D.T 1.5.1 – ACTION PLAN ON MULTIMODAL NODES EFFICIENCY AND CONNECTIONS – VENICE (NAPA)

Node management optimization
New multimodal services

Final version
10/2019

Table of Contents

Executive summary.....3

2. Cluster 2- Multimodal nodes optimization: overview of needs and best practices in cooperation with stakeholders to develop the action plan.....10

2.1 Action 1: realization of the new conatiner terminal in the Montesyndial area (Marghera Port).....12

2.2 Main challenges tackled.....12

2.3 Results to be achieved.....12

2.4 Tasks to be performed.....13

2.5 Key actors.....15

2.6 Timeline and financial resources.....15

2.7 Expected results.....15

2.1 Action 2: railway telematics system for shunting operations (SIMA 2).....17

2.2 Main challenges tackled.....17

2.3 Results to be achieved.....17

2.4 Tasks to be performed.....18

2.5 Key actors.....20

2.6 Timeline and financial resources.....20

2.7 Expected results.....20

3. Cluster 3 – New multimodal services: overview of needs and best practices in cooperation with stakeholders to develop the action plan.....21

3.1 Action 3: New shuttle services between Verona freight village and the port of Venice

3.2 Main challenges tackled.....21

3.3 Results to be achieved.....22

3.4 Tasks to be performed.....22

3.5 Key actors.....23

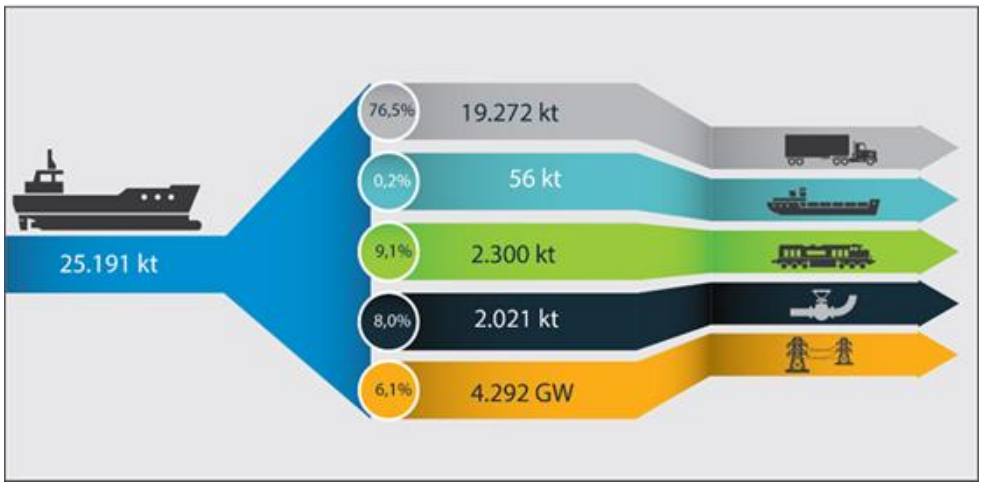
3.6 Timeline 23

3.7 Expected results.....24

Executive summary

The main aim of the North Adriatic Sea Port Authority (hereinafter NASPA) is to promote the growth and the development of its port system including the ports of Venice and Chioggia. In order pursue this objective, several initiatives have been put in place with the aim to improve the nautical accessibility, the road accessibility and the railway accessibility.

In the transport system, the ports represent the connection point between the maritime and the land modes. The port of Venice handles most of its traffic by the road, an increasingly large share of it by rail, and smaller share by pipeline and by the river.



Source: NASPA – Traffic data of 2017 (modal split)

This document is dedicated to the development and improvement of Multimodality, one of the two fields of action of the TalkNET project, along with Eco-innovation. Respectively, specific sub-topics are developed through the project activities of both fields, as shown in the table below:

1	LAST MILE CONNECTIONS OF MULTIMODAL NODES	MULTIMODALITY
2	NODE MANAGEMENT OPTIMIZATION	
3	ASSESSMENT OF MULTIMODAL SERVICES	
4	ALTERNATIVE FUELS DEPLOYMENT	ECO-INNOVATION
5	ENERGY EFFICIENCY SOLUTIONS	

In particular, it will present the "Action Plan to improve multimodal nodes efficiency and connections – Venice (NAPA)" and will be focused on the topics of multimodal terminal optimization and the development of multimodal services.

Starting point to present the actions that are planned is the related "Analysis on multimodal nodes efficiency and connections - Venice (NAPA)" developed within the project, that reports the main challenges that the Port of Venice has to face in order to improve its efficiency, related mainly to the upgrading of the port logistics. In fact, the actions that will be presented in details in this action plan are the answers to the problems, needs and challenges identified within the first step of the project activities, that is to say the analysis phase of the TalkNET nodes' regions, both for Multimodality and Eco-innovation.

