D 3.2.1 – Benchmark, transport needs & suppliers' roles

Activity 3.2 – Stakeholders analysis

December, 2020 - Version final

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ACRONYMS / ABBREVIATIONS

ACRONYM	DEFINITION
SoA	State of the Art
PP	Project partners
PT	Project Team
TC	Technical task coordinator
WP	Work package
IT	Information Technologies

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1	**Application Form – E-CHAIN - Enhanced Connectivity and Harmonization of data for the Adriatic Intermodal Network** 2014 - 2020 Interreg V-A Italy - Croatia CBC Programme Call for proposal 2017 Standard - E-CHAIN	Application ID: 10048282	Lead Applicant: Municipality of Ancona

1. INTRODUCTION

1.1 PURPOSE OF THE DOCUMENT

This document is relevant to the activity 3.2 Stakeholders analysis (Transport needs) of E-CHAIN project - Enhanced Connectivity and Harmonization of data for the Adriatic Intermodal Network.

This task collects user needs based on selected use cases and needs survey. Survey will include questionnaires, telephone and face to face interviews. Workshop will be conducted both within the consortium and with potential stakeholders to detail the initial range of services and the individual stakeholder requirements. Requirements gathered will form an early draft services document which will provide the basis for a preliminary analysis, subsequent and continued liaison will be conducted to ensure the output is appropriate for development and service commissioning.

A market analysis of the CB local transport systems indicating the points of strengths and weaknesses of each territory (SWOT Analysis)will be included in this activity. This phase envisages strong interaction between public authorities involved and exchanging of information necessary to analyse the implementation cases.

1.2 WORKING PRINCIPLE

The task of this document is the collection of requirements gathered from identified stakeholders and transport needs according to the current situation and the future plans. Transport needs will refer on one hand to commercial/organizational activity in the port area for example supporting travellers for check-in and for boarding operations; on the other hand, mobility management around the port area at touristic level for those travellers are waiting the transfer means or for visit the worth areas including rental car with driver for private guided tours for cruisers.

At first we focused to the Pilot Site of Venice, then we searched one other benchmark outside Italy (Dubai), so we will be able to compare services and needs.

The main source of data should have been the answer at the questionnaires by the stakeholders present in the area. Unfortunately for different reasons, due mostly to COVID-19 pandemic, we were not able to contact directly that list of stakeholder, so we decided to gather as much information as we can from the web.

2. BACKGROUND INFORMATION

E-CHAIN (Enhanced Connectivity and Harmonization of data for the Adriatic Intermodal Network) main objective is to enhance connectivity and harmonization of data for the Adriatic Intermodal Network, through the realization of a modular integrated software (E-CHAIN platform) for the management of intermodal transport services in port areas for passenger transport. To enhance the current situation, E-CHAIN will focus on providing new services such as an improved Port multimodal info mobility system for the passengers, a ticketing system integrated with other transport modes, an advanced touristic co-marketing tool for the operators. These services will be designed and deployed in the selected pilot sites (Ancona, Split and Venice). A Business model suited to adapt the technology developed in the three applicative contexts will be created and specific needs will be taken into account.

The aim of WP3 is to design platform and services and to prepare the E-CHAIN services for deployment in the pilot sites (Ancona, Split and Venice).

The specific objectives of this WP are to:

- Establish the requirements and specifications for E-CHAIN services and for integration with existing services/systems
- Create a detailed reference architecture that complies with relevant standards and best practices
- Verify adapted services against the requirements and specifications before developing for pilot sites to WP4

3. 1ST BENCHMARK: PORT OF VENICE

3.1. GENERAL INFORMATION

The North Adriatic Sea port system, constituted by Venice and Chioggia, boasts a strategic position at the top of the Adriatic Sea, crossed by 2 European Transport Corridors - the Mediterranean and the Baltic-Adriatic – besides being the MoS terminal of the East Mediterranean Sea connecting Central Europe to Africa and Middle East and representing the river pipe crossing the Po valley allowing sea-river intermodality and balanced transport of cargo on barges.

The Veneto port system counts on its natural multipurpose vocation, as an aspect which is particularly strong and extremely relevant in the Port of Venice; indeed, no branch prevails as a preponderant one in a multifunctional port: on the contrary, different supply chains and sectors are equally balanced.

The Port of Venice in particular operates and relates with different supply chains (agribusiness, steel products, chemical industry, energy) besides commercial and tourism branches encompassing not only the regional but the whole North of Italy area. In addition, the fishing supply chain is also part of the port system, thanks to well-known role played by the Port of Chioggia.

In terms of flows and relations, the Port System impacts on the regional entrepreneurial fabric and in general terms on the entire North East area.

As far as its positioning at a national level is concerned, the Port of Venice sets a record in the cruise sector, placing itself at the top in terms of number of passengers as a home port. In terms of overall commercial traffics it places itself at the number 7 and among the top ports according to its multipurpose activity. The Port of Chioggia is among the major players in the fishing sector, placing itself just after Mazara del Vallo in terms of total tonnages of fishing vessels.

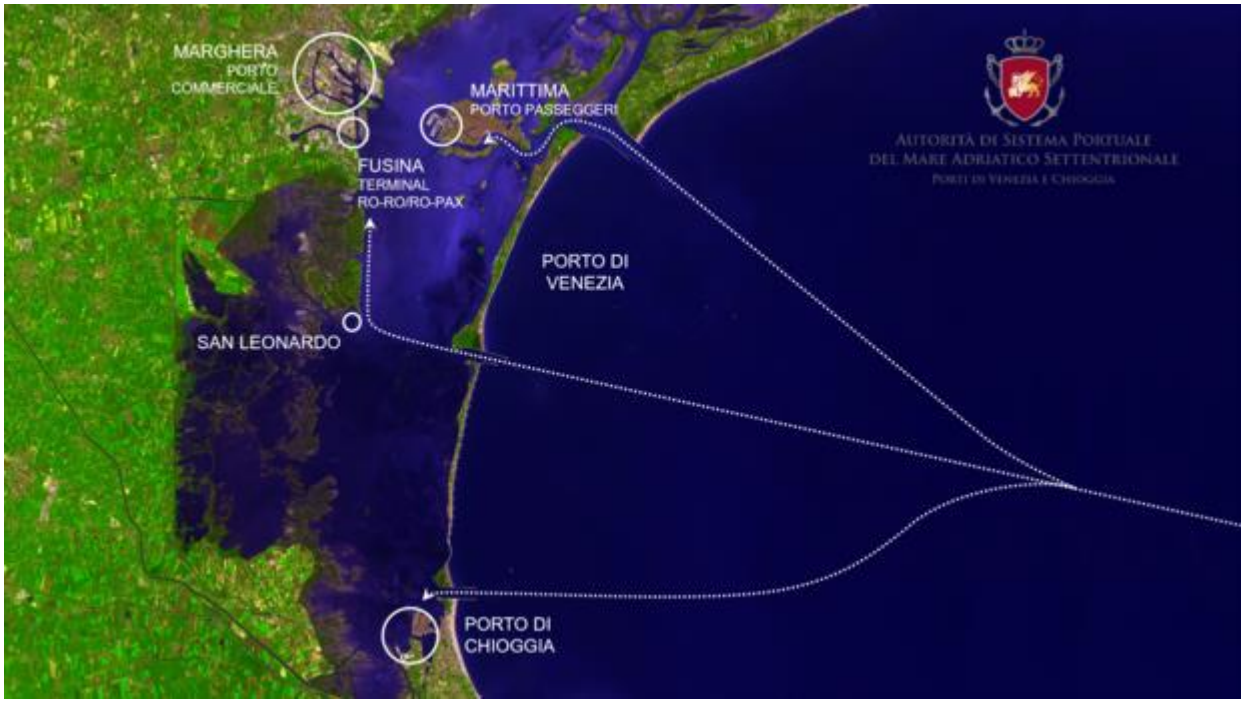


Figura 1 The North Adriatic Sea port system

The Port of Venice stretches over an area of more than 2,045 hectares: this corresponds to 5% of the total surface and 11% of the built-up area of the Municipality of Venice. It includes more than 30 kilometres of quaysides that in turn host 163 ac ve berths organised in the Port's 27 terminals, catering for commercial, industrial and passenger traffic.

Within the port there are two very distinct areas, namely Porto Marghera- which hosts the logistics, commercial and industrial activities -, and the Port in Venice, which has mainly risen around the Marittima passenger port and minor berths where passenger services are organised and supplied to cruise ships, hydrofoils and yachts.

The port of Porto Marghera occupies more than 1,447 hectares of industrial, commercial and tertiary operational areas; it includes more than 662 hectares of canals, basins, roads and railways, and is served by 12 kilometres of active quaysides that can welcome ships with a draught up to 11.5 metres. A dense infrastructure network serves the Port of Porto Marghera, and includes roads and junctions (40 kilometres), rail tracks (more than 135 kilometres) and bre op cs (7 kilometres).

The Venice side of the Port, dedicated to passenger traffic, covers an area of more than 26 hectares, with built-up areas accounting for 4,73 hectares and the water basin for 12,37 hectares in the Marittima passenger port. There are five main areas to the passenger port: the Marittima Passenger Port, San Basilio, Santa Marta, Riva delle Zattere and Riva degli Schiavoni, in addition to Fusina, on the mainland, that caters for ferries. The Marittima passenger port is Venice's cruise terminal: it can berth up to ten ships simultaneously in its 3.5 kilometres of quaysides and 10 terminals, for a total of 11 berths. The Fusina ferry terminal stretches over 36 hectares of land and provides 4 berths.

The Port of Chioggia is located between the islands of Pellestrina and Sottomarina: it is the southernmost access point to the Venice Lagoon.

The only access point to the port is the Chioggia Inlet, that is 550 m wide with a navigable depth of 8m below the sea level.

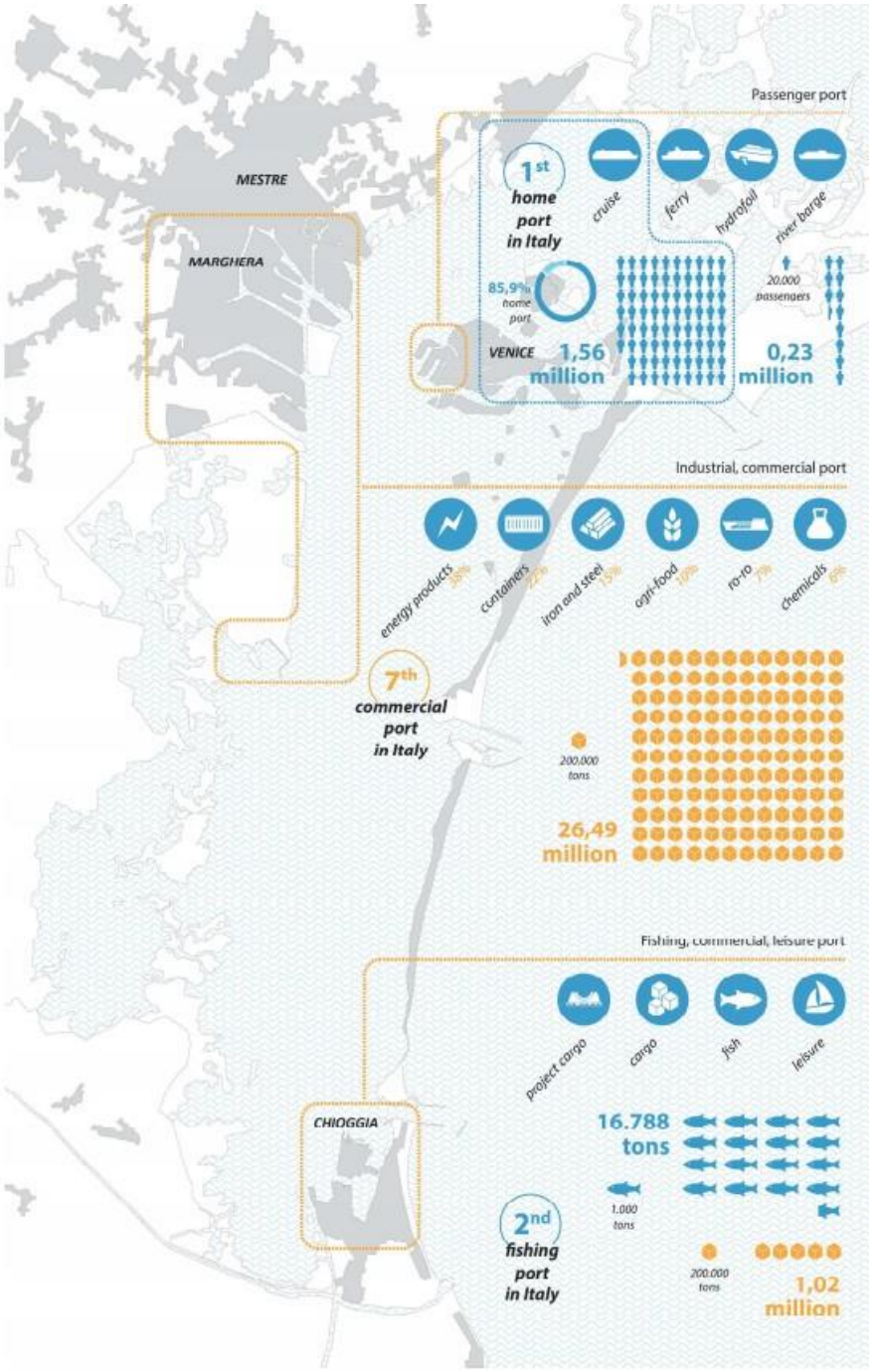


Figura 2 The Ports of Venice and Chioggia in figures (https://www.port.venice.it/en/the-ports.html)

January – December 2020 (final)

