority, managing the second largest port in the Republic of Croatia (traffic of over 3,1 million tons of cargo), is currently not actively involved in the development of this project.

One interesting trait of PCS implementation in the port of Rijeka is that it does not anticipate financial resources or module dedicated to ingress and egress. Functional specification does mention integration, but only in terms of procedures. Reason for this is fast developing project with fixed ending (end of 2020.) due to CEF rules of funding, so the integration related to access control is missing from the project.

There are also several TOS systems in use by various port terminal operators.

3.3.7 Port of Ploče

Port of Ploče Authority has implemented a Port community system designed to support processes and stakeholders involved in cargo, vessel, truck announcing and other forwarder to port related operations. At present time there are two IT systems in use at port of Ploče community. A new PCS system and the system ECCOS used for recording persons accessing port area through Luka Ploče main gate. There are several stakeholders that have active role in processes connected to truck announcing procedures. However, there is a third system on port area in function of monitoring and video surveillance.

On the basis of the common agreement between the project partners about the list of the processes which should be considered, the Port of Ploce Authority listed all stakeholders in the port community , divided them into the groups on the basis of the core business activity and then selected minimum one and in some processes even more representatives who were interviewed. The crucial criteria for the selection was the level of the involvement in relevant processes, then the size and volume of the activities, as well as the readiness to cooperate in the interview.

During analysis Port of Ploče Authority had two IT systems in use. The system for persons and vehicles access control into port of Ploče area, Technical security system and newly build, but not yet fully implemented IT system for broader port community, Port Community System Ploče.

Port Community System is a centralized and automated system for exchanging of information and documentation between organizations and marine transport authorities. It is based on data exchange automation opportunities and the known international standards and requirements of the port's electronic interaction between the related organizations, systems and customers, transportation terminals, railway and customs administration. Part of PCS system is aimed at covering truck announcements. PCS as main system for all parties involved in port community has been planned to interact and exchange messages regarding truck announcements with Technical Security system used by Port Security.

Key drivers for the establishment of Port Community Systems were, on the one hand, the need for a standardized communication platform in order to improve the systems in terms of punctuality, reliability or costs and, on the other hand, the need to increase competitive position among ports.

A good collaboration with the key authorities, as well as with stakeholders, potential customers and local trade associations, was critical in the setting up of the respective PCS which were – and still are – implemented by means of special training and workshops with the end users.

While target market areas differ widely in terms of existing IT infrastructure and use of functionality, it is arguable that where little or no automated processes are in place either at frontier, port or fiscal and regulatory level, the PCS is ideally placed to form the foundation or backbone of the Single Window vision.

Among PCS functionalities, there are different modules. Modules are APC, Vessel announcement, Liquid Bulk, General and Dry Bulk, Trucks, Railway, Permits, Reporting, Customs, Archive, PCM Integration, CIMIS.

Module APC is used to input data in IMO files.

Vessel announcement module enables working with vessel announcements, meaning that all action about vessel´s arrival and departure can be done by Vessel announcement module.

Liquid Bulk, General and Dry Bulk module enables working with dispositions (work orders). These modules also enable warehouse documents saving.

Trucks module enables working with truck announcements.

3.3.8 Italian program territory IT systems

The regulatory and strategic planning framework envisages programmed interventions and common guidelines about the digitization of the logistics chain. Therefore, the mapping of the main initiatives is to be considered mainly within this field of application where economic and financial supports help design on two interconnected levels: European and national.

In Europe, the transport technological innovation issue is expressly mentioned in the EU Regulation 1315/2013 on the trans-European transport network (TEN-T), describing it both as a general horizontal priority (art. 10) as a specific priority for each transport mode (art. 23). More specifically, the Regulation mentions that the TEN-T network "*should provide the basis for the large-scale introduction of new technologies and innovations, which, for example, could help improve the overall efficiency of the transport sector in Europe and reduce its carbon footprint*".

The objectives of technological innovation in transport are the following:

1. to allow the decarbonization of all modes of transport by promoting energy efficiency
2. to improve the safety and sustainability of the mobility of people and the transport of goods
3. to improve the functioning, management, accessibility, interoperability, multimodality and efficiency of the network.