In general, the analysis has foreseen the assessment of the multimodal chain in which ports and logistics nodes operate, to understand how is the state of art (AS-IS analysis) and what are the methods to improve the situation (TO-BE). The tool chosen to achieve these aims is the S.W.O.T. analysis.

The actions planned are presented per cluster. TalkNET has set-up five thematic clusters - corresponding to the five sub-topics shown in the table above – right on the basis of the common priorities identified through the analyses of all project partners, identifying the cooperation networks with mapped stakeholders in order to improve their coordination.

Moreover, the actions presented will support and will be the ground for the implementation of the pilot actions that will be carried out within the project. In particular, NASPA will carry out two pilot actions in the topic of multimodal terminal optimization:

1) D.T 3.2.2 – Pilot action for multimodal nodes/terminals efficiency and optimization: Innovative control shunting system: development of DATAMART
2) D.T 3.2.3 - Pilot action for multimodal nodes/terminals efficiency and optimization: Innovative control shunting system: ICT/ITS tools for rail traffic (SIMA 2): Railway telematics system for shunting operations.

LP NASPA will be involved also in an additional pilot action foreseen in the sub-topic of new multimodal nodes. Verona freight village and the port of Venice are working together to create a railway shuttle service between their nodes - D.T 3.2.6 - Pilot action for the activation/optimization of multimodal services: new services port gateway/freight village - that anyway will be directly implemented by PP4 ZAILOG.

Therefore, the core intervention logic of the project is the following:

1) to detect the problems affecting the nodes (analysis phase)
2) to find solutions through specific actions planned (planning phase)
3) to test and implement the solutions presented (testing phase)

Finally, the document will offer also a brief overview of the best practices that can offer good solutions to better plan actions and the pilot actions foreseen in the project (the complete collection of best practices is available in the knowledge management activity of the project: Outputs Knowledge tools).

In the following paragraphs, a summary of each action included in this document will be presented, clearly linking problems/needs/challenges and actions/solutions that will be illustrated through the support of the results of the SWOT analysis.

Action 1: Realization of the new container terminal in the Montesyndial area (Marghera Port)

SWOT ANALYSIS - RESULTS:

STRENGTHS	WEAKNESSES
Competitive position of North Adriatic ports located closer to Suez Canal than ports of Western Mediterranean Strategic geographical position of Port of Venice located at the crossroad of Baltic and Mediterranean Ten-T Corridor. Excellent road and railway accessibility with port railway station directly connected with main railway network. Richness of port hinterland	Draft limitation that limits the size of container vessels which can access the commercial Port Final destination of goods close to the port is limited at railway use if imply a reloading using road system. Low number of international railway connections.

OPPORTUNITIES	THREATS
Additional traffic Increase the efficiency of railway shunting inside the Port New investments in port's facilities Development of an efficient rail freight services to link the port with current and new international markets New planned investment in order to increase the intermodal terminal capacity Development of efficient intermodal rail freight services	Fewer customers with greater market power Rationalization of port's call Additional pressure on port and terminal operations and impacts on port's efficiency Growth of railway traffic flow and need to upgrade the external railway network Increase competition by other North Adriatic ports and Tyrrenian ports On-going rail freight liberalisation

As part of its port development framework, North Adriatic Sea Port Authority (NASPA) is developing a new container terminal in the disused areas of previous petro-chemical production and loading facilities. This newly planned facility of approx. 84 ha is known as Montesyndial from the names of the previous facilities at the location (Montefibre & Syndial).

The objective of this action is to reconfigure the entire Montesyndial container terminal layout and include a logistics area for the development of a Container Freight Station (CFS) and light industrial processing activities (manufacturing).

The container terminal will have the following area requirements:

- berth, handling and storage areas
- rail tracks and ancillary facilities

Particular focus should be given on the work and cargo flows inside the areas, on the relations between the same areas and their link with the outside, in order to achieve the best transport performance in line with the market requirements (e.g., delivering and forwarding time) and to optimize the available space.