ESPO	2019 January - December			2020 January - December			Diff.	
	IN	OUT	TOTAL	IN	OUT	TOTAL	TOTAL	%
TOTAL TONNAGE	19.553.875	5.434.035	24.987.910	17.376.012	5.028.738	22.404.750	-2.583.160	-10,3
LIQUID BULK	8.348.065	669.652	9.017.717	7.884.279	672.413	8.556.692	-461.025	-5,1
of which:								
Crude oil	0	0	0	0	0	0	0	
Refined (petroleum) products	7.197.873	323.928	7.521.801	6.891.720	264.354	7.156.074	-365.727	-4,8
Gaseus, liqufied or compressed	0	0	0	0	0	0	0	
Chemical products	890.940	280.831	1.171.771	790.480	376.745	1.167.225	-4.546	-0,3
Other liquid bulk	259.252	64.893	324.145	202.079	31.314	233.393	-90.752	-27,9
DRY BULK	6.117.976	135.712	6.253.688	4.832.694	142.580	4.975.274	-1.278.414	-20,4
of which:								
Cereals	593.893	67.921	661.814	265.017	68.338	333.355	-328.459	-49,6
Foodstuff/Fodder/Oil seeds	1.516.898	12.234	1.529.132	1.566.653	3.300	1.569.953	40.821	2,6
Coal and lignite	1.425.857	5.536	1.431.393	433.941	0	433.941	-997.452	-69,6
Ores/cement/lime/plasters	372.831	0	372.831	319.362	0	319.362	-53.469	-14,3
Metallurgical Products	1.606.236	3.299	1.609.535	1.477.678	24.633	1.502.311	-107.224	-6,6
Chemical products	122.178	0	122.178	119.638	0	119.638	-2.540	-2,0
Other dry bulk	480.083	46.722	526.805	650.405	46.309	696.714	169.909	32,2
GENERAL CARGO	5.087.834	4.628.671	9.716.505	4.659.039	4.213.745	8.872.784	-843.721	-8,6
of which:								
Containerized	2.275.864	3.412.269	5.688.133	2.148.159	2.947.125	5.095.284	-592.849	-10,4
Ro-Ro	840.220	923.414	1.763.634	758.747	857.401	1.616.148	-147.486	-8,3
Other general cargo	1.971.750	292.988	2.264.738	1.752.133	409.219	2.161.352	-103.386	-4,5
ADDITIONAL INFORMATION								
Number of Calls			3.365			2.320	-1.045	-31,0
Gross Tonnage			78.134.646			40.619.192	-37.515.454	-48,0
Number of local and ferry passengers	100.232	96.308	196.540	23.757	23.264	47.021	-149.519	-76,0
of which:								
Local (< 20 miles journey)	46.926	46.328	93.254	0	0	0	-93.254	-100,0
Ferry passengers	53.306	49.980	103.286	23.757	23.264	47.021	-56.265	-54,4
Cruise passengers			1.617.945			5.653	-1.612.292	-99,6
"Home Port"	698.309	699.119	1.397.428	2.888	1.754	4.642	-1.392.786	-99,6
"Transits" (to be counted once)			220.517			1.011	-219.506	-99,5
Number of Containers (in TEU)	308.567	284.503	593.070	283.871	244.805	528.676	-64.394	-10,8
"Hinterland"	308.567	284.503	593.070	283.871	244.805	528.676	-64.394	-10,8
of which:								
Empty	160.490	16.741	177.231	148.483	17.762	166.245	-10.986	-6,1
Full	148.077	267.762	415.839	135.388	227.043	362.431	-53.408	-12,8
"Transshipped"	0	0	0	0	0	0	0	
of which:								
Empty	0	0	0	0	0	0	0	
Full	0	0	0	0	0	0	0	
Ro-Ro units	37.796	41.415	79.211	34.783	38.826	73.609	-5.602	-7,0
Number of private vehicles	17.251	17.707	34.958	7.158	6.325	13.483	-21.475	-61,4
Number of commercial vehicles	18.635	23.183	41.818	15.046	17.891	32.937	-8.881	-21,2

Figura 3 Ports of Venice – 2019 Vs. 2020 in numbers (https://www.port.venice.it/en/the-ports-in-figures.html)

3.2. CONNECTIVITY

The Port of Venice is accessible year-round 24/7. Served by 45 km of railroads, it is directly connected to the European transport corridors' rail and roadways.

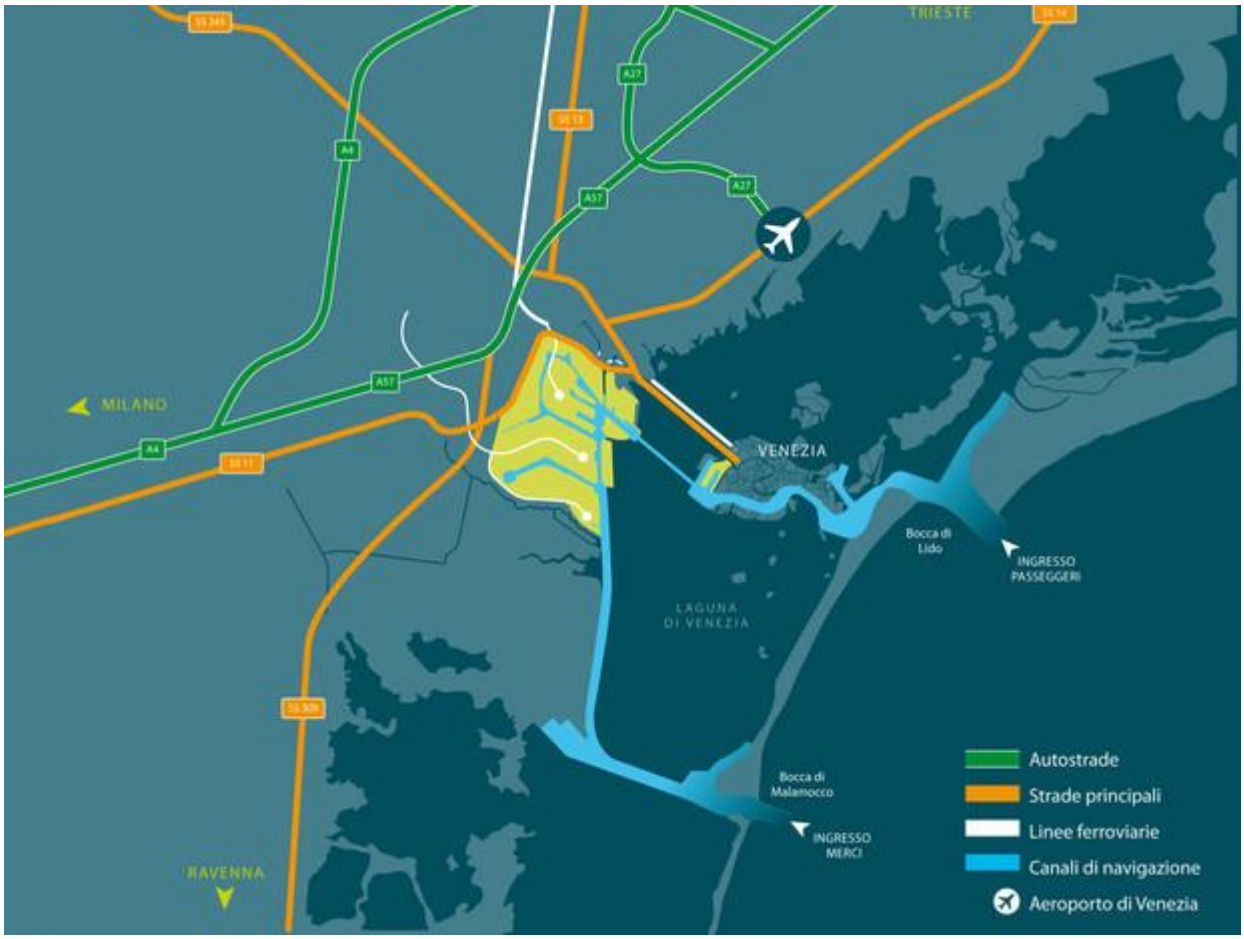


Figura 4 Sea, rail and road access map (https://www.port.venice.it/en/connectivity.html)

Access from the sea

The Port of Venice is situated in the Venice lagoon and can be accessed year-round, 24/7. Constituted of two port areas, Marghera and Marittima, the port offers 30 km of quayside where ships can berth. The Port of Venice is also the only port in Italy with an inland waterway port enabling cargoes to sail up the Po Valley.

Two separate access points for the two Venice Port facilities

The Port of Venice includes two main port areas each of which has its own separate access: the Malamocco port mouth serves cargo ships (commercial/industrial traffic), while the Lido port mouth serves passengers ships (cruise ships, ferries, fast ships and yachts).

The port can be accessed year-round at any time, including at night, and in all weather conditions. As a result, the Port of Venice can be accessed 24/7/365.

Access to the cargo port

Dedicated to cargo ships, the Malamocco port mouth is 14 m deep.

Merchant ships reach the commercial/industrial port facilities through the Malamocco-Marghera Channel which is 11 m. deep and leads directly to the cargo terminals.

Access to the passenger port

The S. Nicolò port mouth is located between Punta Sabbioni and the Lido, and serves passenger traffic alone. Cruise ships, ferries, high speed crafts and yachts reach the Marittima facilities through the Giudecca Channel.

With a constant draught of 9 m, this itinerary crosses the city's historical center and provides a magnificent view over St. Mark's square.

The inland waterway port

The Port of Venice is the only port in Italy to have an inland waterway port. Navigation along the only navigable river in Italy connecting the sea and the inland enable cargo, including containers, to be transported by barge to Cremona and Mantua.

The port's quays

The Port of Venice's quayside is 30 km long and is distributed between the two port facilities of Marghera (15 km) and Marittima (5 km, including the berthing points in the center of Venice).

Furthermore, another 10 km of coastline have been consolidated in Marghera in view of their future use as quays. The draught of the Malamocco-Marghera channel, including the area facing the quayside, will be dredged to 12 m.

The Marittima facility (dedicated to passenger services) was renewed recently and the berths for mega yachts in the historical center have recently been improved with new services. The Western Channel in Marghera hosts a marina dedicated to recreational sailing.

Railroad access

The Port of Venice is served by an internal railroad network of 200 km. It has its own marshalling yard and is connected to the main international railroad corridors. The Venice Port Authority plans to extend its internal railway system as a means to support intermodal and sustainable transport.

The port's railroad network

The Port of Venice is served by an internal railroad network that stretches for over 45 km.

The rail tracks reach the different terminals and also run along the quayside. The tracks serve both commercial and industrial traffic in the Marghera cargo port.

The Marghera railroad yard

The Marghera railroad yard connects the Port of Venice to the main international railway network through the Venice-Mestre station. Trains are allowed to stand or transit through the Marghera railroad yard after loading/unloading operations.

Connections to main international railway lines

Trains can easily reach the main European destinations from the Port of Venice. Trains travel in four main directions: Venice–Milan–Turin–Lione; Venice–Udine–Tarvisio–Vienna; Venice–Padua–Bologna–Rome; Venice–Trieste–Ljubljana–Budapest.

Extension of the railroad network

Welcoming the European policy aimed at enhancing railroad freight transport, the Port of Venice plans to develop and modernise its internal railroad network. Initiatives, either already in progress or planned, include:

- the extension of the Marghera freight yard (9+7 tracks supporting up to 40 trains/day);
- the electrification of the second track entering the Railway Station of Venice Mestre;
- the construction of a new direct link between the Chemical Peninsula of Fusina and the Venice-Milan line to bypass the Mestre station;
- a second track to add to the existing one in via dell'Elettronica to support the Motorways of the Seas Terminal;

the construction of a Railroad Park serving the new container terminal and the Distripark to be erected in the area formerly occupied by the Montefibre plant.

Road access

The Port of Venice has direct access to national and European roadways (Corridors I, V and the Adriatic-Baltic corridor). The Venice Port Authority is striving to improve the road access to the commercial and passenger terminals. This will also relieve roads from heavy traffic and increase their safety.

Marghera (cargo)

The Port of Venice includes two main port facilities: Marghera and Marittima. Cargo traffic inbound and outbound from the Marghera facility (hosting the commercial and industrial terminals, and the firms working in the port) travels down via dell'Elettricità which is directly linked to the Romea State Road (SS309-E55), the Padana Superiore Regional Road (SR11) and the motorways (A4 and A27). In turn, these roads link the Port of Venice to the Lisbon-Kiev, Berlin-Palermo, Adriatic-Baltic European Corridors.

Marittima, S. Marta, S. Basilio (passengers)

Road access to the Marittima area of the Port and other port facilities located on the island of Venice (S. Marta and S. Basilio) is provided by the Ponte della Libertà which is well connected to the Romea State Road (SS309-E55), Padana Superiore Regional Road (SR11), the Triestina State Road (SS14) and the motorways (A4 and A27).

Improving the roadways

The Venice Port Authority (VPA) works with other institutions to relieve the local roads of heavy traffic, especially in view of the port's future transformations (new Sea Highways Terminal, new container terminal and annexed Distripark).

New initiatives will include implementing roundabouts, redesigning the intersections with major roadways, constructing a fly-over, extending the connection roads to primary routes and widening via dell'Azoto and via dell'Elettronica that lead to the port. The road system inside the Port itself will also be redesigned.

Plans to build a new roundabout are in place to more efficiently distribute traffic directed towards the Marittima. Once it has been completed, access to the Marittima and the Tronchetto will flow freely even during peak periods. The new roundabout will also provide easy access to the planned multi-storey garage and will allow a new bus stop to be positioned near the intermediate station of the People Mover monorail.

Public buses, public water buses (vaporetto) and water shuttles

- ACTV - https://www.actv.it/
- ATVO - https://www.atvo.it/
- ALILAGUNA - https://www.alilaguna.it/
- VENICE CITY SIGHTSEEING - https://www.venezia.city-sightseeing.it/eng
- VENEZIANA MOTOSCAFI - https://www.venezianamotoscafi.it/

Water Taxi

- Venice Water Taxi - https://www.venicewatertaxi.it/
- Venezia Turismo - https://www.veneziaturismo.net/
- Cons. Motoscafi Venezia - https://www.motoscafivenezia.it/

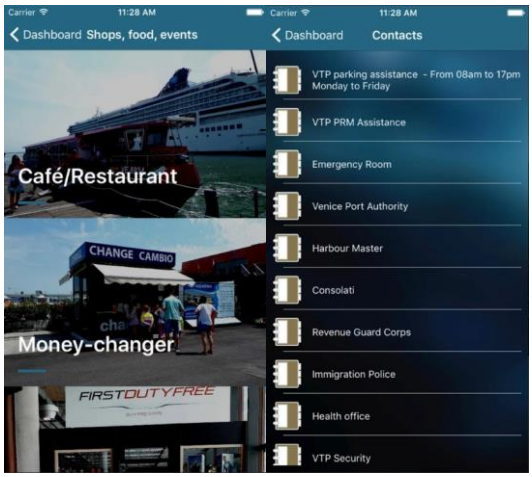
Taxi Cab

- Radiotaxi
- Cooperativa Come Taxi

3.3. APP MY VENICE PORT

Venice My Port is the new APP developed by VTP (Venezia Terminal Passegeri SpA is the society, founded in 1997 by the Venice Port Authority, that control the activities of the Venice Port) and dedicated to passengers, crew members and operators to facilitate the use of the services available at the Cruise Port of Venice.

By downloading Venice My Port on the Smart Phone or mobile device, it is possible to receive all the information related to the port services connected to the cruise or to the possible booked parking. Furthermore, Venice My Port allows using the navigation systems to reach the Port and informs about the deals exclusively reserved to the APP user.



The new APP Venice My Port, available for free downloading on both Apple Store and Play Store, provides all the information related to the services available in the port and where they are thanks to the geolocation. With Venice My Port, it will be very easy to know how to get to the Historical City, the St. Lucia or Mestre Railway stations or the airport.

Venice My Port can also help in finding the car after disembarkation in case It was parked in the port's facilities.

Unfortunately, at the time while this document is been writing, the app was not working (tried to install it in several smartphone), so we were not be able to try the features of this app.

3.4. SWOT ANALYSIS

Strengths

- The History and peculiarity of the Venice City is a big attractive for tourism
- The strategical position in the Adriatic sea

Weaknesses

- The intense traffic of cruise boats are destroying the delicate balance between the lagoon and the city
- Incapacity to manage the flux of people during some period of the year

Opportunities

- The restoration of the natural balance between the city and the lagoon
- The opportunity to manage the flux of tourists in the peak moment of the year

Threats

- Weakness of the transport infrastructure to manage high flux of people
- Necessary changing require high amounts of investments

4. 2ND BENCHMARK: PORT OF DUBAI

The idea to analyse the port of Dubai is related to the research of an highest benchmark in fact of services and project, dued by the big investment that this port received by the emirate in the last years.

4.1. GENERAL INFORMATION

There are two major commercial ports in Dubai, Port Rashid and Port Jebel Ali. Port Jebel Ali is the world's largest man-made harbour, the biggest port in the Middle East, and the 7th-busiest port in the world.

Port Jebel Ali

Port Jebel Ali was constructed in the late 1970s to supplement the facilities at Port Rashid in Dubai. The village of Jebel Ali was constructed for port workers, and it has a population of 300 people.