At European level, innovation and new technologies are declined both in the field of digitalization and decarbonization, where the effects can often be combined. Although the main aspect remains digital and technological innovation and information technology for logistics and transport. The development of innovation and technology in transport is reflected concretely into telematic applications for management, signaling and traffic safety by transport modes (ERTMS for the railway network, VTMIS for maritime transport, ITS for the roads, RIS for the waterways and SESAR for the aviation sector) and in instruments that can guarantee the interoperability and the integration between the IT systems used in the different modes of transport.

Consistently, the CEF Transport 2014-2020 allocates important resources to the priority “technological innovation and digitalization”, considering it a dedicated financing resource in each call and a horizontal priority (therefore the financing for digitization and ICT systems can also be part of actions co-financed in other priorities, e.g. MoS, Core Nodes, etc ...). CEF Transport 2014-2020 program has allocated significant amounts to projects and actions with Italian beneficiaries in the 2014-2017 period which sum to 30 projects (mostly multi-beneficiaries) for a total budget on the Italian side exceeding 328 Mln € and a related European co-financing of over 130 Mln€.

Another 9 projects with the participation of Italian beneficiaries in the field of ICT innovation and

digitalization was approved during the last CEF-T call for proposal 2018 for investments of over 152 Mln € with a European co-financing of approximately 75 Million €. Additional European funds for transport innovation and digitalization for the 2014-2020 programming period can be found in the Horizon 2020 programs (research and development), in the European Territorial Cooperation programs (INTERREG) and in the European Structural Investment (ESI) Funds.

Coming to the national level, the 2015 National Strategic Plan for Ports and Logistics is the basic tool for strategic planning of the maritime sector aimed at improving the competitiveness of the Italian logistics system. The theme of technology, innovation and digitalization in transport is set out in the following points:

· Action 1: measures for the simplification and speeding up of procedures, controls and interventions on ports of national interest

· Action 2: measures to encourage research, development and technological innovation in Italian ports.

Subsequently then in the annexes to the DEF 2017 and 2018, the infrastructural planning of transport expressly foresees in the program the theme of the digitization of the logistic chain and ICT as well as the fact that there is a mapping (state of the art) of the existing in terms of technological innovation in Italian logistics and ports.

UIRNet is a company governed by public law which, as a result of specific regulatory provisions and conventional agreements with the Ministry of Infrastructure and Transport (MIT), operates as the sole implementing body of MIT for the creation and management of the National Logistics Platform (PLN), as defined by the Ministerial Decree 20 June 2005 n.18T.

The PLN should represent the main Intelligent Transport System (ITS) for the management of the national logistics network, aimed at allowing the interconnection of the intermodal nodes (ports, freight villages and logistic platforms) in an efficient and safe way. With the PLN the operators, through a common digital language, will be able to exchange information in real time to agree, verify, schedule freight transport.

In the recent years the key player in the digitalization of ports has probably been the Customs and Monopolies Agency, which has implemented important projects based on intangible infrastructures, on

the commitment of new technologies, on electronic tracking of goods for simplification of the import / export cycle and for the decongestion of port spaces. Between these:

· **The pre-clearing**: The procedure, which works in synergy with the new single customs window, allows even before the arrival of the ship and docking at the dock, to carry out not only all the safety and security checks of the ship's cargo, but also to anticipate the complex administrative procedure of the customs clearance of goods and the consequent payment of customs duties. All this takes place via telematic dialogue, based on precise IT protocols, between the Customs Authority, the Maritime Authority, the shipping companies, the Container Terminal managers and the operators, ie importing companies, shippers and customs agents. In this way, the time required to park the containers in the ports was restricted, all the unloading operations were optimized and all the containers already cleared and released directly to the port exit were addressed; while the consignments of goods are destined for control will be diverted to the control areas.