This action will not be followed by a pilot action within TalkNET project, but it will have the following funds leverage foreseen after the project end:

- Realization of container terminal: € 184,000,000
- Realization of dedicated logistic area: € 142,000,000

Action 2: Railway telematics system for shunting operations (SIMA 2)

SWOT ANALYSIS - RESULTS:

STRENGTHS	WEAKNESSES
Excellent road and railway accessibility with port railway station directly connected with main railway network. Richness of port hinterland	Final destination of goods close to the port is limited at railway use if imply a reloading using road system. Low number of international railway connections.
OPPORTUNITIES	**THREATS**
Additional traffic Increase the efficiency of railway shunting inside the Port New investments in port's facilities Development of an efficient rail freight services to link the port with current and new international markets New planned investment in order to increase the intermodal terminal capacity Development of efficient intermodal rail freight services	Additional pressure on port and terminal operations and impacts on port's efficiency Growth of railway traffic flow and need to upgrade the external railway network On-going rail freight liberalisation

The Port of Venice has planned several investments with the scope of increase it railway traffic flows. Among the others, these investments are focused on:

- the enhancement of railway telematics systems for shunting operations (SIMA) and its integration with PCS (Port Community System) and information systems of other subject involved in developing rail services and OCR SYSTEM.

- the improvement of coordination between local and national paths. The programming of the railway shunting service will be coordinated both with the planned capacity of national infrastructure manager (RFI) and with the processing times of the loads within the individual

linked terminals of the port. The coordination will increase the overall capacity of the “Comprensorio” (Marghera Port) because it will result in a drastic reduction of the "double" shunt, or rather the need to shunt more than once a single convoy.

This action is the ground for the two pilot actions that will be carried out within the project:

- ICT/ITS tools for rail traffic (SIMA 2): Railway telematics system for shunting operations. Development of the second phase of the integrated system (SIMA) for the management of the shunting railway in the port of Venice.
- Innovative control shunting system: development of DATAMART that will be part of the SIMA and will be used to manage data in/out for statistical purposes.

Action 3: New shuttle services between Verona freight village and port of Venice

STRENGTHS	WEAKNESSES
The great amount of railway connections in the north of Europe of Verona can be combined to the ones of Venice in the Adriatic and Mediterranean sea	The shunting in the port of Venice takes a lot of time
One train can carry 32 trailers, reducing considerably the CO2 emissions and the traffic jams	Verona Quadrante Europa railway station is closed during Sunday night when there is the availability of a rail path for the shuttle train
The development of the freight trains allows to change the role of truckers, decreasing the daily work load since their trips are shorter (e.g. from the terminal to the company and vice versa, last mile concept)	The absence of contribution from the public sector to incentive the development of new railway connections

OPPORTUNITIES	THREATS
Creation of a long multimodal route starting from Turkey coast and arriving to Scandinavian countries without the use of the road transport	Scarcity of T-3000 pocket wagons
The activation of a shuttle train between Verona and Venice could allow to create a customs corridor to speed up customs declarations	Lower cost of road transport on the same route

They main needs that will be tackled by this action are the reduction of the air pollution and of the traffic jams. Over the years, the road transport has been a steady growth both on the freight and passengers side. For this reason, the efforts of Europe are to reduce its use when it is possible, fostering the railway transport on long stretches (longer than 400 kilometres). However, the distance between Verona and Venezia is very short (about 120 kilometres) so the challenge is to make this shuttle service competitive to the road transport. Another challenge is to increase this service as more as possible in order to face the needs mentioned before (congestions, CO emissions, etc.). Lastly, the bigger challenge is to change the behaviour of the freight operators used to carry out their daily activities especially using the road transport.

This action is linked to D.T 3.2.6 - Pilot action for the activation/optimization of multimodal services: new services port gateway/freight village. The purpose of the pilot action is to activate a new railway shuttle service in order to connect two long multimodal routes (from Greece to Italy/Germany and from Italy to Germany/Scandinavia), reducing the road traffic on the motorway between Verona-Venice thanks to the use of this railway shuttle service. A possible scope will be to start with three weekly connections and to arrive to a daily railway service, but it will depend on the operators' availability and cooperation. This pilot action aims to create a unique multimodal service with a low use of the road transport (necessary only for the last mile connections between the nodes to the shippers/dispatchers and vice versa).

The pilot action will be carried out by PP4 ZAILOG.

2. Cluster 2- Multimodal nodes optimization: overview of needs and best practices in cooperation with stakeholders to develop the action plan

As part of its port development and environmental restoration action framework, NASPA is developing a new container terminal in the disused areas of previous petro-chemical production and loading facilities.

The geography of container trade between Europe and the rest of the world has changed dramatically in the last 15 years for two main reasons:

- there has been a significant switch in the relative importance of the Far East for manufactured imports (and away from imports from North America), accelerated by the entry of China into the World Trade Organisation in 2001;

- the integration of Central and Eastern European countries into the European Union since 2004 - with their more dynamic economies - has switched the centre of gravity of inland origins and destinations of containerised trade in Europe to the south and east.

These trends have improved the competitive position of the North Adriatic ports because they are located closer to the Suez Canal than ports in the Western Mediterranean and the Northern Range and are natural gateways to Central and Eastern Europe.