Covering over 134 square kilometres (52 square miles), Port Jebel Ali is the biggest man-made harbour in the world and the biggest Middle East port. It is home to over five thousand companies from 120 countries of the world. Its deep harbour and large facilities have made it the US Navy's most-visited port. The harbour and facilities will accommodate Nimitz-class aircraft carriers and battleships. US service personnel frequently take liberty there and have come to call it "The Sandbox."

Port Jebel Ali is 35 kilometres southwest of the city of Dubai in the United Arab Emirates (UAE). In 2008, The Dubai Port Authority (DPA) announced that all cargo operations would be moved from Port Rashid to Port Jebel Ali. Port Rashid will then become a cruise terminal and mixed-use urban waterfront area to house 200,000 people.

Nurturing Trade, Geared for Growth

Jebel Ali Port is a gateway hub that enables trade across the region and beyond. It is a vital link in the global trade network, connecting eastern and western markets with North Africa, the Middle East, and South Asia. As DP World's flagship, it is the largest seaport in the Middle East and ranks among the top 10 container ports of the world. The port's container handling capacity has grown from 18 million TEU (twenty-foot equivalent units) to 22.4 million TEU. Jebel Ali Port has been voted "Best Seaport – Middle East" for 24 consecutive years.

As an integrated multi-modal hub offering sea, air and land connectivity, complemented by extensive logistics facilities, the Port plays a vital role in the UAE economy. It is a premier gateway for over 80 weekly shipping services, connecting more than 150 ports worldwide.

Container Terminal 1 (T1) has a capacity of 9 million TEU and is one of the busiest terminals. With 15 berths and 51 quay cranes, T1 is the foundation that has allowed Jebel Ali Port to achieve its position as one of the top ten ports globally.

Container Terminal 2 (T2) with 32 quay cranes and 8 berths has a capacity of 6.5 million TEU. Its state-of-the-art technology has decreased the carbon emission by 30%.

Container Terminal 3 (T3) is known for its remarkable technological achievements. It has 5 berths and a capacity of 3.8 million TEU. Inaugurated in 2014, T3 is one of the largest semi-automated terminals in the world equipped with 19 automated quay cranes and 50 automated rail-mounted gantry yard cranes (ARMG). It is capable of handling Ultra Large Container Vessels (ULCV) with capacities exceeding 18,000 TEU.

Container Terminal 4 (T4) will be the next benchmark for the world of trade with capabilities designed to serve the current and future market with a capacity of 3.1 Million TEU.

Logistics Capabilities

CFS (Container Freight Station) Our modern Container Freight Station (CFS) facility located outside Gate 2 at Jebel Ali Port covers a total area of 134,343 sqm, which includes a covered storage area of 11,900 sqm and an uncovered storage area of 122,443 sqm. CFS provides a range of services based on the customers' requirements:

– LCL

– Handling transshipment cargo

– FCL de-stuffing/stuffing

– Rework/Consolidation operations

– Cross stuffing

– Weight reduction of containers

– Export stuffing

– Cargo delivery, including Inter-Port Transfer, Internal Shifting, and other additional services

Cool & Cold Store

Jebel Ali Port offers the latest cool and cold storage facilities with a floor space of 9,665 square metres, and are ideal for a wide range of perishable cargo requiring special storage conditions, including chocolates, produce, alcohol and cigarettes, pharmaceutical products, and cosmetics.

Our cool storage facility has a temperature range of 10°C to 20°C, with three rooms with a total pallet storage capacity of 3,240. The Cold Storage has a temperature range of -29°C to +13°C, with a pallet storage capacity of 8,183.

General Cargo

The Jebel Ali Port plays a significant role in serving the Gulf, Indian Subcontinent, and African Markets. The port is strengthened by the high degree of specialisation in the storage and handling of all kinds of cargo at its facilities including bulk, breakbulk, and RoRo.

Jebel Ali's General Cargo Terminal covers a total storage area of over 1.4 million square metres comprising 27 berths, with a quayside depth of 15 metres, allowing very large and special cargo vessels to berth.

Visiting Vessels

All vessels visiting Jebel Ali are supplied with a 6 cbm skip for the disposal of general non-hazardous waste. The bin is supplied as part of the port tariff and is mandatory for all vessels entering the port (Refer to Miscellaneous section for Port Tariff).

Port Rashid

Port Rashid opened in 1972 with two gantry cranes and capacity for less than 100 thousand TEUs of containerized cargo. It was expanded in 1978 to include 35 berths, five for large container ships. Today, the Port Rashid has nine gantry cranes and capacity for 1.5 million TEUs. Dubai is the capital and largest city in the UAE, with waterfront of about 45 miles along the Persian Gulf. It contains almost all of the UAE's population. In 2007, Dubai's population exceeded 1.2 million people.

The early settlement of Dubai was first noted in 1799. The town was dependent on Abu Dhabi until 1833, when a group of Bani Yas tribesmen left Abu Dhabi and took over Dubai. After that, Dubai grew more powerful. Dubai signed a maritime truce with Britain in 1835, and its foreign relations were controlled by Britain under the 1892 Exclusive Agreement.

When the British left the Persian Gulf in 1971, Dubai became an important founding member of the United Arab Emirates. Unlike their neighbours, Dubai's sheiks traditionally encouraged commerce and trade, and Dubai was an important port in the early 1900s. In the early years, it was known primarily for pearl exports. Foreign merchants settled there, and it was an international trade center.

From 1966 until 1973, Dubai joined Qatar in establishing the riyal as a monetary unit. In 1973, the UAE adopted the current national currency, the dirham. With free trade in gold, Dubai supports a busy smuggling trade with gold ingots to India. An offshore oil field was discovered about 75 miles east of Dubai in 1966 and, by the 1970s, several huge submarine tanks holding 1.5 million barrels of oil (called the "Three Pyramids of Dubai") had been installed on the sea floor.

Combined oil income and trade have made Dubai wealthy. Today, it contains several industrial plants, and aluminium production has become an important part of the city's economy.

Port Rashid was opened in 1972, and its supertanker dry dock was finished in 1979. In the early 1980s, Port Jebel Ali was declared a free-trade one to encourage industrial development. Many international companies soon opened facilities there. The Dubai Ports Authority took over port operations in the early 1990s.

In the first years of the 21st Century, Dubai was working on several major transportation and construction projects. These include light-rail systems, a modern sports complex, island developments, and luxury hotels. Although interrupted by some labour strikes, the famous Dubai Tower became the world's tallest building in 2007 even though it was not yet complete.

In January 2008, it was announced that the port would be redeveloped, all cargo operations were moved to Jebel Ali Port by the end of March 2018, transforming Port Rashid in a Cruise Terminal.

Figura 5 Port Rashid – Cruise's Terminal (http://dubaicruiseterminal.com/)

Cruise Terminal

Mina Rashid is the leading cruise tourist destination in the Middle East, according to polls for the past eight consecutive years at the World Travel Awards), and is steadily gaining traction as a leading destination globally. Currently, Mina Rashid can handle seven mega-cruise vessels or 25,000 passengers simultaneously. The port's Hamdan bin Mohammed Cruise Terminal is the world's largest single, covered cruise terminal facility capable of handling 14,000 passengers a day. Mina Rashid is currently undergoing an expansion to improve its capabilities by building a world class recreational area that will symbolise Dubai's rich cultural heritage and solidify the terminal as one of the world's premiere cruise tourism hubs. Due to high demand, it is also working towards providing improved berthing services for private yacht owners looking to make Dubai a home for their vessels.

Coastal Berth and General Cargo Facilities

As Dubai's first modern port and located along traditional trading lanes, Mina Rashid is an attractive site for non-containerised cargo, especially for break-bulk and RoRo vessels. Its proximity to the city's used car markets and support from the Road Transport Authority allows for easy and hassle-free export handling.

Cruise terminal's facilities and services

- Help desk manned round the clock to cater to the passenger needs, inquiries and distribute city maps, brochures on tourist attractions, heritage sites etc.at free of cost.
- Money exchange
- Post Office
- Shops selling souvenir, gifts, electronics, jewellery
- Café and a mini mart
- Aerial and coach tour operators outlets
- Free Wi-Fi and business center –
- Ample seating
- Easy access for physically challenged
- Dedicated taxi rank, monitored by RTA
- Help desks of major shopping malls offering complimentary shuttle bus services
- Terminal houses offices for other Government Departments as well to ensure easy access and swift services for passengers.
- Dubai's cruise port is about 25 minutes away from the Dubai's airport.

Transportation from Dubai cruise's terminal

Though the port looks quite close to the city on a map, It's possible to walk to see the sights in Dubai. Plus the cruise's terminal is located in the center of a cargo shipping port, so there is a need of a transportation to get around. Some malls may offer free shuttles and have desks set up inside the terminal with their schedules posted. Shuttles typically run from 9:30am (malls open at 10am) until 5 to 7pm. Malls running shuttles (Apr 2012) are Mercato, Wafi (Egyptian themed with indoor modern souk and free nightly light show), Dubai Outlet and Burjuman (most convenient with a main metro stop beside it). Otherwise, the only way to leave the port is by taxi (see transport section below). Since there is a surcharge for taking a taxi from the port, it will be cheaper to take a shuttle first to the mall closest to the preferred destination.

Taxis are metered and reasonably priced but can get expensive since Dubai is a huge city. The starting fare is 3dh with a 10dh minimum charge. A slightly higher evening rate applies after 10pm. An expensive 20dh surcharge is applied to fares leaving the airport or cruise terminal. The surcharge also applies to trips that cross into Sharjah. Most taxis will take credit cards and US dollars and should be tipped by rounding your fare to the nearest 5 AED.

The Big Bus Company runs hop-on, hop-off (HOHO) routes with evening service and a stop outside the terminal. They have an information desk inside.

It’s better to get around Dubai using taxis, buses, ferries, boats, trains, or shuttles. It is not recommended to rent a car because it would not be able to park it at Dubai’s Cruise Terminal.

5. CONCLUSIONS

The comparison between this two sites shows that it’s really important to provide services and to manage the flux of people, moving from the port to the city and vice versa.

It’s very difficult for Venice, because of different reasons (like lack of investments), to improve in few time its physical infrastructure. That’s why it’s more fast to improve an IT system that can give all the informations needed by the travellers, with the possibilities to update them in real-time.

D 3.2.1 – BENCHMARK, TRANSPORT NEEDS & SUPPLIERS' ROLES

Activity 3.2 – Stakeholder Analysis (Transport needs)

December 2020, Version final

Partner: PP1 Amatori Interestate srl

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Project ID Number	10048282
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Priority Axis	4 - Maritime Transport
Specific objective	4.1 - Improve the quality, safety and environmental sustainability of marine and coastal transport services and nodes by promoting multimodality in the programme area
Work Package Number	3
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1	Application Form – E-CHAIN - Enhanced Connectivity and Harmonization of data for the Adriatic Intermodal Network 2014 - 2020 Interreg V-A Italy - Croatia CBC Programme Call for proposal 2017 Standard - E-CHAIN	Application ID: 10048282	Lead Applicant: Municipality of Ancona

Table of Contents

1) Introduction

This document is based on official documents provided by the Municipality of Ancona and the Central Adriatic Port Authority and on pieces of interesting information we were able to obtain through semi-structured interviews as well.

With reference to questionnaire surveys, they have been submitted to the involved stakeholders in order to collect relevant datas about transports and multimodality.

Specifically, have been interviewed, the representatives of:

a) Port Authority of the Port of Ancona
b) Ancona Falconara Airport (Enac)
c) Polytechnic University of Marche (Engineering)
d) Conerobus SpA
e) Association of tourist guides of Ancona

2) Ancona and its port: analysis of the transport situation

The metropolitan area of Ancona is characterized by an infrastructural endowment capable of serving in a diversified manner all modes of transport of goods and people (road, rail, air, sea). It allows an easy and fast connection between the urban areas of the coast and internal areas, as well.

The Presence in the area of a strategic motorway artery (A14), of a railway network with northsouth and east-west routes and three multimodal platforms (port-airport and freight village), allows the entire province of Ancona to be described as a territory with good infrastructure endowments.

The railway network consists of two main lines:
- the Bologna-Lecce line (Adriatic route), which connects the important southern ports (Taranto, Gioia Tauro) and the entire southern Adriatic with northern Italy and continental Europe

- the Orte-Falconara line which represents the backbone of the Umbrian-Marche railway system and ensures the connections between the Milan-Rome ridge and the Adriatic line.

The national road network is centered on the A14 motorway, a north-south connection infrastructure, recently upgraded through the construction of the third lane along the Marches section.

Currently 5 motorway exits are available along the crossing path of Ancona metropolitan area: (Loreto, Ancona Sud, Ancona Nord, Montemarciano, Senigallia).

The SS16 Adriatica, parallel to the Adriatic railway line, crosses the inhabited centers of the coast and has taken on the role of an urban road over the years, becoming the backbone of the complex and diversified settlement system that from the lower Musone valley crosses the plain of the Aspio to reconnect with the coastal territories north of the Esino.

Road transport finds in the ss76 Vallesina an important axis connecting the coastal territory of the Marches with the Umbrian areas; this road artery is part of the ambitious road network project called *Quadrilatero Umbria Marche*, a transport and development framework that connects the Perugia-Ancona axis to the Foligno-Civitanova axis.

The SS76 road represents the main infrastructure in support of the various urban centers and of the industrial and infrastructural areas located along the Esino valley (the production area of Jesi, the "Sanzio" Airport and the Marche Interport)

The Interport has a total extension of 101 hectares; the infrastructure is equipped with 100,000 square meters of warehouses with 215,000 square meters of appurtenant courtyards. In the structure, connected to the FS Orte-Falconara line, there are 6 tracks 500 mt long (corresponding to the maximum admissible size of the train).

The port of Ancona, seat of the Authority of Harbour System, is included among the 24 ports of national interest and is part of the TEN-T "Core" Network as the maritime terminal of two PanEuropean Corridors proposals (Helsinki-Valletta and Baltic- Adriatic).

The port area covers about 70 hectares and is equipped with a stretch of water of about 700,000 square meters, and 26 berths for a total of about 4,300 linear meters of docks with a draft of 12.5 m.

The passengers passed through the port of Ancona in 2019 were 1,189,332 with a growth of + 3% on 2018 when there were 1,151,266. The number of passengers for Greece (772.540) and Croatia (218.499) remained stable in 2019 (Of these, approximately 180,000 sailed on the Ancona-Split route. The Jadrolinija passengers on the Ancona-Split route were about 100,000). The number of people who passed through the route to Albania grew: passengers were 98,155 compared to 90,832 in 2018, with an increase of + 8%.

It is relevant to notice the growth record for cruise passengers in the Doric port. In 2019 there were 100,109 with an increase of + 49% on 2018 when they were 67,031. A much better figure than the national average of 11.2% cruise traffic recorded by the recent analysis on 2019 by "Ship2Shore". A constantly growing market, that of cruises, in the world and in Italy where the 2020 increase in cruise ship traffic is estimated at + 2.8% according to the forecasts of the Italian Cruise Watch of "Risposte Turismo". An opportunity also for Ancona, inserted on the Adriatic Sea route of the most important shipping companies in the sector, starting with MSC Cruises which for 2020 has already confirmed its presence in the port. A great opportunity for the development of the economy and tourism of the city and of all the Marches, which requires adequate infrastructure for docking ships such as the new cruise hub to be built at the Clementino pier.

Furthermore, it is important to mention the **historic record for the port of Ancona, which recorded a positive trend in container traffic in 2019**, a sign of efficient infrastructure and business competitiveness, and leadership in the passenger sector strengthened by the trend in cruise traffic.