· **Customs clearance at destination (Fast corridors):** The fast corridors or controlled corridors help to relieve congestion in port areas and reduce the time for forwarding and customs clearance of goods from the point of disembarkation to the final destination, allowing geolocation systems to track goods, real-time monitoring of the company's logistics cycle. The goods are transferred through special corridors on rubber, railway or intermodal sections, "controlled" by electronic tracking systems (GPS, e-seals, etc.) which are placed side by side with the traditional systems for tracking documentary shipments. To date, the following have been activated:

- o 10 Fast Corridors activated on the road in collaboration with PLN (Uirnet) or 7 Fast Corridors activated on the railway
- o 2 intermodal Fast Corridors activated

Initiatives will be evaluated for the digitalization of the entire logistics chain, optimization of operations, monitoring and integrated management between various elements of the network:

1. Fast corridors, recently implemented between ports and land terminals in cooperation with the Italian Customs Agency;
2. The National Logistics Platform (PLN) being implemented by Uirnet;

3. Custom Agency initiatives;

4. Port Community System at national level (MUPCS).

4 SWOT ANALYSIS

4.1. INTERPORTO DI TRIESTE / PORT OF TRIESTE

Strategic evaluations about the Port of Trieste and Friuli-Venezia Giulia

INTERPORTO DI TRIESTE /PORT OF TRIESTE	
STRENGHTS – *FVG Region boasts the presence of several multimodal logistics platforms (3 ports and 4 RRTs), a consistent infrastructural endowment for a region of only 1.2 people.* – *Overall, the level of the infrastructure is good without criticalities in terms of operation and maintenance.* – *The level of cooperation among institutional players and private operators is generally good with a constant exchange and sharing of opinions and experience.*	***WEAKNESSES*** – *The governance of the regional logistics infrastructure is still fragmented.* – *The last mile connection (linking to the national railway network) must be strengthened due to the increasing volumes of traffic.* – *High costs for last mile connections among nodes.*
OPPORTUNITIES – *The governance of the regional logistics infrastructure is still fragmented.* – *The last mile connection (linking to the national railway network) must be strengthened due to the increasing volumes of traffic.* – *High costs for last mile connections among nodes.*	***THREATS*** – *Strong competition at national and international level in the field of maritime and intermodal transport.* *Weak awareness of the possibility of using intermodal transport units (ITU) and considering intermodality as a possible alternative, essential for modal shift.*

4.2. PORT OF VENICE

Feedback pending

PORT OF VENICE	
STRENGHTS –	***WEAKNESSES*** .
OPPORTUNITIES –	***THREATS***

4.3. PORT OF RAVENNA

Port of Ravenna and summarises the key potential opportunities and threats up to 2020:

PORT OF RAVENNA	
STRENGHTS – *Well-located to connect East Med foreland to a supra-regional hinterland including much of Northern and Central Italy* – *Strong supra-regional hinterland (Emilia-Romagna, Lombardia, Veneto).* – *Adequate depth of water for feeder/short sea container ships, most deep sea RORO vessels and a reasonable range of bulk vessels.* – *Rail-linked quays, with established flows of rail freight such as steel coils and raw materials for the ceramics industry.* – *Land available close to the quay for the storage of goods, including trade cars and containerised goods.*	***WEAKNESSES*** – *Lack of adequate depth of water to receive direct calls from increasingly large deep sea container ships and also bulk vessels.* – *Lack of critical mass of LOLO traffic to justify a network of intermodal rail freight services to and from the target hinterland. More remote from the Austrian and Southern German markets than regional competitor ports.*
OPPORTUNITIES – *Ravenna HUB project close to the deployment phase will increase water depth of the Candiano Channel* – *Ravenna HUB project will relocate the container terminal increasing the production capacity up to 500.000 Teus/year* – *Securing additional feeder traffic by developing more feeder services to and from East Med hub ports.* – *Developing rail freight infrastructure in port to increase efficiency (and reduce costs) of operating services to/from Austria and Southern Germany.* – *Efficiency gains from improvements to customs and other administrative procedures.* – *Developing port-centric distribution and terminal(s) for trade. Trans-alpine base tunnels* – *Developing port-centric distribution and terminal(s) for trade. Trans-alpine base tunnels offering additional rail freight capacity to Austria and Southern Germany.*	***THREATS*** – *Regional competition from other North Adriatic ports and Tyrrhenian ports.* – *Competition from Northern Range ports as they expand terminal capacity and the range of intermodal rail freight network.* – *Trans-alpine base tunnels offering additional rail freight capacity to/from Northern Range ports.* – *Unbalanced inbound & outbound flows run the risk to affect economic sustainability of the rail connections between port terminals and hinterland* – *General market inertia*