Between 2005 –2016 the EU – Far East route has increased its market share from 27% to 41% reaching a total container throughput of 21 million TEU's. In this scenario, the Mediterranean Sea has increased its market share respect to the ports of Northern Range.

Due to the financial crisis that occurred in 2008/2009 container shipping industry has been forced to respond to declining profitability by:

- Seeking to control supply through the development of three strategic alliances (2M Alliance, the Ocean Alliance and THE Alliance);

- An on-going process of industry consolidation through mergers and acquisitions;

- Reducing unit costs through the deployment of larger ships (22,000 TEU, as compared with 10,000 TEU a decade ago).

Nowadays, on the major east-west trade lanes some 94% of total capacity is controlled by the three global alliances. Currently 55 ships on order over 20,000 TEU, which represents some 34% of all ships and 52% of the total capacity on order for ships over 5,000 TEU Vessels of 20-22,000

TEU will soon be regarded as ‘normal’ on the east-west services that pass through Suez route to the Northern Range ports.

The potential impacts of these trends in the North Adriatic are that:

- Ports and terminal operators are likely to have fewer customers with greater market power, which will tend to reduce handling rates.

- Port calls may be rationalised, with calls being made only at the ports with the deepest water and the greatest productivity.

- Ports have to invest in deep water berths and the appropriate handling equipment to cater for the larger vessels.

- Ports have to cater for larger average exchanges of containers, which puts additional pressure on handling equipment, storage space and the capacity of rail and road transport operators to distribute the traffic inland.

Another package of investments that will be realized in the port are those related to the needs detected for the upgrading of the railway management.

In particular, these investments are focused on:

- Improvement of coordination between local and national paths. The programming of the railway shunting service will be coordinated both with the planned capacity of national infrastructure manager (RFI) and with the processing times of the loads within the individual linked terminals of the port. The coordination will increase the overall capacity of the “Comprensorio” because it will result in a drastic reduction of the "double" shunt, or rather the need to shunt more than once a single convoy.

- Enhancement of railway telematics systems for shunting operations (SIMA) and its integration with PCS (Port Community System) and information systems of other subject involved in developing rail services and OCR SYSTEM (Optical Character Recognition).

- Upgrade of railway port district (doubling and new connection) in order to support growth in traffic flows.

- Implementation of railway station and yard in agreement with RFI (5 tracks of 750m Marghera Scalo, more 4 arrival/departure tracks.

- Realization of a new station and direct railway link between the port railway network and main railway line (long run investment).

2.1 Action 1: realization of the new container terminal in the Montesyndial area (Marghera Port)

In order to respond to these new logistic needs, the North Adriatic Sea Port Authority is planning for a new container terminal on the Montesyndial site in Marghera.

The new Montesyndial container terminal, which would have a quay of 1600 metres and be located on a 84 hectare site, will be able to handle large feeder and short sea container vessels and partially laden deep sea container ships up to 9,000 TEU in size. The following actions will be carried out:

realization of container terminal;

realization of dedicated logistic area within the container terminal equipped with a Container Freight Station for consolidation and deconsolidation of containerised cargo and freight storage and manufacturing area for light industrial processing operations.

2.2 Main challenges tackled

A new terminal container able to tackle the new shipping lines needs cost-efficiency. Shipping lines are strongly focused on cost-efficiency of their services. The Montesyndial container terminal will be able to improve the logistic chain performance thanks to reduction of turn-around time.

In fact, the cost-efficiency of shipping lines is positively affected by the following factors:

- The use of larger (and wider) vessels (economies of scale)

- The reduction of turn-around time in ports (time efficiency);

- Increased cooperation between shipping lines due to lower freight rates and selection of efficient ports and reduced number of port calls.

2.3 Results to be achieved

The port of Venice has planned a series of investments aiming at increasing the management efficiency of the node in order to achieve the following results:

1) improve its multimodal terminal efficiency

2) increase its logistic efficiency, and

3) accommodate new traffic flow.

2.4 Tasks to be performed

Main tasks to be performed to develop the Montesyndial area are the following:

- Container Terminal (CT) storage yard of 1MTEU capacity, which will be the main user of the area and its access to the quay;

- Empty Container Depot (ECD); this could be an independent tenant to the container terminal as it could separate the empty container operations and long term storage from the container terminal. Additionally the Depot would serve the other areas of the logistics zone providing and receiving empty containers. The empty container depot serves all the other facilities and if it is independent it should have its own administration building and a separate gate to the road network to supply empty containers to the CFS and receive empty containers from the DC.

- Auxiliary areas, including Terminal Buildings and privately owned vehicles (POV) entrance and parking.