The goods in containers went from 1,135,549 tons in 2018 to 1,252,197 tons in 2019, an absolute record for the port with a growth of + 10%. Strongly positive dynamics for exports at 711.707 tons (+ 13%) after two consecutive years of decline. Imports rose to 540,490 tons (+ 7%). A clear sign that the Doric port is a port at the service of companies from the Marche, Abruzzo and neighboring regions which are experiencing a phase of recovery on international markets. The number of TEUS handled (container units of measurement) went from 159,061 in 2018 to 176,193 in 2019, with an increase of + 11%.

All this happened with a reduction in the number of container ships which, in 2019, were 354 (17% compared to 2018 and -23% compared to 2016). Signal of the increased loading capacity of ships which, although larger, can access the port of Ancona thanks to the commissioning in 2015 of quay 26 with related dredging works.

Another sign of better rationalization of the logistics chain and management of commercial traffic by shipowners is the trend towards a decrease in the handling of empty TEUS, which fall from 27% in the previous periods to 22% in 2019. The numbers of solid bulk goods and general-cargo are more than positive, growing by + 27%, going from 305,169 tons in 2018 to 386,948 tons in 2019. 78% of freight traffic transported by ferry is direct and / or comes from the Greek ports of Igoumenitsa and Patras, 18% from Albania and 4% from Croatia.

3) Swot analysis of intermodal transport in Ancona and its port area

For the purposes of this project and the swot analysis of the intermodal transport of Ancona and its port, it is necessary to remember that Ancona, like all Italian cities with more than 100,000 inhabitants, is required to compile the PUMS (Integrated Sustainable Mobility Plan).

The tendering procedure for the realization of the PUMS is ongoing. Here it is important to insert:

a) the table containing the general and specific objectives, approved by the Council of Ancona

Municipality for the construction of the new PUMS

b) The swot analysis on the Ancona mobility system.

3.1) General and Specific Objectives of SUMP – Municipality of Ancona

GENERAL OBJECTIVES	SPECIFIC OBJECTIVES		PLAN OF ACTION	
GO 1 **ACCESSIBILITY AND URBAN**	SO 1	**DEVELOPMENT**	PoA 1.1	Increase km travelled as the "load factor" and maintenance of the ratio between traffic revenues and operating costs equal to 35% (DPCM n.69084 11th March 2013)

ENVIRONMENT IMPROVEMENT		**OF PUBLIC TRANSPORT**	**PoA 1.2**	Development of new ways where supply and demand of the service meet: brand-new interaction on digital platforms, greater flexibility in the provision of services that dynamically adapt to the changing demand (shuttle systems, bus on demand, reduction of overlaps etc.)
GO 2 REDUCTION OF POLLUTANT EMISSIONS DUE TO MOVEMENTS			**PoA 1.3**	Promoting a culture of integration between a variety of mobility systems
GO 3 REDUCTION OF RISK FACTORS LINKED TO MOVEMENT AND MOBILITY SAFETY	**SO 2**	**DEVELOPMENT OF ELECTRIC MOBILITY**	**PoA 2.1**	Adapt and complete the trolleybus ring, creating a fast trolleybus connection between the heat exchanger nodes and the city centre
			PoA 2.2	Linking strategic city spots (University, Rail Station, Torrette Hospital and Ancient Port) (car sharing, bike sharing and local bus)
GO 4 EFFICIENCY AND AFFORDABILITY OF MOVEMENT IMPROVEMENT			**PoA 2.3**	Development of a charging network for private electric vehicles with the aim of linking main local public transport (LPT) hubs with higher demand
	SO 3	**IMPROVEMENT OF INTERCHANGE NODES AND CAR PARKS**	**PoA 3.1**	Encouraging the use of car parks close to the city centre supporting dedicated LPT solutions to reduce the impact of traffic in those city centre areas of greater pedestrian traffic
			PoA 3.2	Development of eco-friendly sustainable systems to facilitate private and public exchanger hubs (electric vehicles (EV) -sharing)

			PoA 3.3	Network development of low impact systems with the purpose of connecting attractor poles whether they are in the city centre or in the suburban area
	SO 4	**DEVELOPMENT OF CYCLING AND PEDESTRIAN PATHS**	PoA 4.1	Carrying out pedestrian and cycling infrastructural system already started between piazza Ugo Bassi towards Passetto.
			PoA 4.2	Development of pedestrian and cycling infrastructural system as connection between sea and inner land (from Palombina beach to Torrette, throughout the North seafront to the tourist port and the Ancient port)
			PoA 4.3E	Encouraging pedestrian and cycling paths on home-school commute (already active “Piedibus”) and those more tourist (in particular towards the Conero Park)
	SO 5	**SAFE AND ACCESSIBLE MOBILITY**	PoA 5.1	Build a shared path with representatives of disable and elderly people with the aim of improve accessibility to services and mobility infrastructure
			PoA 5.2	Use the monitoring system and air quality control to evaluate the effectiveness of actions undertaken in terms of environment sustainability and inhabitants health levels linked to pollution cause by transport system; developing a common awareness to reduce pollution among citizens

Figure 1

3.2) Swot Analysis – Ancona mobility system

STRENGHTS	WEAKNESS
Concentration of three important infrastructural nodes (port-airport-freight village)	"Bottlenecks" that affect accessibility to the port of Ancona (port-A14 connection)
"Core" port of the TEN-T (terminal of the HelsinkyValletta corridor) with an heavy traffic of ferries and a good traffic of container with direct rail connection to the national network	Excessive segmentation of railway maneuvers in port
Airport with good cargo potential	Freight flows on containers centered exclusively on regional territory
Interport with direct railway connection	Fragmentation of transport operators
Strategic geographical position in the Adriatic Basin and in central Italy;	
Railway connection to the network with north-south and east-west routes (Bologna-Ancona section inserted in the TEN-T “Core” network)	
Recently upgraded connection to the motorway network (third lane and new extension of toll booth of Marina di Montemarciano)	
Awareness by the “general states” of the territory of the development potential of the logistics offer	
Financing and forthcoming construction of a rectified railway line in the vicinity of the north entrance to the station	

OPPORTUNITIES	THREATS
Potential logistics platform capable to work as a gateway for transnational flows	Loss of competitiveness of the port if not adequately strengthened and supported by an efficient rear port area and a smooth connection to the motorway network
Development of long distance intermodal rail traffic with strategic hubs in the port and in the interport	Inefficiency of the interport system with respect to logistics geographies
Railway with potential reserve capacity compared to the current situation for freight traffic	Overrun of the limits for suspended particulates, due to the presence of Port and to vehicles mainly powered by fossil fuels
Reorganization of Local Public Transport on a large scale, through the identification of a single managing company to be found through a regional tender.	

Figure 2 (Source: Documento preliminare al Piano di Sviluppo dell'Area vasta_2013)

Figure 3

3.3) Swot Analysis - Port of Ancona

STRENGHTS	WEAKNESS
Ancona can be reached by all means of transport (plane, train, car, bus)	The embarkation points are relatively far (2 km) from the ferry terminal
The train station is very close to the ferry terminal	The check-in and control procedure can be very slow
The port of Ancona is equipped with a logistics and boarding assistance service (Dorica Port Service)	There are no long-term parking lots in the immediate vicinity of the ferry terminal
A shuttle bus connects the railway station with the ferry terminal	The northbound exit from the port (TorretteAutostrada) is subject to traffic and delays due to traffic of trucks and tir
The port is close to the historic center of the city, its main services and points of interest	Traffic flows are highly seasonal
OPPORTUNITIES	**THREATS**
Increase the visibility of Ancona as a tourist destination and not exclusively as a transit town (cfr. https://www.cronacheancona.it/2021/04/19/anconadestinazione-turistica-creiamo-un-citybrand/296652/)	The Covid pandemic could further complicate checkin and boarding procedures
Increase the sells of other goods and ancillary services (Shopping, excursions, etc)	The commercial policies of low cost airlines
The growing sensitivity of users towards sustainable mobility	
The development and the diffusion of new technologies foster the creation and research of innovative and sustainable modes of transport.	

Figure 4

The above analysis is also consistent with the strategic plan of the city of Ancona "ANCONA 2025", the result of an articulated process of stakeholder engagement.

What emerged is that most of the desires of the citizens focus in the line that stands between land and sea, together with the main changement of the city and the most important planning effort already financed and activated. Five are the main “rooms” that are located along that line:

- Lungomare Nord
- From the Palombella to the Archi
- The Mole
- The pedestrian path from sea to sea
- Porto Antico and the ITI Waterfront T

Three topics characterize the multiple projects of the five rooms:

- sustainable mobility;
- urban regeneration;
- the new qualities of public spaces.

Figure 5

For further information, it is possible to consult the final document of the strategic plan at the following link:
https://www.comune.ancona.gov.it/strategicancona/www.strategicancona.it/wpcontent/uploads/2013/12/Documento-Finale-Piano-Strategico_def.pdf

4) Good practices in other harbour cities

With reference to the identification of best practices in other port cities, there are no particularly innovative initiatives related to the issues of connections and sustainable mobility in Italy.

There is a growing and widespread awareness of the issue regarding the environmental impact of vehicular traffic which, especially in high season, becomes a critical issue for the cities that host ports with important traffic of vheicles embarking and disembarking from ferries.

In Europe, on the other hand, the largest ports are working at innovative projects in terms of new technologies and environmental sustainability for several years.

The port of Antwerp stands out from this point of view having activated initiatives on three main axes :

1) Port mobility
2) Sustainability
3) Port of the future

PORT MOBILITY

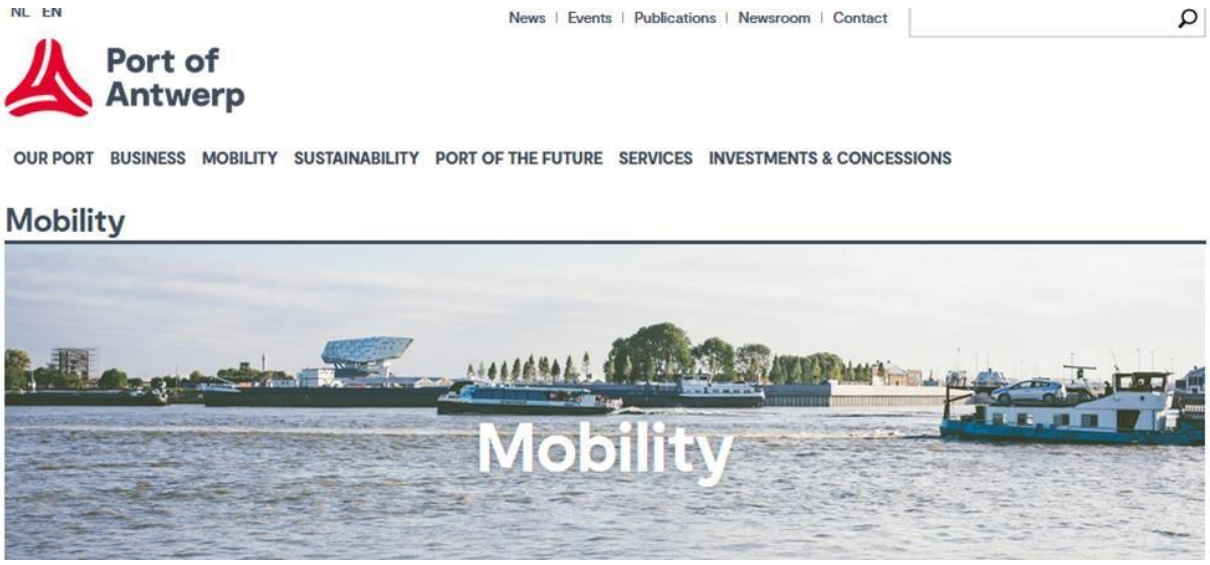


Figure 6

With reference to mobility and sustainability, Antwerp is working towards the development of innovative solutions and tools that can optimize transport and logistics both in the cargo sector and in the movements of citizens, port workers and ferry passengers.