4.4. PORT OF ANCONA

PORT OF ANCONA	
STRENGHTS	***WEAKNESSES***
– *The Port of Ancona is leader in the Adriatic regarding Ro Ro and Ro Pax traffic;* – *Good and profitable relations with all the customs local and national authorities;* – *Presence in the port of an internal railway terminal;* – *Being main port for Port Network Authority of Central Adriatic Sea*	– *Weak in railway and road infrastructures;* – *Poor attractivity in local industry;* – *Weak in port infrastructures different that ferry traffic;* – *Low impacts of regional policies*
OPPORTUNITIES	***THREATS***
– *Increase interoperability between the three logistics nodes;* – *Increase ferry traffic with Balkans and extra Adriatic regions;* – *Increase importance of Ancona as core hub thanks to TEN-T network;* – *Future improvement of regional road and railway network;* – *New chances deriving by establishing Port Network Authority of Central Adriatic Sea;* – *Increase attractiveness of Ancona thanks to partnership and projects with customs agency.*	– *Missed development of future projects and funds for improving regional infrastructures;* – *Competition in the ferry traffic with ports of north Adriatic with better infrastructures;* – *Poor understanding by local authorities regarding the importance of intermodality*

4.5. PORT OF BARI

PORT OF BARI	
STRENGHTS	***WEAKNESSES***
– *Strategic position* – *Presence of relevant production chains* – *Strong presence of international operators on the Ro-Ro* – *Strong tourist attraction of the territory* – *Multi-purpose identity* – *Incidence of maritime trade towards the Mediterranean* – *In Bari, more than one and a half million passengers*	– *Inefficiencies on intermodal trade* – *Diversity of ship services costs* – *Saturation of spaces for ferries* – *Insufficient intermodal connections* – *draft seabed* – *Absence in the TOP ranking* – *Inefficiencies on intermodal trade* – *Neighboring spaces* – *Long time for checking goods in transit* – *GAIA PCS only available for Bari, but not for the other ports of the Southern Adriatic Sea Ports Authority*
OPPORTUNITIES	***THREATS***
– *Corridor Scan - Med* – *Mediterranean strategy* – *Establishes Special Economic Zones* – *High speed Naples Bari* – *Development of the Sea Ways* – *Short Sea Shipping* – *Growth opportunities in the distribution of LNG* – *Coooperation with the local University.*	– *High number of competitors* – *Possible openings of new intercontinental routes* – *Development of alternative transport sectors* – *Traffic reduction* – *instability Middle East and North Africa zones* – *Decreased cruise flows in the Mediterranean* – *Industrial underdevelopment of the south Italy*

4.5 PORT OF RIJEKA

PORT OF RIJEKA	
STRENGHTS – *A key port in the integration of the Croatian transport system and inclusion in international traffic flows, core TEN-T port* – *Port of Rijeka Authority, instituted by Ministry of Sea, Traffic and Infrastructure, is a key solicitor of infrastructural and organizational changes in the port of Rijeka, including core and commonly used ICT systems* – *Proven record of inclusion of Port of Rijeka Authority in partnerships related to EU funded project execution, along with successful project completion* – *Ongoing project of PCS implementation using latest technologies, detailed study of port concessionaire's needs and cybersecurity / business continuity requirements, is at the time of TNA creation execution on time and within budget* – *Competent and flexible ICT implementation team*	***WEAKNESSES*** – *Focus on operative tasks and lack of quality analysis and study of port concessionaires needs for commonly used ICT services* – *Caused by lack of funds and limited time available according to CEF funding rules, implementation of the new PCS system does not foresee a wholesome solution for access control and permits issuing* – *Port of Rijeka basin is very distributed geographically, covering many locations, several terminals and entry/exit locations, increasing complexity and implementation costs* – *Many different port concessionaires (among which are also terminal operators), and other stakeholders, some of whom need access to port areas only occasionally, along with different modalities and duration of access permits, additionally complicates access control.* – *Permit issuing is a commercial process, so it needs to be integrated with payment gateways*
OPPORTUNITIES – *Permit issuing is a commercial process yielding revenue, increasing liquidity and solvency of Port of Rijeka Authority* – *Increase of revenue by introduction of new means of payment (prepaid,* – *PayPal, credit card, SMS)* – *Modern system for permit issuing and access control enhances ISPS adherence for all stakeholders through traceability and analytics* – *Cross-stakeholder transfer effects by provision of sub-module for access control by the Maritime Police* – *Use the European Union's financial resources and projects to fund parts of IT infrastructure portfolio requiring upgrades thus enhancing critical business processes* – *Developing port-centric distribution and terminal(s) for trade. Trans-alpine base tunnel.*	***THREATS*** – *Coordination and lack of cooperation of all participants, depending on current focus* – *Public procurement process for IT system implementation and upgrade may be lengthy and subject to revisions depending on appeals*