- Rail Yard, sending import non-local containers and bringing raw materials for the light industrial activities. The rail yard sizing refers to the requirements from the container terminal assuming 30% of throughput going through rail. The rail yard can serve the container Terminal, the distribution Centre for long distance combined unitised imports and the Light industrial manufacturing zone for raw materials.

- Light Industrial Manufacturing Zone (LIMZ); this facility or group of facilities will perform added value activities on semi-manufactured goods and assemble them for export through the terminal.

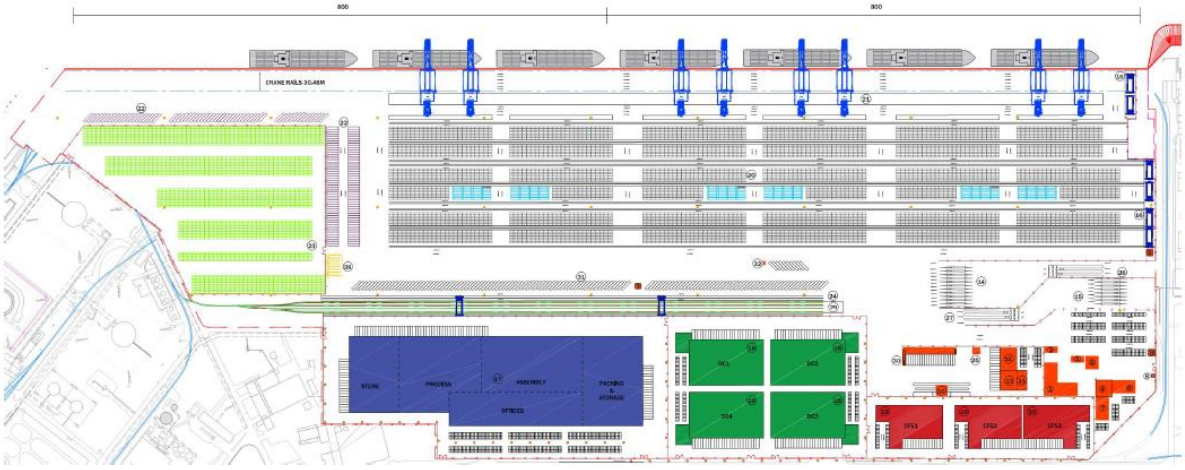
- Distribution Centres (DC), acting as a bonded warehouse, storing and deconsolidating imported containers, perform customs clearance, re-sorting, and delivering via truck to retail outlets or larger warehouses. The DC is essentially a medium term storage, re-sorting and dispatching facility that deconsolidates containerized imported cargo to smaller shipments. The building hence is essentially a warehouse where the goods are unloaded from import containers, sorted and stored by client and destination and then assembled in orders ready for pick up.

- Container Freight Stations (CFS), for short term storage and consolidation of mainly export container. The CFS is essentially a consolidation and short term storage for export less-than-container-load (LCL) cargo before it goes to the container terminal for export by sea. Its function is the reverse of that of the distribution centre.

- Terminal Gate, for processing over-the-road (OTR) trucks carrying containers and Out of gauge (OOG) cargo, that includes pre-gate automated inspection, and trouble resolution areas.

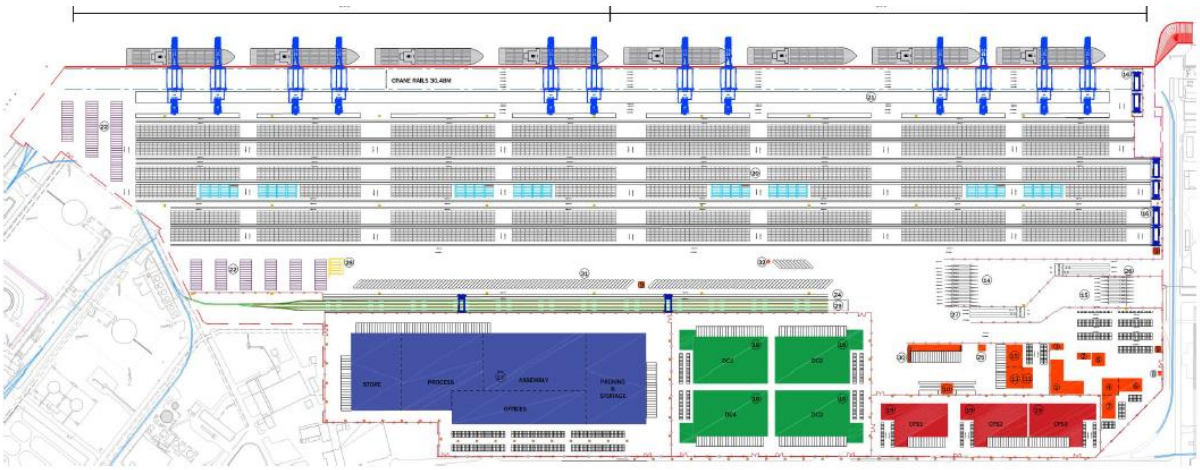
Two final layout options have been produced for the new Montesyndial terminal.