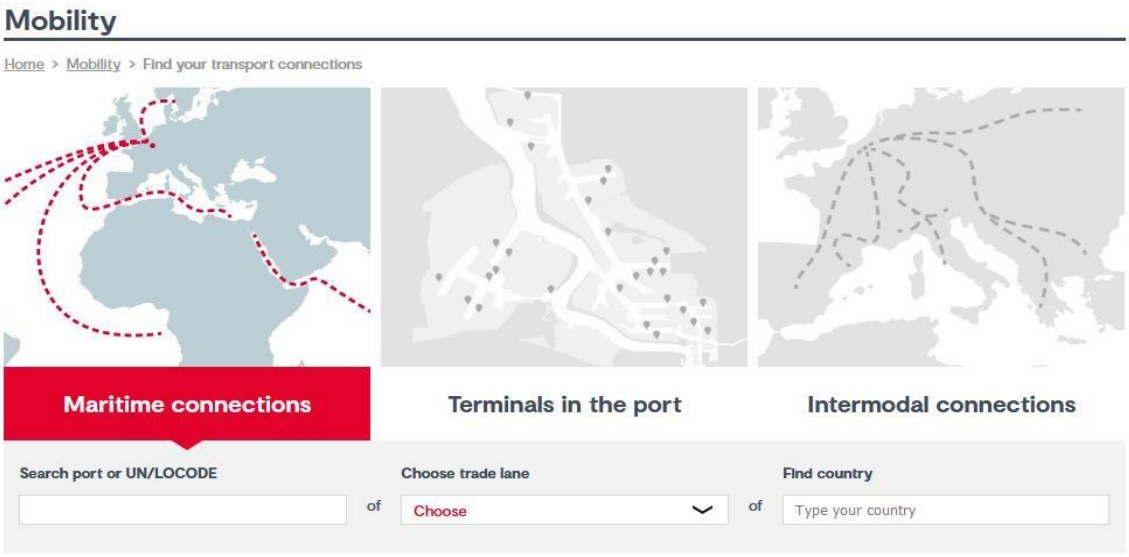


Figure 7

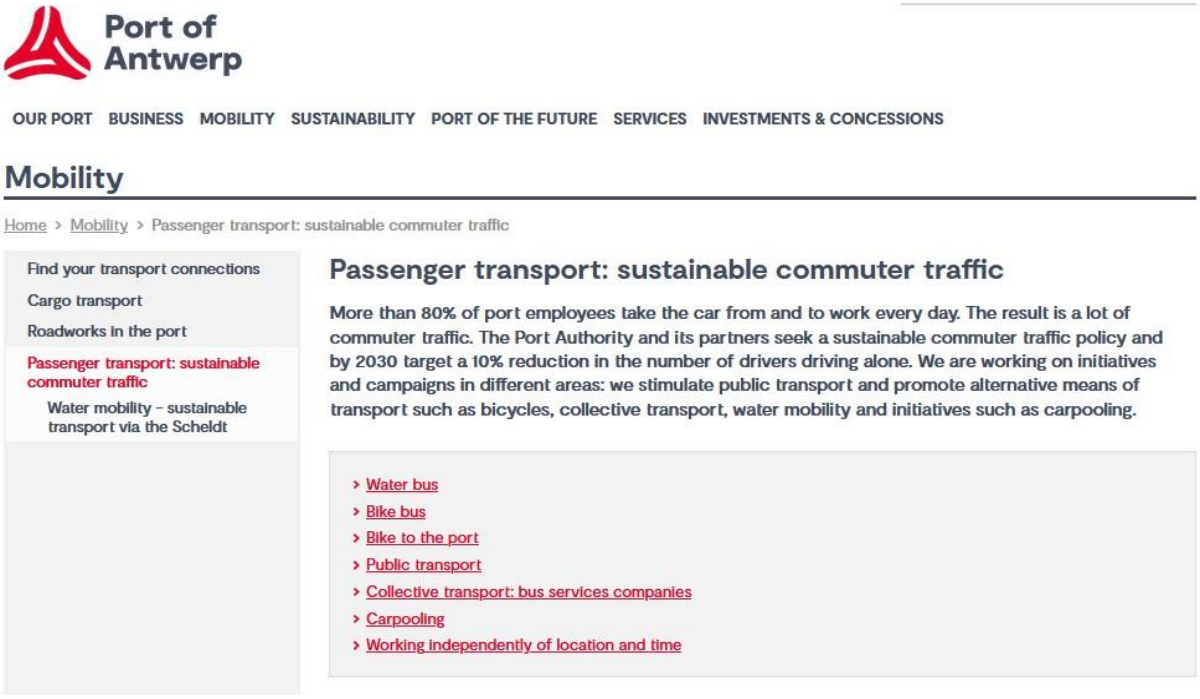


Figure 8

SUSTAINABILITY

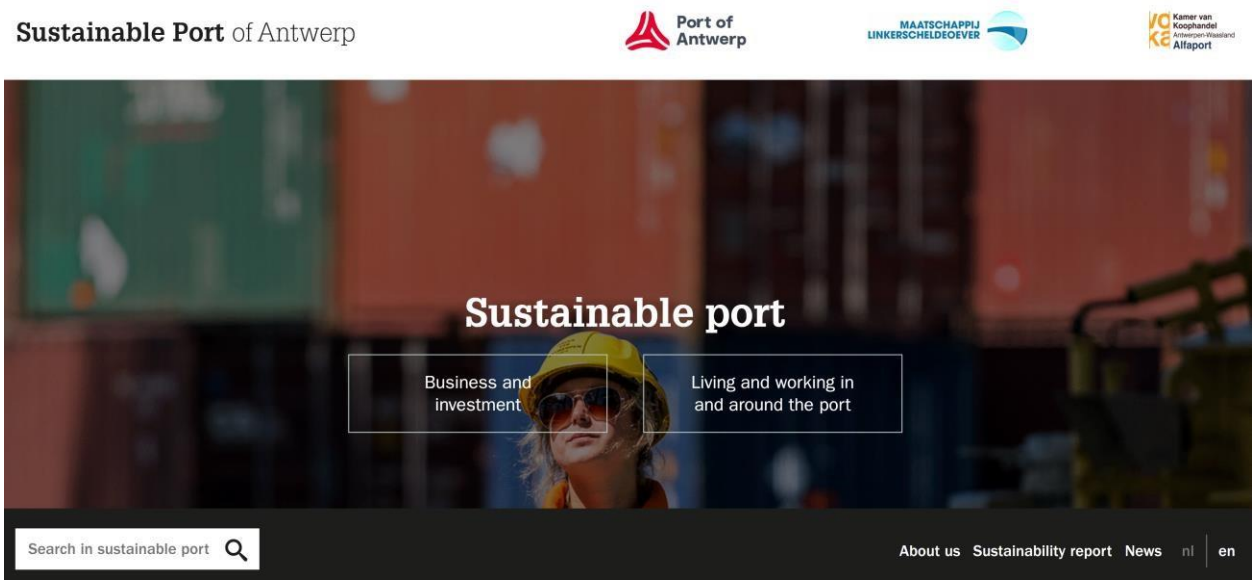


Figure 9

Building a sustainable port means building a harbor *in harmony with society and the environment in which the port operates. To achieve this goal, we are continuously pushing our boundaries with innovations that make our port greener, keep it accessible and lead the way in a digital world. By*

2030, we want goods to be transported in a more sustainable way, for example by making more use of rail, inland navigation and pipelines. We also want to achieve a transition to a circular and low-carbon economy. Along with our partners, we are pioneering towards 2030 (Source: https://www.portofantwerp.com/en/sustainability-2).

Sustainability and the SDGs, or the United Nations' development goals are the touchstone for what they do. Their sustainability policy and business plan are built around five core SDGs: health & welfare, work & economic growth, innovation, sustainable cities & communities and climate action. They form a guideline for the further development of the port. A strategic role is attributed to partnerships.

8. **Decent work and economic growth** (focus on maintaining leadership);

3. **Good health and well-being** (focus on improving health and well-being of all port employees);

11. **Sustainable cities and communities** (focus on investing on mobility, safety and environmental quality);

13. **Climate action** (focus on promoting the transition to a circular economy and investing in the energy transition. It is useful mentioning the collaboration with other frontrunners on ambitious projects around green hydrogen, CCUS and power-to-methanol, e.g. NextGen District for the creation of a new hub for circular economy.

9. **Industry, innovation and infrastructure** (focus on innovation as a lever towards a sustainable future for the port industry)

THE PORT OF THE FUTURE

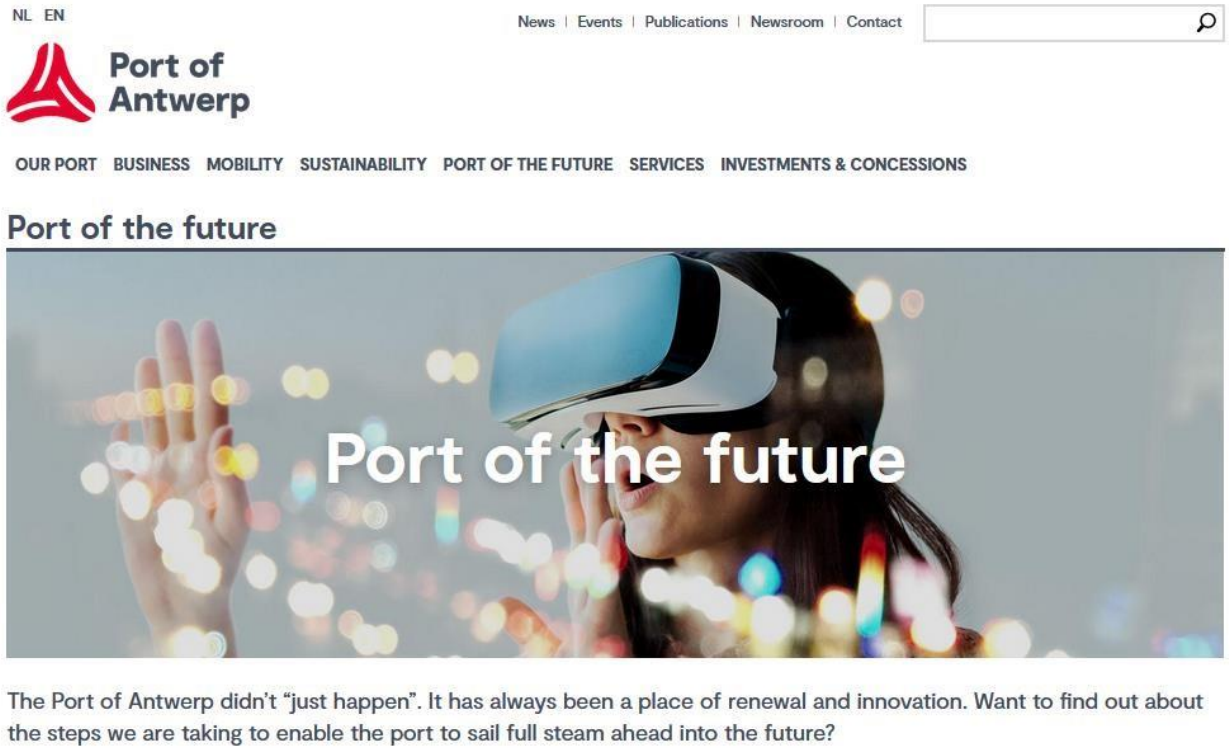


Figure 10

With reference to the Port of the future, Antwerp has since long time started the implementation of technologies such as **blockchain, augmented reality, the internet of things, artificial intelligence and machine learning**.

Noteworthy is the extensive use of over **600 intelligent cameras** which, through the automatic image recognition system are able to:

a) Optimize preventive maintenance and increase the frequency of inspections analysis of mobility: how many vehicles are in transit and what type of vehicles?
b) Increase security through additional monitoring and collection of additional information on traffic flows

One of the most innovative ports in Europe, in addition to that of Antwerp, is certainly that of **Rotterdam**.

Until the middle of last decade, Rotterdam was the largest port in the world. It has since slipped to 11th, overtaken in a heartbeat, and edged out off the top 10 by a rush of six Chinese ports, as well as Singapore, Busan, Hong Kong, and Dubai. Even so, Rotterdam

remains Europe's **preeminent maritime trading hub**, and **a focal point for the region's Industry 4.0 assault**. Its **key partnership for digital transformation** is with IBM, and Cisco by extension. Rotterdam wants to host autonomous ships by 2025-2030.

To achieve this, it is augmenting its 42-kilometre port area with sensors, software, and intelligence – with the objective to create a digital twin of the site's set-up and operations to mirror, track, and pre-pilot everything from shipping movements and infrastructure to weather and water depth. To these ends, IBM and Cisco have integrated their Watson IoT system and Kinetic IoT platform, respectively, to improve data processing and intelligence at the network edge, and enable a path to autonomous shipping and logistics. Edge and fog computing setups enable lower-latency alerts, and higher-bandwidth applications.

The Port of Rotterdam processes more than 140,000 ships every year. Coordinating the berthing of each vessel is complex; highly tuned environmental and navigational metrics can improve profitability for freight operators.

IBM and Cisco are already **collecting environmental data** at the port, including wind, visibility, and tidal information to discern the optimal conditions and timing for the berthing and passage of ships. They are also providing guidance on the clearance heights for ships, increasing capacity of ships based on clearance heights to increase the revenues generated by each ship entering the port.

The port of Rotterdam has also established a new R&D facility called the Rotterdam Additive Manufacturing LAB (RAMLAB) in the port's shipyards. This 3D printing facility has the will enable wider availability of certified shipping parts.

5) Benchmark analysis between port of Ancona and other Italian ports

With reference to the Italian situation, the ports of Civitavecchia, Genoa and Livorno for the importance of passenger traffic can be taken as a reference term for a possible comparison with the port of Ancona.

The evaluations of the services offered, based on online reviews on a scale of one to 5, although not completely reliable, are more or less aligned around values between 3.8 (Ancona) and and 4 (Genoa and Civitavecchia).

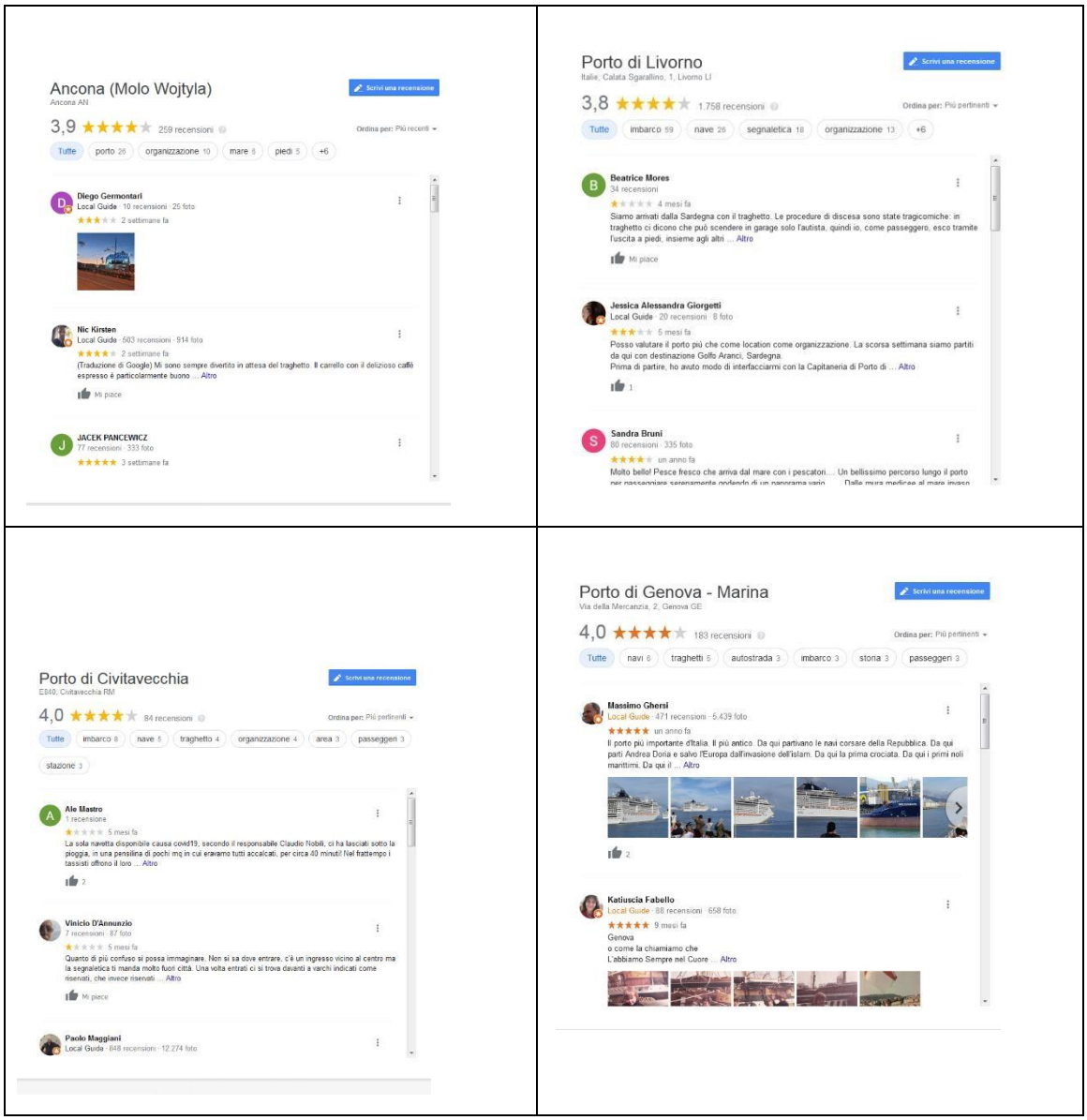


Figure 11

From a comparative analysis of physical and digital services, the port of Civitavecchia seems to stand out from the others. Also for Ancona, the port of Civitavecchia may be taken as a reference for what concerns:

- Breadth, depth and clarity of the information provided on the website (fig. 12)
- Information about transfers and mobility (fig.13)
- The possibility to reserve the parking directly from the website of the port (fig.14)
- Presence of Info Points inside the port (fig.15)
- Possibility to organize a tailor made journey, with useful information also about things to see, to do, itineraries, etc.

Figure 12

Figure 13

Figure 14

Figure 15

6) Intermodal exchange points and their criticalities

The main travelling hubs for passengers departing from the port of Ancona are: Raffaello Sanzio Airport, Ancona Railway Station, long stay parking lots, coach Parking.