4.6 PORT OF PLOČE

PORT OF PLOČE	
STRENGHTS – *Geostrategic and traffic position which enables a quality maritime connection both with the cities on the Adriatic Coast and in Italy and with the ports in the entire world* – *Terminal infrastructure* – *Port Community System* – *Level of security* – *Competitive prices* – *Wide gravitational area* – *Characteristics of the port area suitable for berthing, performance of port operations, and the organization of intermodal transport and connections with the hinterland* – *Specialized terminals*	***WEAKNESSES*** – *Port loading and storage capacities* – *Limited capacity and flow of rail traffic* – *Underdeveloped multimodal transport* – *Criteria for determining justification, priority and approval for major infrastructures and other development projects are not clearly defined* – *Revenues per square meter of concession areas* – *Lack of long-term and strategic plans* – *Lack of response capacity in the event of major contamination and other major emergencies* – *Operations of port authorities are often not harmonized and coordinated* – *Lack of financial resources for funding large strategic projects*
OPPORTUNITIES – *Create favorable conditions for private investments in the construction of port infrastructure and specialized port terminals* through various forms of public-private partnership – *Encourage the use of innovative port solutions to prevent environmental pollution* – *Attract high-tariff cargo in ports* – *Development of the port as a logistics hub for the wider hinterland* – *Integration with national AIS / CIMIS system* – *International cooperation and partnerships in the wider European area* – *Development of a hub for foreign trade for Central European countries that do not have access to the sea* – *Incensement in traffic demand by creating long-term partnerships* – *Increasing the competitiveness of the port and customer satisfaction through better organization of the port system and management of the quality of services*	***THREATS*** – *Inconsistency of investment and market demand* – *Lack of standardizing services* – *Reduction of the national co-financing* – *Lack of coordination and cooperation with operators and service operators within the intermodal transport corridor* – *Inadequate marketing mix* – *Lack of mechanisms for managing and directing the behavior of port operators* – *Inability to meet safety standards* – *The lack of improvement of the system in terms of competence, professionalism, organization, responsibilities and information flows* – *Weak economic growth in the Eurozone* – *Competition between the ports of the northern European passage and the transshipment ports of the Mediterranean hub* – *Cyber security issues* – *Strong impact of potential marine pollution on economic development and sustainability*

– *Introducing a system of education and certification of port workers in order to raise the level of security, flow and quality of services* – *Harmonization and development of other infrastructures (roads and railroads)* – *EU accession of neighboring countries* – *Opportunities from European funds* – *Designing and implementing modern technologies* – *Modernization and development of port infrastructure and superstructure* – *Short sea shipping between Italy and Croatia (Motorways of the Sea)* – *Environmentally friendly solutions for maritime transport and maritime transport infrastructure* – *Completion of Corridor Vc*	– *The risk of an increase in marine casualties with a negative impact on the environment*

5 CONCLUSION

Within scope of this documents, themes, challenges and chances taken into consideration during development of the cross-border action plan with KPI identification have been clearly explained, outlined and enumerated. Final goal of the activity is to propose a set of relevant KPIs that shall ultimately lead to better communication, coordination among ports and stakeholders both within port and in port's hinterland which is goal of PROMARES project.

Goal of PROMARES is to enhance sea and multimodal cargo traffic in all ports of interest that generate intermodal and multimodal transport flows, facing the same type of challenges of accessibility of multimodal transport and efficiency of TEN-T corridor in the region (from the port to inland), and increase level of cooperation and stakeholder cooperation. Focus of cooperation of PP11 is research of elements of multimodal transport system with final goal of creating a solid set of KPIs and testing models of their measurement.