The first option (layout A) with empty containers stored inside the terminal:



Layout A

In the layout B all yard area is dedicated to full containers and the empty ones are stored outside of terminal.



Layout B

2.5 Key actors

Stakeholder	Level of involvement	Relevance of participation
Terminal operators	High	High
Railway operators	High	High
Local public authorities	Medium	Medium

2.6 Timeline and financial sources

Action		2019	2020	2021	2022	2023	2024	2025
Action 4	Realization of the new container terminal in Montesydial area							
Action 4.1	realization of container terminal							
Action 4.2	realization of dedicated logistic area within Montesyndial area							

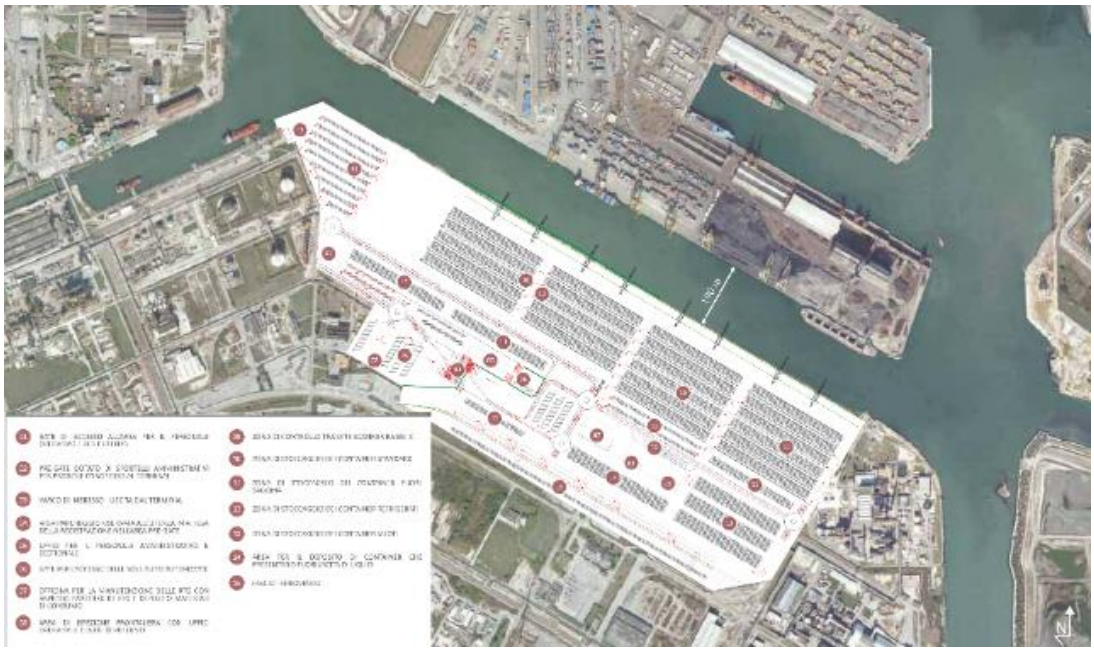
Financial forecast:

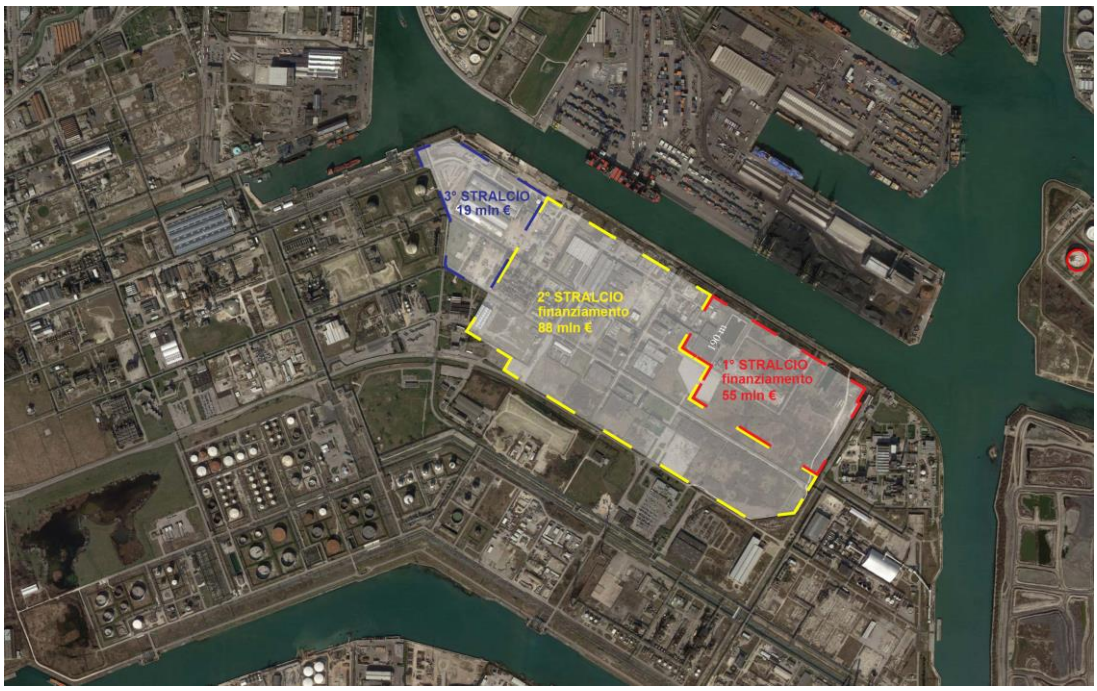
Realization of container terminal: € 184,000,000

Realization of dedicated logistic area: € 142,000,000

2.7 Expected results

The new terminal, which would have a quay of 1600 metres and be located on a 84 hectare site, would be able to handle large feeder and short sea container vessels and partially laden deep sea container ships up to 9,000 TEU in size. It would be equipped with an intermodal terminal and there would be some distribution centres developed adjacent to the terminal to provide port-centric distribution (PCD) facilities. The facility is being marketed to serve the Central and Eastern Europe market which implies that intermodal rail freight services will be a key element of the overall offer.





The purpose of Montensyndial terminal area is:

- Shipment of import and export containers via sea road and rail

- Light industrial manufacturing

- Consolidation of export less-than-container (LCL) loads to containers

- Storage, de-consolidation and shipment of import container loads to local destinations.

2.1 Action 2: railway telematics system for shunting operations (SIMA 2)

The Port of Venice has planned several investments with the scope of increasing its railway traffic flows. One of these investments is focused on the enhancement of the railway telematics systems for shunting operations (SIMA 2) and its integration with PCS (Port Community System) and information systems of other subject involved in developing rail services and OCR SYSTEM (Optical Character Recognition).

2.2 Main challenges tackled

Currently 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.

2.3 Results to be achieved

The following main results are foreseen:

1) Increase the efficiency of railway shunting inside the port

2) Development of an efficient rail freight services to link the port with current and new international markets

4) New planned investments in order to increase the intermodal terminal capacity

5) Development of efficient intermodal rail services

2.4 Tasks to be performed

The SIMA IT system retrieves, processes and stores data during the manoeuvring procedures and the wagons positioning operations inside a port area or a railway hub, aiming to support management and real time monitoring of the operations. 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.

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 start up 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. 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 manoeuvre 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.

2.5 Key actors

Stakeholder	Level of involvement	Relevance of participation
ERF- railway operator	High	High
RFI – national infrastructure manager	High	High

2.6 Timeline and financial resources

The first part of the SIMA 2 will be concluded within March 2020.

The cost foreseen for the SIMA 2 is € 70.000,00.

2.7 Expected results

The improvement of the efficiency of railway operations is also strictly linked with the resolution of any kind of physical interferences that could cause delays to the shunting manoeuvre and consequently reduce the performance of port operations as a whole. With this aim a specific study has been carried out with the scope to identify the interaction between private transport on road network and rail transport on the port railways network.

3. Cluster 3 – New multimodal services: overview of needs and best practices in cooperation with stakeholders to develop the action plan

The purpose of a new railway shuttle service is to connect two long multimodal routes (from Greece to Italy/Germany and from Italy to Germany/Scandinavia), reducing the road traffic on the motorway between Verona-Venice thanks to the use of this railway shuttle service. The aim is to create a unique multimodal service with a low use of the road transport (necessary only for the last mile connections between the nodes to the shippers/dispatchers and vice versa).

3.1 Action 3: New shuttle services between Verona freight village and port of Venice

The following paragraphs will deal with the railway shuttle service between Verona freight village and the port of Venice that will be deployed despite the short distance between these two nodes.