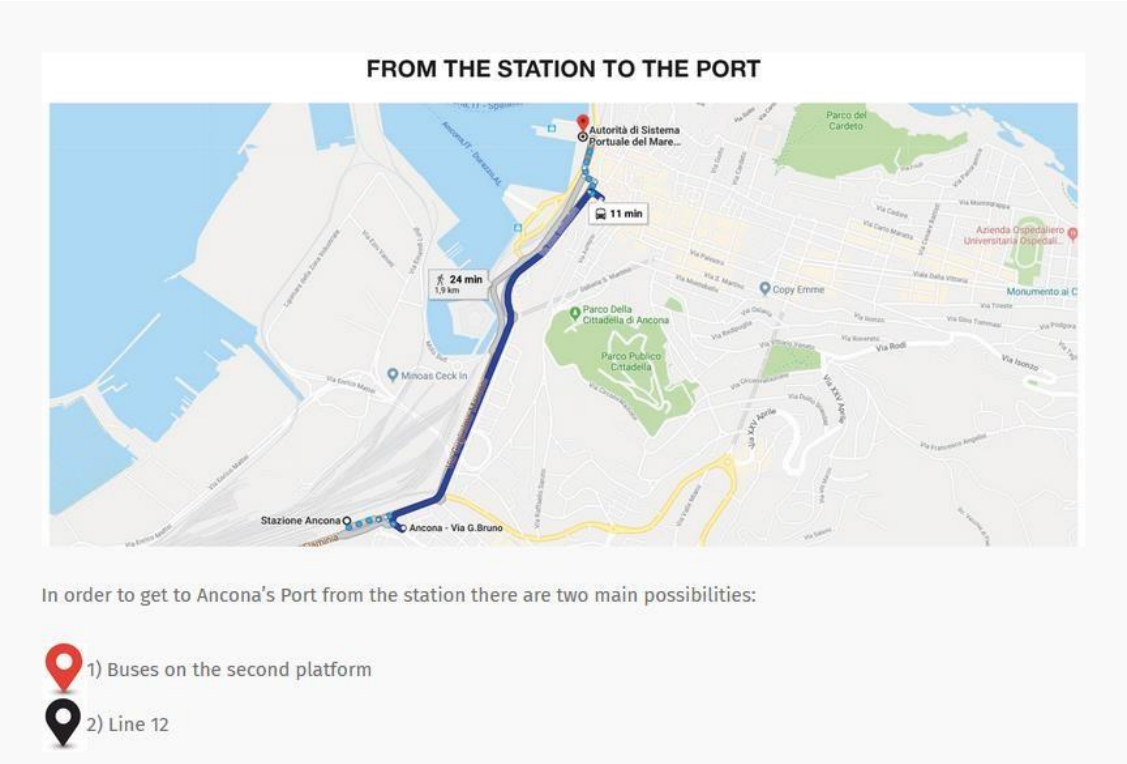
The Airport

The Marche Airport, also called Ancona-Falconara Airport is located 18 km from the city center of Ancona, more precisely in Castelferretti, in the municipality of Falconara Marittima. A shuttle guarantees, in about 30 minutes, the connection between the airport and Ancona center.

Criticalities: lack of on-site information on port-airport connections

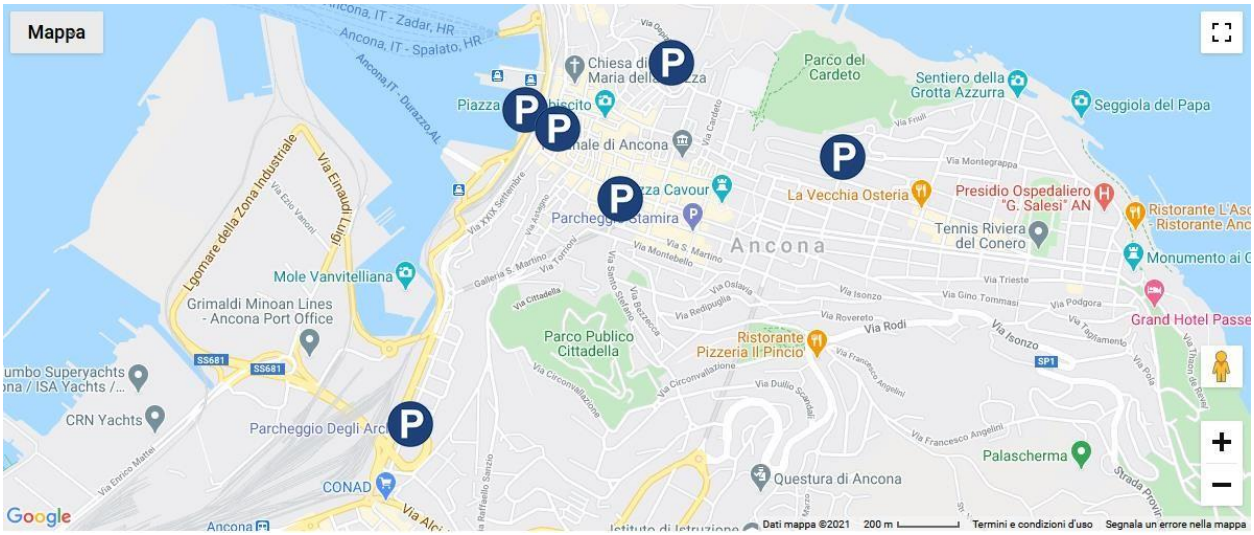
The Railway Station

The railway station is about 2 km from the Terminal. There is the bus line 12 linking the Central Railway Station to the Ancona Ferries check in, 20 minutes frequency. From Ancona Ferries check in to the embarking areas line 20. The service is free, with 25 minutes frequency.



Criticalities: Bus line 12 is active only during the high season. During the winter there's no direct connection between the railway station and the port.

Long stay parking lots



There are three long-term car parks generally used by passengers departing from Ancona:
Archi Parking, Traiano Parking and Cialdini Parking.

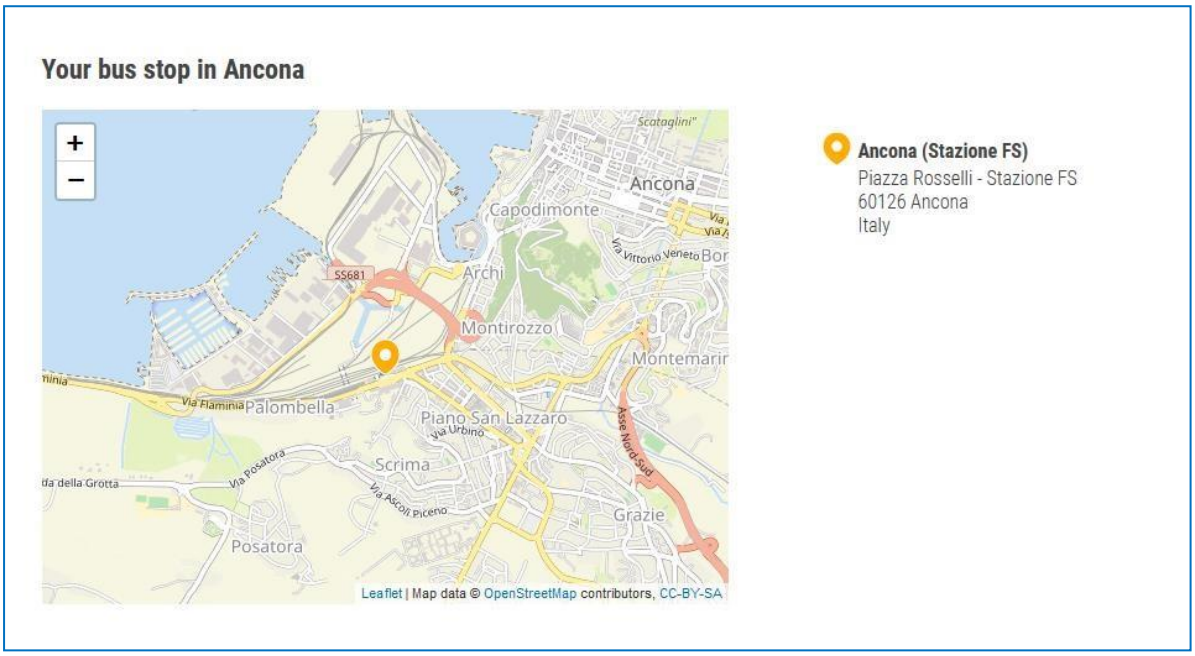
The availability of spaces in the three car parks can be considered sufficient because most of the departing passengers board their vehicle.

Criticalities:

a) Passengers who have to leave their car in a long-term car park are not always well informed about the procedure to follow

b) Only the parking lot “Archi” is connected by bus to the ferry terminal

Parking Bus Flixbus



The flixbus bus station is located in Piazza Rosselli in front of the railway station. It is quite convenient to reach the ferry terminal on foot or by bus

Criticalities:

a) Passengers do not always know whether to proceed on foot or by bus to reach the ferry terminal

Act. 3.2 Stakeholders analysis (Transport needs)

D 3.2.1 – BENCHMARK, TRANSPORT NEEDS, SUPPLIER'S ROLES

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Table of Contents

1. Introduction

This document is relevant to the activity 3.2 Stakeholders analysis (Transport needs).

The purpose of this document is to collect user needs based on selected use cases and needs survey. In that perspective, Brusutti has initially set, as a goal of its research, the analysis of the E-CHAIN survey results provided through questionnaire by the stakeholders operating in the Venice area. Even though a large number of suppliers for the Venice area has been contacted, only the response from the Croatian supplier FILS d.o.o. was received and processed, in addition to one provided by Brusutti itself. However, despite the low interest to take part in the query, Brusutti was still able to describe the port area through the direct knowledge of the key actors for public and private transport in the metropolitan area as well as through the information available on their websites.

2. The Port of Venice: figures and values

The Port of Venice is divided in two main areas: port of Marghera destined to commercial, logistics and industrial activities and port of Venice, developed mainly in area called Marittima including other minor berths. This area is mostly dedicated to cruise ships, hydrofoils and yachts passengers' related activities. In fact, thanks to 3.5 km of docks, the Marittima Station is intended to large cruise ships and can accommodate in its terminals up to ten ships at the same time.

Fig.1 Port of Venice

Fig.2 Areas Marittime Station Terminal and San Basilio

The areas of S. Marta and S. Basilio are entirely dedicated to the medium-sized cruise ships, mega yachts and fast ships while the area of Fusina is dedicated to ferries and provides 4 berths.

The cruise ships lines themselves represent a very substantial part of passenger traffic: in 2019 the passengers who stopped in Venice were 1,617,945

The following table shows the trend of previous cruise seasons:

ANNO	CROCIERE (TC)	PAX CROCIERE	FLUVIALI (TC)	PAX FLUVIALI	TRAGHETTI (TC)	PAX TRAGHETTI	ALISCAFI (TC)	PAX ALISCAFI	TOTALE TC	TOTALE PAX
2016	529	1.605.660	96	18.670	0	0	339	93.501	964	1.717.831
2015	521	1.582.481	89	18.561	0	0	297	85.564	907	1.686.606
2014	488	1.733.839	88	16.702	0	0	328	91.125	904	1.841.666
2013	548	1.815.823	130	26.498	213	138.648	334	92.984	1.225	2.073.953
2012	569	1.757.297	92	18.647	223	157.785	396	105.395	1.280	2.039.124

Fig. 3 Trend of previous seasons (source: http://www.vtp.it/azienda/statistiche/)

The companies entered the Port of Venice in 2019:

GRAND CIRCLE CRUISE LINE	Cruise
AIDA CRUISES	Cruise
AZAMARA CLUB CRUISES	Cruise
CELEBRITY CRUISES	Cruise
COMPAGNIE DES ILES DU PONANT	Cruise
COSTA CROCIERE	Cruise

CRYSTAL CRUISES	Cruise
CUNARD LINE	Cruise
FRED. OLSEN CRUISE LINES	Cruise
FTI CRUISES	Cruise
GRAND CIRCLE CRUISE LINE	Cruise
HAPAG-LLOYD KREUZFAHRTEN	Cruise
HOLLAND AMERICA LINE	Cruise
MAESTRAL WIND CRUISE SHIPPING INC	Cruise
MAJESTIC INTERNATIONAL CRUISES	Cruise
MANO MARITIME	Cruise
MARELLA CRUISES-TUI UK	Cruise
MONET CRUISES	Cruise
MSC CROCIERE	Cruise
NORWEGIAN CRUISE LINES	Cruise
OCEANIA CRUISES	Cruise
P & O CRUISES	Cruise
PHOENIX REISEN	Cruise
PRINCESS CRUISES	Cruise
PULLMANTUR CRUISES	Cruise
REDERIJ CLIPPER STAD AMSTERDAM	Cruise
REGENT SEVEN SEAS CRUISES	Cruise
ROYAL CARIBBEAN INTERNATIONAL	Cruise
SEA CLOUD CRUISES	Cruise
SEABOURN CRUISE LINE	Cruise
SILVERSEA CRUISES	Cruise
STAR CLIPPERS	Cruise
THE AEGEAN EXPERIENCE MARITIME	Cruise
VIKING OCEAN CRUISES	Cruise
WINDSTAR CRUISES	Cruise

CROISE EUROPE ALSACE CROISIERES	River

GRC GLOBAL RIVER CRUISES GMBH	River

ATLAS D.D.	Hydrofoils
KOMPAS D.O.O.	Hydrofoils
VENEZIA LINES LTD	Hydrofoils

3. Access to the Port, transport logistics and reference hub

Passengers can access the Maritime Station from the:

Venice Airport "MARCO POLO"

Venice's Marco Polo International Airport is only 13 km far from the lagoon city. Once landed, the passengers can reach the Port by the following means of transport:

- Land taxi (20 minutes journey).
- Water taxi (60 minutes journey).
- Public water buses and boats transportation (80 minutes journey) provided by the companies Actv and Alilaguna.
- Public bus transportation provided by the transport company ACTV. The busses reach the Piazzale Roma, very close to the Terminals (approx. 20 minutes) and from which the passengers can continue toward the Port by using the People Mover, an automated and elevated public monorail, that reaches the Cruise Terminal of Marittima in 3 minutes.

Treviso Airport "CANOVA"

-Land taxi transportation (japprox. 50 minutes journey).

- Commercial shuttle service dedicated to Ryanair passengers (shuttle bus) provided by the ATVO and BRUSUTTI companies, arriving to/ departing from Piazzale Roma, and from which the passengers can continue to the Port by using the People Mover (approx. 60 minutes journey).

Railway stations:

the **Mestre** railway station is around 10 km away from the City of Venice that can be reached by the following means of transport:

- Land taxi (approx.10 minutes journey).

- Public bus lines provided by the ACTV company that reach Piazzale Roma, very close to the Terminals (approx. 20 minutes) and from which the passengers can continue toward the Port by using the People Mover.

the **Venice** railways station – S.ta Lucia. In order to reach the Port, after exiting the railway station by the main entrance, the passengers have to turn right and walk toward the Ponte della Costituzione, that leads to Piazzale Roma (walking distance approx. 350 meters). From Piazzale Roma toward Port there are taxi services and People Mover Transport available to passengers.

Alternatively, after exiting the railways station, the passengers can take a water bus (vaporetto) that leads to Piazzale Roma (1 stop) and then take the People Mover or reach the Port by taxi.

Differently, the passengers can use the water taxi service directly from the railway station to the Cruise Terminal Marittima.

Piazzale Roma

Piazzale Roma is the gateway to the city of Venice, the last area accessible from the mainland by car. There is situated the central bus station for public urban and extra urban transport , the taxi station and several quarded parking lots, as well as number of sales / information points and one of two Brusutti's Ticket Points.

The Terminals can be reached by the following means:

– People Mover (3-minute course). This new mean of public transport, consisting of an elevated monorail, quarantees a continuous connections from 7.00 to 23.00 and allows passengers to reach Piazzale Roma from Terminal Station Marittima and vice versa in few minutes.There is a shuttle service by bus connecting terminals n.117, n.123, Isonzo 1 and 2 with the People Mover stop. - Land taxi (approx. 2 minutes journey)

Tronchetto

The Tronchetto is the secondary entrance to the city of Venice and it has a function of a coach station specifically forthe long-distance and tourist buses (e.g. the companies like Flixbus, Eurolines, OBB, Florentia Bus, Segesta Bus Center). Nearby, there are guarded parking lots and the second Brusutti Ticket Point.