In Cross-Border Study of Maritime and multimodal transport, a summary of most important territorial requirements and coverage for submitted TNA's is provided along with thematic ports, terminals, locations and basins. The same aproach has been used for all submitted TNA's.

ICT systems used in ports and hinterland locations identified by project partners are described. This part of document is essential as this ICT systems and their connection towards external systems used in data interchange are most likely candidates for key pilot action for next project phases.

To conclude, partners have identified involved ports and ICT systems strengths, weaknesses, opportunities and weaknesses – known as SWOT analysis.

D.3.3.3, Cross-border action plan for enhancing maritime and multimodal freight transport

6. CROSS-BORDER ACTION PLAN FOR ENHANCING MARITIME AND MULTIMODAL FREIGHT TRANSPORT

6.1. PLANNING METHODOLOGY FOR THE ENHANCEMENT OF MARITIME AND MULTIMODAL FREIGHT TRANSPORT

Purpose of outlining planning methodology is to is to define actions and deliverables that will lead to cross border strategy for enhancing maritime and multimodal freight transport in Croatian and Italian ports participating in project.

Main objective is to improve planning capacities of key stakeholders and policymakers of maritime and intermodal freight transport using delivered territorial needs assessment and action plan for overcoming them for the respective region.

The planning methodology is based on the results of the territorial needs assessments, the best practice analysis and held training sessions, and aligned with identified geographical constraints and requirements of involved participants,

Goal of the subsequent (following) activities within WP4, and after creation of the strategy is the implementation of pilot actions with ICT tools to enhance maritime and multimodal freight transport in the Programme Area. Participating logistic nodes need to implement concrete and identified pilot actions on their PCSs and ICT systems to streamline freight traffic flows between the ports and the hinterland, by improving communication and coordination with private companies (e.g. terminal/logistic operators, freight forwarders) and public institutions (e.g. customs agencies). WPL, with the support of the LP, will oversee the correct implementation of the pilot actions in each concerned node, providing guidance and assistance.

Guidelines for implementation of key pilot actions are fully aligned with the content of the project application form, addressing imbalanced development of multimodal transport options, weak coordination and communication of stakeholders and policy makers in the port-hinterland

interface and uncoordinated measures and tools at cross-border level, leading to increased road transport with negative consequences on the Programme Area in terms of pollution, GHG emissions and noise.

Further to this, PPs will in the next project stages identify and test ICT solutions as a part of the project aiming to streamline freight transport in the ports and the most relevant intermodal logistic node of the Programme Area, from the port to the hinterland and at cross-border level, setting standards which may be replicated to other logistic nodes, also beyond the project's geographical scope.

In particular, in identification of the key pilot actions, PPs and ports should focus on their Port Community Systems, as scalable and powerful tools to increase communication and coordination among terminal and logistic operators and public institutions (e.g. customs agency), resulting in lower transit time and increasing the competitiveness and productivity of the multimodal transport, and propose key pilot actions that would be an extension of existing capabilities of their PCS, or similar IBIS (Integrated Business Information Systems) used in operations related to freight processing.

Positive externality of the project is setting up an enduring cross-border cooperation network, simultaneously and innovatively combining a bottom-up (from stakeholders to policy makers) and top-down (from policy makers to concrete action) approach.

Consequentially, approach of this methodology leads to the development of new infrastructures (hard measures) that could be partially out of the proposed project’s scope given their financial needs and the existence of more suitable financial initiatives (CEF, EIB). However, PROMARES will tackle “soft” measures – increased transport efficiency between the port and the hinterland through ICT solutions, allowing better communication between different stakeholders – which are low-cost, requiring accurate data, policies, prioritization of intervention measures, communication, and cross-border coordination and cooperation.

6.2. PROMARES KEY PILOT ACTION GUIDELINES AND MEASURES

Taking into account all gathered and described prerequisites, TNAs, reals demand and outlined methodology aligned with the project as a whole, it is possible to derive and outline the following key pilot action guidelines, as a part of cross-border strategy:

1. Preferably, best practices of ICT tools for enhancing maritime and multimodal freight

   transport is applied both between each port and its hinterland and between ports

   at cross-border level

2. Ports and PPs are advised to propose key pilot actions as a part of cross-border cooperation planning and strategy that rely on already existing and identified ICT infrastructure as a part of individual TNA analysis, and that will further enhance connectivity and interoperability within scope of the PROMARES project

3. Goal of the key pilot actions is aligned with the primary project goal, which is strengthening the role of ports and intermodal logistic nodes as roots and gateways of the TEN-T networks

4. Main targets of the proposed actions are increase of the competitiveness and productivity of maritime and multimodal transport and submitted key pilot action proposals should be aligned with the main target.