3.2 Main challenges tackled

The number of trucks on the road network is steady increasing. For instance, through the analysis of A4 motorway, one of the most important Italian roads, it is possible to measure the impact of the heavy vehicles traffic. Throughout the day, the trucks occupy two out of three lanes. Therefore, the challenge is to reduce their number on the longer stretches, keeping only their shortest routes. For this reason, the Verona freight village and the port of Venice are working together to create a railway shuttle service between their nodes. The aim is to catch as road freight traffic as possible, reducing the congestions on the motorway and the CO2 emissions. However, another challenge is hampering the development of this new service. The distance between Verona and Venice is too short, so the price of the service is not affordable for the actors of the multimodal chain. The solution is to sell this stretch inside a longer route. For example, the service can be embedded in the multimodal route from Greece to the Baltic Sea (and vice versa).

3.3 Results to be achieved

The expected results are the reduction of the trucks on the longer routes, shifting their daily activity on the last mile connections. In this way, they will connect the terminals to the companies since the railway cannot cover these short distances. As previously described, the benefits will be the reduction of the congestions on the roads (especially on the motorways) and the decrease of the CO2 emissions. However, there is also a social aspect that must be considered. In fact, there is a scarcity of truckers since there are only few people willing to stay for long periods far to their house. Therefore, the use of the road transport only for short routes can solve this problem because a trucker will drive only for daily short stretches, avoiding longer business trips. This action will make the trucker job more attractive.

3.4 Tasks to be performed

The actions that must be performed are mainly focused in the identification of the right players willing to invest money in this service. In fact, it is not simple to convince the operators to start this service since the costs are too high in a short route like Verona-Venice (and vice versa). For this reason, the business operators must be clever to sell in the market a long multimodal route that includes also the short stretch between Verona and Venice. Only in this way, it is possible to absorb the high costs and timings of the service. Therefore, the necessary actions to start the service are:

a) to identify the key actors willing to invest in this shuttle train;

b) to analyze all the factors of this innovative service (technical aspects, costs, timings, administrative issues, etc.);

c) to grab an adequate market share in order to cover the cost, making the service sustainable.

As said before, the first action is the most important. In fact, there must be some players willing to make a business activity that is not able to compete with the road. Therefore, this service will not produce profits at the beginning phase and it is necessary a starting support.

The second step regards mainly the evaluation of the shuttle connection operative elements. The cost is the bigger issues as mentioned before but also the other aspects are important. For instance, there must be two sets of wagons always available since the first train can be in delay and it is important that the departures be as much as possible on time. In addition, this stock

can support the potential lack of wagons caused by sudden damages in order to guarantee the regular daily activity.

Lastly, the third action is the key to solve the other problems. In fact, the marketing department must be able to offer to the customers a long route that starts in Greece and finishes in the Baltic Sea (and vice versa). Only in this way is possible to spread the costs and the timings of the shuttle service otherwise it is not sustainable.

3.5. Key actors

1) NORTH ADRIATIC SEA PORT AUTHORITY
2) TERMINALI ITALIA
3) CONSORZIO ZAI
4) QUADRANTE SERVIZI
5) RFI
6) FORWARDERS
7) RAILWAY UNDERTAKINGS
8) MTOs (Multimodal Transport Operators)
9) WAGON OWNERS

3.6. Timeline

	REALIZATION											
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
TASKS DESCRIPTIONS												
IDENTIFICATION of the key actors												
ANALYSIS of the all factors												
BEGINNING of the SHUTTLE SERVICE												

3.7. Expected results

The proper way to measure the impact of the actions undertaken is to use some KPIs. However, this shuttle service does not exist in the market since nobody has offered something similar before. Therefore, it is easy to understand that it is necessary an evaluation about the expect results since there are not historical data to compare like in the previous case. This introduction is essential to explain why there are not KPIs defined in advance for this type of service. Nevertheless, an assessment of the expected outputs can be done in order to fix the targets to achieve. In fact, at the starting phase the service must be launched with three train pairs per week. Assuming a minimum train filling rate of 85% in both directions (otherwise the service is disadvantageous), we will have a reduction of about 162 trucks per week on the Milan-Venice motorway that is a decrease of 8,424 trains per year in the stretch Verona-Venice. Since a truck produces 0.85 tons of CO2 in the stretch analyzed (source: EcoTransit), there will be savings for 7,160.4 tons of CO2 per year. The benefits described show the importance for the community of service like this one. The motorways can become less congested and the air quality will increase. In addition, the evaluation is done with the minimum conditions necessary in order to make the shuttle train economically sustainable. However, if there were a good market response it would be possible to double the number of train pairs, reaching six weekly roundtrips. This optimistic result can be translated in a little reduction of the daily traffic in the motorways but it can be the spark to create other similar services. In this way, there will be a strong decrease of the heavy vehicles on the main motorways with all the benefits previously described.