- People Mover (3-minute course).

- Land taxi (approx. 2 – minute course)

4. Transport analysis for the pilot site in Venice

As already written, a large number of key actors were contacted in order to provide specific information regarding their internal organizational and ticketing system but the answers did not produce the expected results.

The cruise passengers transfers and displacement in the pilot site of Venice, due to its conformation, generally engage the public intermodal transports. In fact, the majority of passengers comes from the Venice international airport Marco Polo and from the Treviso airport Canova (linked to the low cost airline Ryanair flying from the United Kingdom or the Southern Italy).

Due to the particularity of the city of Venice, many cruise passengers include to their travel experience also a visit of the lagoon city and of the neighbouring attractions. Without their own means of transport, the cruise passengers are linked to the interconnected mobility.

There are also other passengers, mainly domestic tourists, that normally use their own transport means but due to the high parking costs in the port area and to the lack of free parking places during the high tourism season, they find more comfortable to travel by other means.

The main companies providing public and private transport services in the area of interest are **Actv, Atvo, Alilaguna**, that cover most of the individual passenger transfers and displacements between the hubs described above (AIRPORTS - FS STATIONS - P.LE ROME – TRONCHETTO). Even though the above listed companies did not answered to the E-CHAIN questionnaire, we were however able to analyse some aspects relevant to our purposes through their websites.

Actv (Azienda del Consorzio Trasporti Veneziano)

It is the municipal company providing the urban public transport and a part of the extra-urban transport for the province of Venice, with 2,687 employees (2018) and a turnover of € 233.5 millions(2018). Its business is connected to mobility and port transport and it is the main carrier between the city hubs performing its activities through the navigation network (water buses), the public land service (buses) and trams (trams and People Mover).
Aware of the impact of transport and port operations in terms of CO_2 emissions, as a part of the AVM Group (Azienda Veneziana della Mobilità , a company of the Municipality of Venice, holder of service contracts for Local Public Transport (TPL) throughout the municipal territory and the metropolitan city) , the ACTV Company has set for its activities and for all its employees the priority objectives aiming the safety and health of the people and the protection of the environment.
These objectives are reflected in the management principles laid down in the Company Safety, Health and Environment Policy such as the full compliance with current legislation (including any other provision signed by the Company), the reference legislation and company procedures on safety and environment; the use of means and materials that have characteristics in line with current safety and environmental legislation, promoting the green transport while maintaining market costs.

From a commercial point of view, the Company has a widespread travel ticket sales network, both physical sale and electronic ticketing, through its own sales points spread over the territory and/or through authorized external sellers.

The online purchases are available through the Company's website as well as through other multiple IT portals for the distribution of the "Venezia Unica City Pass" tickets (i.e. tourist time-limited travel cards that can be integrated with visits to museums and with other cultural activities) .

ATVO S.p.A. (Azienda Trasporti Veneto Orientale)

It is a public transport company operating in the metropolitan city of Venice and in some municipalities of the province of Treviso, with 467 employees (2019) and a turnover of € 45,303,000 (2019).
Its business is connected to mobility and port transport as the main link between the cities of Venice, San Donà di Piave and Treviso, as well as with the seaside resorts of Jesolo, Caorle, Cavallino-Treporti, Bibione, Lignano and other smaller towns of the Venetian hinterland. The company also carries out rental services of GT buses, it operates with school buses throughout the Sandonatese area and carries out other transports such as the connection with the airports (MARCO POLO - VENICE and CANOVA- TREVISO) by means of shuttle services to / from the city of Venice.

In order to achieve its environmental objectives, the ATVO S.p.A. has identified various guidelines such as the use of an Environmental Management System as a tool for containing and controlling aspects relating, for example, to the vehicular traffic containment or respect for the landscape. It is also used as a tool, in accordance with suppliers, customers and other interested parties, for the continuous research, implementation and development of real and common objectives related to **reduction of the environmental impact of all activities, products and services; prevention and consequent progressive containment of all business phenomena that directly or indirectly cause environmental impact and consumption of materials and energy; commitment to the continuous improvement of the management system to increase environmental performance.**

From a commercial point of view, there is a widespread travel tickets sales network, both physical sale and electronic ticketing, through the Atvo sale agencies and by authorized external ticket offices. The online purchases are available through the Company's website as well as through other multiple IT portals for the distribution of shuttle services from/to VENCIE- VENICE AIRPORT - TREVISO AIRPORT.

Alilaguna

Alilaguna is a company specialized in a scheduled public transport, performed in Venice by a private carrier through a navigation network connecting the terminals of the Marco Polo Airport and the Cruise Terminal in the center of Venice and covering through 4 lines the connection of Lido and Murano. Alilaguna develops its activities with the awareness that the achievement of its objectives must be wellmatched

with the safeguard of the environment and have to comply with regulations and legislation in force. Furthermore, the Alilaguna staff is required, as part of their duties, to contribute to safeguarding the environment, in compliance with legal provisions and company procedures. To this end, Alilaguna has experimented the use of the hybrid boat named "Liuto" operating within one of the most complex routes, such as the one along the Grand Canal known for a high number of stops and high traffic density, in order to collect essential data and locate problems this new type of vehicle may encounter. This is an important signal in a view of a more extensive use of sustainable mobility in order to safeguard the fragile ecosystem of the city of Venice.

From a commercial point of view, there is a widespread travel ticket network and services providing information on public transport and routs, private and shared transfers, on museums, tours and excursions, as well as a network of authorized sellers. The online purchases are available through the Company's website as well as through other multiple IT portals for the distribution of shuttle services from/to VENICE- VENICE AIRPORT.

5.Swot analysis of the pilot site regarding the intermodal transport in the port area

BRUSUTTI

Strengths:

- Historical authenticity of the port of Venice
- Attractiveness of the city and the surrounding area
- Peculiarities of the lagoon city

-Substantial revenues for the entire tourism sector and high number of activities derived from all collateral services

Weaknesses:

- Propensity towards mass tourism
- Lowering of interests and experiences
- Low levels of sustainability towards a fragile city
- Inability to manage tourist flows during seasonal peaks and daily peaks

Opportunities:

- Optimization of resources to support the distribution of flows
- Greater awareness and environmental sustainability and town area protection. - Differentiation of the maritime timetable

Threats:

- Inadequacy of means of transport for the distribution of cruise passengers
- Investments that is too expensive to be realized in a very long time

6. Genoa as a national benchmark

The port area of the city of **Genoa** was chosen as the national benchmark destination of intermodal hub for various reasons and for some common characteristics with the city of Venice: first of all, for the cultural and strategic proximity that the two maritime powers experienced in the history. Secondly, in both destinations the port area represents a vital part of the economy, both for what concerns the trade and circulation of goods, and for the huge arrival of tourists from cruise ships. In fact, in 2019, according to an analysis of Maritime Stations, Genoa has received a total of 3.5 million travelers who generated a direct and indirect impact of between 374 and 433 million Euros. The numbers concerning ferries that visit the port are also growing: + 89 thousand units more than in 2018, for a total of 2.17 million in 2019. Likewise, according to a study made by CLIA (Cruise Line International Association), the cruise ships in Venice generate a positive economic impact for Italy equal to 410 million Euros, creating more than 4 thousand stable jobs. This means that both destinations represent important carriers in the field of tourism at national level. As third point, both port cities represent strategic maritime and land-based hubs: Venice toward the east and Balkans and Genoa , towards the west, France and Spain. In addition, both cities share further common characteristics: the presence of the port, airport, strategic motorway connection, railway connection and public road transport, also from an international point of view. As fourth item, the inter-modality is identified in the new Strategic Transport Plan of Genoa as a key and innovative element to be developed in the port city. Lastly, the Liguria capital city is considered, as stated in the 15th report on the mobility of Italians in 2018, as a best practice in Italy for what concerns sustainable mobility. This

acquires even more importance, given that it is considered as a concrete goal to be pursued by city in the short term to reduce the gap with the other European cities.

Fig 4: Port of Genova

6.1. Tourist system within the Genoa port area

The city of Genoa and the seaport have been able, from a tourism point of view, to build their own system, well integrated within the city's tourist offer with focus on maritime culture and its traditions.

There can be found:

- the Aquarium of Genoa: built on the occasion of Expo in 1992, it is the largest aquarium in Europe. According to their report of August 2019, the Aquarium of Genoa is one of the main Italian cultural attractions, counting over million visitors every year and over 30 million visitors since its opening. In addition, the Aquarium of Genoa was ranked in 2018 on TripAdvisor in fifth place in the list of Top 10 of the most popular aquariums in the world with an average rating f 4/5 with over 17 thousand reviews.

- the **Galata Sea Museum**: according to a research published by Ligura Business Journal, in 2019 there were 240 thousand persons visiting the **Galata Sea Museum, Commenda di Prè, the Naval Museum of Pegli and the Lanterna of Genoa**. Another significant data concerns the visitors of Lanterna, a structure managed by the Mu.MA (Musei del Mare e della Navigazione) since March 2018: the attendance of the symbol of Genoa was 20 thousand visitors, in line with previous years, while the attendance of the Naval Museum of Pegli and the Commenda di Prè was 30 thousand visitors . The high number of visitors therefore confirms the social vocation of those facilities visited mostly by citizens.

- the **Genoa Port Center**: according to the facility's website "The Genoa Port Center is the only place in Italy where you can learn to know and understand the port of Genoa in a simple and funny way, by means of simulators and through interactive exhibits. The Genoa Port center, promoted as part of the project for the enhancement of the natural and cultural resources of Liguria (Axis 4 of the Por Fesr 20072013) by the Metropolitan City of Genoa (former Province) with support of the Port System Authority of the Western Ligurian Sea, Port Authority, Ancient Port of Genoa, University of Genoa including institutions, associations, categories of the maritime and port community, was created with intention to spread the port culture and in order the stimulate a dialogue between the port and the city ".

- the **Sauro submarine**: as integral part of the **Galata Open Air Museum**, the boat offers visitors the opportunity to get to know from a closer point of view the living conditions of sailors aboard a real submarine. Built in 1976 by Fincantieri for the Italian Navy and decommissioned in 2002, the Nazario Sauro submarine was donated to Mu.MA and it was exhibited in 2010, while remaining faithful to the original. Although built during the Cold War period, nowadays the submarine has the purpose such as knowledge and culture sharing.

- the **crane Eiffel**: linked as a monument of industrial archeology to the Ministry for Cultural Heritage and Activities , represents a clear example of the port activity in the past.

Lastly, it is necessary to make a careful analysis as regards the tourist services offered to 'passenger' tourists. It is indeed important to mention the high number of cruise passengers in transit (passengers who did not board or left the ship in Genoa) that is equal to 47% of the total passengers, according to the Maritime Stations analysis. In this context it is worth mentioning that in 2019 the agreement between ATP and MSC Cruises was signed for the transport of cruise passengers, especially within the port area where the high level of investments were made, in order to transform passenger terminals in more comfortable, modern and computerized area (the check-in procedures for embarkation, information) According to an ISNART analysis of 2014, the average score for the tourist information access and availability was 7.2 / 10, while the local transport was scored 7.4.

6.2. Inter-modality and innovative services in the port area of Genoa

In addition, the town offers innovative services and inter-modality regarding the port area

- **ERMES** Project: is aimed at studying various relationships that a port and logistics system can generate in terms of economic clusters and innovative services. It has also the objective of formulating strategies and proposals for actions or projects for the improvement of trade flows through the infrastructure system. The main focus is towards the **development of company clusters as well as research centers in the coastal are**as. The council member for the economic development Andrea Benveduti states that the project purpose is to approach the target analysis tool in a more innovative way: for the first time the project sets up the eco-cluster development, which means both economic and eco-friendly clusters.

The **VAMP-UP Project** form an infrastructural and inter modal transport perspective has made it possible to build up the railway system serving the port of Vado Ligure and the relative road connections. It also offers a smart railway gate able to read from the trains in transit and identify necessary data for handling operations and customs checks.

Fig. 5: Infrastructures realized in the framework of the VAMP-UP project- Port of Genoa

- The **E-Bridge project** instead aims to create the intangible infrastructure needed for the integrated management of the last railway mile, so that the entire process is fully usable when the Third Pass is activated. Particularly, with the aim of improving the interconnection between the port and the transport networks, it concerns the development of a web interface between the Port Community System (PCS) and the Integrated Circulation Platform ("PIC") of the Italian Rail Network (FS group), for the systematic sharing of information updated in real time and relating to railway connections between the ports of the Western Ligurian Sea port system and the reference inland terminals;
- The 5G network was also activated in the area of the ancient port. This has allowed a strong improvement in the control and management of access, as well as the virtualization of the Palazzo Rosso which has allowed the 360-degree mapping of the museum itinerary, improving its use for tourist purposes. This has made it possible, as defined by the municipality's website, to 'manage, regulate and make more efficient the brightness of the 5G connected street lamps and to intervene immediately in the event of malfunctions. The smart lighting system is based on the connection to the Ericsson IoT platform via 5G, to which an advanced **Smart Weather Environmental Monitoring** system is also connected. Through the installation of sensors, devices and probes connected to the 5G network, it is possible to monitor the air quality of the Porto Antico and be informed of any exceeding of predefined thresholds;

- And again, the discussion started at the beginning of 2020 between the mayor of the city and some Costa Cruises executives to introduce the use of **LNG (Liquefied Natural Gas)** in ports to reduce CO2 emissions and the pollution produced by numerous cruise ships.

- **"Send"** is also a concrete step to promote sustainable mobility. Send was born as an environmentally friendly delivery service in the historic city center and in the ZTL thanks to zero-emission vehicles.

Finally, the **Urban Sustainable Mobility Plan (SUMP)** defines the macro-objectives for sustainable mobility belonging to 4 areas of interest: Effectiveness and efficiency of the mobility system; Energy and environmental sustainability; Road mobility safety and socio-economic sustainability. The SUMP focuses on the functional integration of networks (MaaS) - in terms of complete integration between the network of power lines, the network of interchange parking lots and private traffic flows, and the "secondary" (adduction) transport public network - and on the tariff integration and transport offer provided by different subjects, ensured by the “Genovino” electronic payment system.

7. Barcelona as an international benchmark

The city of Barcelona was identified as the international benchmark destination. This choice is justified by several aspects. Firstly, the Catalan city has a similar situation to Venice in terms of tourist arrivals and presences. Both cities are usually identified and studied as destinations that suffer overcrowding or overtourism, with residents who sometimes show their intolerance. For example, according to data from the European Data Journalism Network, in 1990, two years before the famous Olympic games, the city of Barcelona welcomed 1.7 million tourists but in 2017 that number jumped to 32 million, that is almost 20 times the actual population. In this context, the port represents an important logistics infrastructure both for the movement of goods and for the arrival of tourists, especially as a result of the large number of cruise ships that dock. In 2018 there were over 2.5 million people and for this reason, in fact, the Mayor Ada Colau started in 2019 a strong campaign towards the decrease of cruise ships arrivals in the port, especially to improve the level of environmental sustainability in the city and reduce the problem of a “hit and run” crowding. In addition, the city hosts, such as Venice do, an important port, as well as the airport, representing a strategic hub for sea and land connections to Europe.

Furthermore, the new urban mobility plan, presented in 2019 and valid until 2024, identifies sustainability and the need to continue the process of urban transformation (already started with the previous plan in

2013) as a fundamental step for growth. Lastly, the aforementioned ISNART 2014 research identifies the port of Barcelona as a best practice in terms of the quality and availability of information useful for tourists , for example on how to move inside the city or info's regarding the intermodal hubs. In addition, the Port Barcelona and in particular the Port Vell became, as a part of the city, a place of territorial animation, giving thus a new life to the ancient port.