5. Every target may contain a set of suitable sub-targets enhancing the main target, for example, secondary or „external “effects like reduction of GH emissions or secondary optimizations and enhancements of productivity of transport efficiency

6. Considering the cross-border cooperation framework and transnational nature of TEN-T

corridors where pilot actions will be tested, ports and PPs can be encouraged to propose and follow up execution of those pilot actions whose effects in case of successful completion will well extend beyond the regional and national borders, preferably affecting not only core and comprehensive ports or one intermodal logistic node but tentatively national policy makers and academic/competent research institutions, which might result in a crossborder multidisciplinary and institutional multilevel cooperation

7. Ports and PPs are be advised to propose key pilot actions that will increase the technical knowledge and transport planning competences of the particular ports, keeping in mind previously identified lacking points and territorial needs and bottlenecks that might be improved within scope of the PROMARES projects.
8. Final goal of the proposed key pilot action should be generation of intermodal and multimodal freight transport, even when initial effect is increase of productivity, efficiency, or timely information delivery.
9. Proposal and implementation process of individual key pilot action should clearly lead in the increase of competences of particular port/PP
10. Ports and PPs should strongly prefer to propose those key pilot actions that support the «port clustering», whereby ports, inland terminals and public authorities jointly work as to develop an efficient co-modal network and streamline transport flows between ports and their hinterlands.
11. Considering Port Community Systems and related ICT systems (examples: TOS, TMS) are aiming at a better communication and coordination with port stakeholders (both private and public) at a node and cross-border level, their upgrade, introduction of new modules, information exchange or analysis conduits using big data paradigm, Web forms or structured XML message exchange, can be treated as obvious candidates for key pilot actions across all ports and PPs.

12. Some other such systems that may be supporting project goals, may be thematic subjects of aforementioned subjects, including but not limited to modules related to goods and persons egress and ingress control, CCTV, VTS/VTMIS systems, UHF over VoiP, meteorological, ISPS supporting and similar systems, that operate in close conjunction with other top level port and cargo management IT systems, and if there is sufficient data supporting use-case within context of the project and if inefficiencies are clearly identified and present at the beginning of the pilot action.
13. Key pilot actions are of special interest for the project if proposed enhancements aim to increase level of connectivity towards national and supranational intelligent transport systems, related also to customs operations, like NSW or future MNSW systems.
14. Some clearly identified systems towards or within which there is a high level of desirability of key pilot action proposals, if they lead to increased level of connectivity and data interexchange for the ports/PPs are (the list is not final, and not in order of importance):
    a. MNSW (example: CIMIS, PMIS2 Harbor Master's Offices),
    b. Freight Village Systems,
    c. PCS systems (examples: Sinfomar, Port of Ploče PCS, PCS-Ravenna, LogIS),
    d. Integrated VTS/VTMIS/access control systems (Kongsberg Norcontrol IT/Consilium/Elman VHF/Vaisala meteo system),
    e. Access control /gate in gate out (Siemens Granta access control, Digital Port i-Gate),
    f. TOS systems (examples: NAVIS, F4B, Combis, Rathmann, SINFOSEC),
    g. National level PCSs (example: MUPCS),
    h. Customs agencies SW systems (example: SUDOCO-AIDA, TROVATORE, ECS/ICS, NCTS),
    i. Railway management systems (ERTMS (European Rail Traffic Management System), CH30 module),

j. Integrated Traffic Platform (example: Piattaforma Integrata Circolazione - PIC).

k. Other.

6.3. KEY PERFORMANCE INDICATORS (KPIS)

As a consequence of previously outlined methodology, guidelines and measures, the following KPIs are proposed as being fully aligned with PROMARES project goal.

Indicator number	Indicator	Measurement unit	Target	Explanation
1	Percentage of timely submitted TNA drafts	Percentage (%)	90 %	Timely submitted TNA drafts enable LP to effectively manage and steer the efforts of cross-border action plan creation
2	Percentage of timely submitted final TNA documents	Percentage (%)	95 %	Timely submitted TNAs guarantee punctual and wholesome input for creation of the proper quality cross-border action plan
3	Timely creation of cross-border strategy	Items	1	Analysis of the technology, training session and cross-border action plan serves as an input for the creation of cross-border strategy underlining the project goal
4	Percentage of timely submitted key pilot action proposals	Number of timely submitted items / Total number of PPs	95 %	High number of submitted key pilot actions demonstrates that all PPs have identified the needs within their territories that are aligned with the project goals and integration requirements
5	Number of correctly approved key pilot action proposals	Approved key pilot action proposals /	100 %	Goal of the key pilot actions submission is to align all pilot actions with project goals

		Submitted key pilot action proposals		
6	Number of ICT systems upgraded/enhanced as a consequence of project involvement	Items	At least equal to number of involved ports (PPs)	At least one ICT system identified by PP/ports within TNA should be upgraded/enhanced within the scope of the key pilot action
7	Amount of funds leveraged based on project achievements	Monetary value justifiably spent by the PPs for key pilot actions / Total funds allocated for key pilot actions	100 %	Maximum available fund utilization within the project scope enables the best possible envisaged project outcome
8	Number of secondary affected ICT systems as a consequence of the key pilot action execution	Items	At least twice the number of involved ports (PPs) or of ICT systems upgraded/enhanced as a consequence of project involvement (KPI 6.)	Inclusion of this indicator empowers involved PPs to apply for those key pilot actions whose secondary effects are transferred also to other interconnected ICT systems
9	Number of improved internal PP/port processes as a consequence of the key pilot action execution	Items	At least one per PP (same of involved ports (PPs) or of ICT systems) upgraded/enhanced as a consequence of project involvement (KPI 6.)	Inclusion of this indicator empowers involved PPs to apply for those key pilot actions that enhance the largest number of internal processes directly benefitting from the project
10	Number of affected port terminal, basin or land terminal locations as a consequence of the key pilot action execution	Items	At least equal to the number of involved ports (PPs)	Inclusion of this indicator encourages involved PPs to apply for those key pilot actions that will affect the largest number of port terminal, basin or land terminal locations as a consequence of the proposed key pilot action

11	Number of key pilot actions involving local PCS as a chosen ICT system	Items	At least 2	Inclusion of this KPI entices involved PPs (ports) to apply for those key pilot actions that will further enhance local PCS functionalities and modules
12	Number of executed key pilot actions directly enhancing PP (port) security	Items	At least 1	Inclusion of this KPI entices involved PPs (ports) to apply for those key pilot actions that will enhance PP (port) security
13	Number of executed key pilot actions directly or indirectly lowering GHG emissions	Items	At least 2	Inclusion of this KPI entices involved PPs (ports) to apply for those green key pilot actions that will lower GHG emissions
14	Percentage of proposed key pilot actions enhancing multimodality	Number of timely submitted items / Total number of PPs	100 %	All PPs (ports) should strive to apply for those key pilot actions which are enhancing multimodality as a primary project goal
15	Timely submitted key pilot action completion/closeout reports	Items	100 %	Proper project management of the Interreg PROMARES project requires timely reporting on key pilot action completion/closeout

5. CONCLUSION

Within scope of this documents, themes, challenges and chances taken into consideration during development of the cross-border action plan with KPI identification have been clearly explained, outlined and enumerated. Final goal of the activity is to propose a set of relevant KPIs that shall ultimately lead to better communication, coordination among ports and stakeholders both within port and in port's hinterland which is goal of PROMARES project.

In order to set key pilot action guidelines and measures, planning methodology for the enhancement of maritime and multimodal freight transport is provided, paving the path for all key pilot actions that will be executed as a part of the WP4. PPs are then given a set of guidelines and measures to be adhered to during establishment of proposals for key pilot actions and their execution.

Finally, a proposal of a set of SMART KPIs is given, aiming to quantitatively measure success of the key pilot action execution by involved PPs and provide a provable and auditable grid criterion for evaluation of the project deliverables.