Fig. 6: Port of Barcelona

7. 1 Innovative sustainable and multimodal mobility services in Barcelona

The city is developing new solutions and planning various innovative and intermodal services within the port area such as:

- within the **BClink project** : the city is involved in the activities **of the MOS for the future** project, partly funded by the European Commission in 2017, aiming at strengthening the relationships of the logistic chains of the ports of Barcelona and Civitavecchia and in the activities of **the Escola Europea Intermodal Transport** project aimed at facilitating the exchange of innovative ideas for sustainable management of ports and inter-modality. In 2019, the Port System Authority (AdSP) of the Central Northern Tyrrhenian Sea and the Port Authority of Barcelona signed a new memorandum of understanding aimed at creating an intermodal corridor that can unite Spain to the Balkans;
- within the **European project Trails**: th city of Barcelona cooperates here with the French city Saint Charles for the creation of an Observatory of intermodal transport costs. This will be used to integrating information on logistics costs, both those published by Cimalsa once a year and those relating to transport on tires published by the Catalan Territories and Sustainability Department.

The aim is to create transparency on the costs of multimodal operations but also to introduce into the system a new multimodal transport operators.

- the new **urban mobility plan**, published in 2019 by the city council, aims to complete the mobility transformation process with a view to the sustainable development of the area. It is based on the promotion of a mobility that is safe, healthy (especially by increasing pedestrian and cycling spaces), sustainable (favoring intermodality), well-balanced (favoring access to public transport by the weaker sectors of the population) and intelligent (favoring shared transport and integrating technology for the use of less polluting transport systems as well as the use of IT means for transport payments and intermodality). From this point of view, it is important to emphasize that the local community is involved in the strategic definition, through 4 public physical and online meetings. In addition, the budget of the Barcelona new mobility plan of 4.4 millions Euros includes the creation of 21 km long cycle paths, 17 interventions on bus lanes to improve the services and 12 km construction of pedestrian paths.

- the new strategy **Supermanzana Barcelona,** aims to transform streets into the spaces for the benefit of the local community. The goal is therefore to promote a healthier and greener public space that will facilitates human relationships. In fact, there have been identified several 'green axes' , where the cars from the roads will be eliminated, with aim to returned pedestrian and cycle paths to the citizens. In addition, this transformation will also allow the new uses of squares free of cars at their car - free intersections. Finally, the heavy traffic is planned to be redirected and absorbed by a new traffic circulation plan resulting from the revision of the internal routes within each area the city is divided on.

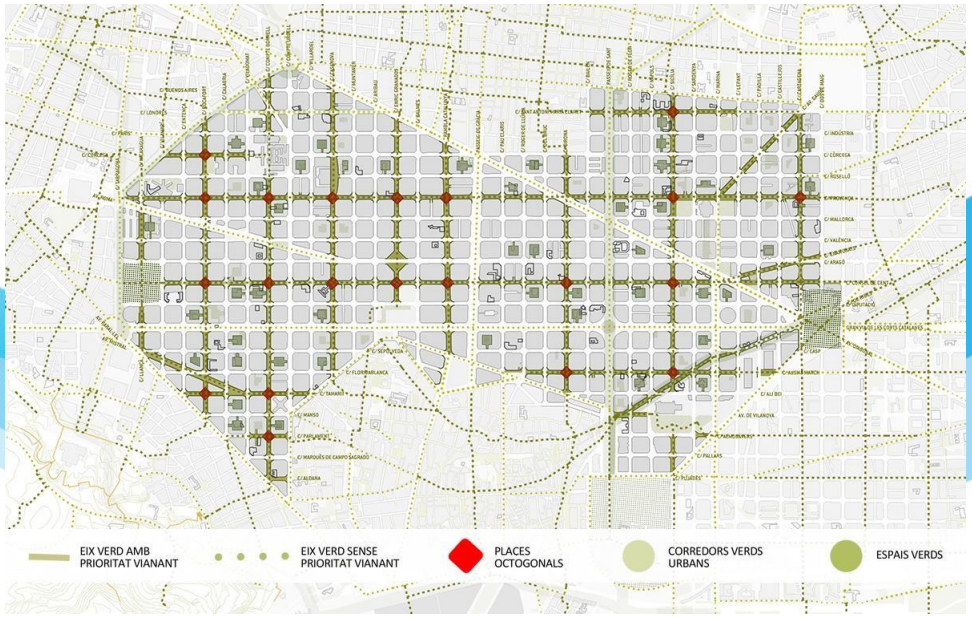

Fig. 7 Urban green spaces identified within the project Supermanza Barcelona

It is also worth mentioning the labor mobility agreement through a public-private partnership between the municipality and the private-sector companies. The main objectives are: reduce traffic congestion, improve public transportation, promote multi-modal shared mobility, increase community awareness of sustainable mobility.

Fig.8. Reference Model - Barcelona's Green Transition

From the perspective of community engagement, the project **"Roadmap Towards Technological Sovereignty"** sparks our interest. The project aims to create an open source network where all the information concerning both citizens and public administration will converge. On one hand, the main purpose is to guarantee citizens' fundamental right to data protection. On the other hand, to provide public access to information held by public authorities. Within this ongoing project, citizens are invited to share useful information to improve the quality of their life and the environment of their city. It represents a challenge for everyone but mainly one of the first experiment in online participatory democracy within the digital era.

From a tourism point of view, it is worth noting that Barcelona offers various information services through innovation hubs designed to improve the communication and support the tourism sector, expecially within the port area of the city, which can be considered as an important transit area for millions of people every year, as previously mentioned Among other services, such as passenger walkways, belt conveyors for luggage transport, currency exchange services, duty-free shops, gift shops, bars and restaurants, the

Port Terminal A provides also an info point that offers advice and assistance for travelers. What is more, the area provides services and facilities for passengers with reduced mobility.

8. Other best practice for national and international ports

This paragraph aims to present other best practices and projects that characterize the international port landscape. In addition, it aims to define the main trends that will shape the panorama of port cities. Therefore, the main characteristics identified also by the **Docks the Future** project - funded by the European Commission – are: the environmental issue and sustainable development, the role of innovative and progressive infrastructures in transforming abandoned areas in order to revitalize the territory and the community, the respect for environment and both the structural and service relationships between ports and cities, the digital transformation of services along the port area, the safety issue .

Some other best practices among topics previously discussed:

- In 2015 at the United Nations climate change conference **Stockholm** was awarded the best sustainable urban development project within the sustainable communities category thanks to **the regeneration of the Royal Seaport** industrial site in a residential area on a human scale that shares the same characteristics of an inner neighborhood: the development of habitable houses (+12,000 new homes), businesses and factories (+35,000 jobs), strategic public and port transport infrastructures. The new area is designed to be the link between north and south of the Royal National Park, thus contributing to the preservation of local biodiversity. Other benefits include less intensive use of resources, the growth of 'green' and IT jobs and better community cohesion through the creation of networks, project groups and resident associations, as well as the proximity of 'green' facilities. The objectives identified by the project are very clear and ambitious: to reduce carbon dioxide emissions below 1.5 tons per person by 2020; have a city without fossil fuels by 2030 and create a district that can mitigate the phenomenon of rising temperatures and sea levels (WUPEN data).

- As already mentioned, digitization is a strategic element. **5G** in particular, as previously indicated, is another key technology. **Livorno**, in this context, represents a best practice as presented in the newspaper "La Repubblica", enabling services such as: 'advanced video surveillance and crisis management with biometric recognition for security forces and health personnel, buoys equipped with devices and waterproof sensors for environmental monitoring in the port area. Furthermore, there are remotely controlled cranes for loading and unloading goods, systems for real-time tracking of logistical operations and massive exchanges of information between various infrastructures.

- 5G is also paving the way for other technologies, with the flexible and fast network able to work in tandem with the **Internet of Things (IoT)**. IoT is a means of connecting physical objects and for ports and terminals, it means that equipment can transfer data through sensor technology and make daily operations independent, automated and efficient. Companies such as ABB are already investing into sensors - a movement that has applications for the container shipping industry beyond the daily operations of ports and terminals. Mitsui O.S.K. Lines (MOL), a carrier that has invested heavily in

innovative technologies, has tested a container tracking management system that uses optical sensors to detect changes in conditions, including whether or not the container is opened by an unauthorized party.

- Other cities have focused instead on making the tourist port as one of the very first images to offer to visitors, also to open up to cruise traffic. For instance, **Copenhagen** with the construction of the **Cultural Center**, quoting the magazine Decor, 'envisages a series of pyramidal structures which, through light plays and full and empty shapes, interact with water in a game of reflections. Water is the main actor of the project through terraced pools that reflect lights and open onto the surrounding landscape. Born in the context of the redevelopment of the Paper Island area, initiated by COBE Architects in 2016, the cultural center inspires its pyramids and inverted cones from the structures designed by COBE, while paying homage to tradition with the exposed bricks of the external cladding. With its 5000 square meters, the center will offer areas open to the public, a commercial and residential area, and cultural spaces for exhibitions and entertainment '.

- **Rotterdam**, on the other hand, aims to implement a project that will **allow zero-emission hydrogenpowered trucks** to leave the docks along the roads of the Netherlands and Germany in 2025. The project with other private partners such as Iveco, one of the largest in Europe for the development of hydrogen trucks and related infrastructures, it aims to improve air quality through the reduction of CO2 emissions by approximately 100,000 tons per year from trucks by every 110 million km traveled. Meanwhile, the port has already implemented the use of **a ground-based drone** that delivers **parcels to merchant ships**, as a pilot project to determine whether this delivery method can improve the quality and efficiency of transport. With highly congested roads and seas, drones have the potential to increase efficiency, as well as reduce emissions, costs and waste. In addition, the Authority has also launched another revolutionary pilot project: the **management and release of containers with a simple click**. In fact, the project rotates around a new **Blockchain application** called **Secure Container Release**, which "replaces the 'old' PIN code with a digital signal, minimizing the possibility of fraud. To conclude, the city has also developed an integrated tourist system within the port area: allowing boat trips for an innovative visit to the port as well as the organization of events for visiting boats and water activities.

- On the **island of Papeete in French Polynesia**, the port authority has launched **Ci5**, an innovative and unique system within the entire port area for goods management in order to facilitate bureaucracy and speed up all operations by having a single IT management.

The ports, as the point connecting land and sea, are becoming mega-hubs of modal distribution that support their customers by promoting seamless trade and enabling highly efficient processes for the cargo-handling and passenger traffic.

BRUSUTTI

D 3.2.1 – Benchmark, transport needs & suppliers' roles

Activity 3.2 – Stakeholders analysis

March, 2021 – Final Version

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DISCLAIMER

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TABLE OF CONTENTS

ACRONYMS / ABBREVIATIONS

ACRONYM	DEFINITION
SoA	State of the Art
PP	Project partners
PT	Project Team
TC	Technical task coordinator
WP	Work package
IT	Information Technologies

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1. INTRODUCTION

1.1 PURPOSE OF THE DOCUMENT

This document is relevant to the activity 3.2 Stakeholders analysis (Transport needs) of E-CHAIN project - Enhanced Connectivity and Harmonization of data for the Adriatic Intermodal Network.

This task collects user needs based on selected use cases and needs survey. Survey will include questionnaires, telephone and face to face interviews. Workshop will be conducted both within the consortium and with potential stakeholders to detail the initial range of services and the individual stakeholder requirements. Requirements gathered will form an early draft services document which will provide the basis for a preliminary analysis, subsequent and continued liaison will be conducted to ensure the output is appropriate for development and service commissioning.

A market analysis of the CB local transport systems indicating the points of strengths and weaknesses of each territory (SWOT Analysis) will be included in this activity. This phase envisages strong interaction between public authorities involved and exchanging of information necessary to analyse the implementation cases.

1.2 WORKING PRINCIPLE

The task of this document is the collection of requirements gathered from identified stakeholders and transport needs according to the current situation and the future plans. Transport needs will refer on one hand to commercial/organizational activity in the port area for example supporting travellers for check-in and for boarding operations; on the other hand, mobility management around the port area at touristic level for those travellers are waiting the transfer means or for visit the worth areas including rental car with driver for private guided tours for cruisers.

Early on, it was decided that the focus is going to be placed on Croatian ports of national significance with ephasis on the passenger traffic. This is the reason why Port of Ploče is excluded from this analyysis, as the passenger traffic in that port is of marginal significance.

The goal of research is to to compare services and needs using harmonized methodology, but also in light of future development of these ports until year 2030.

The main source of data are the questionnaires filled by the stakeholders present in the area and conducted interviews. Unfortunately for different reasons, and due mostly to COVID-19 pandemic, not all the stakeholders from the list have provided adequate input, so a significant quantity of information was gathered using public sources. Croatian traffic strategy for the ongoing period proved to be of large significance for this topic.

As a part of previous acitivities, within D3.1.1 – SoA Master List, stakeholders involved in passenger traffic in relation to PP5 Jadrolinija have been identified and invited to fill online project questionnaire using Google Forms address:

https://docs.google.com/forms/d/1Gu4_S9e9PzVNI3Ar2On9zOx1wRag5dDgTkxhliuOvgg/viewform?edit_requested=true

As some of the stakeholders were not willing to fill the questionnaire, they were called using phone and Ms Teams conferencing tools, and the responses were gathered and entered into the Google survey tool.

Act 3.2 QUESTIONNAIRE

The questionnaire is designed as an interview conducted by the project partner with its stakeholders and is relevant to the activities from WP3. It consists of several sets of questions, each of which has the task of gathering different information:

Part 1: Questionnaire desctiption
Part 2 - identification data about the partner and the person conducting the interview,
Part 3 - stakeholder identification data
Part 4 - the relevance of the stakeholder and his interest in participating in the project *Part 5* - the current state of the level of equipment and stakeholder integration

Previously identified stakeholders that were approached to participate in the survey are:

1. Cammeo franšiza Llc - Transport services
2. Hrvatske autoceste jsc. - Transport services
3. Rijeka Plus Llc - Parking services
4. Port of Rijeka Authority - Public Authority
5. HŽ Passenger Transport LLc - Transport services
6. Rijeka Airport - Transport services
7. Primorsko-Goranska County - Regional public authorities

8. Tourist Board of Rijeka - Tourist agency
9. Tourist Board of Primorsko-Goranska County - Tourist agency
10. Arriva Hrvatska Llc - Transport services
11. Autotrolej Llc. - Transport services
12. Jadroagent jsc. - Transport services
13. Transagent Rail LLc. - Transport services
14. Bolt Technology OU - Transport services
15. Croatian Chamber of Economy - Regional public authorities
16. The Association of Ship Brokers and Agents of Croatia (ASBAC) - Professional association

Altogether, X responses have been gathered and considered as a part of the transport needs benchmark for PP5, Jadrolinija jsc.

2. BACKGROUND INFORMATION

E-CHAIN (Enhanced Connectivity and Harmonization of data for the Adriatic Intermodal Network) main objective is to enhance connectivity and harmonization of data for the Adriatic Intermodal Network, through the realization of a modular integrated software (E-CHAIN platform) for the management of intermodal transport services in port areas for passenger transport. To enhance the current situation, E-CHAIN will focus on providing new services such as an improved Port multimodal info mobility system for the passengers, a ticketing system integrated with other transport modes, an advanced touristic co-marketing tool for the operators. These services will be designed and deployed in the selected pilot sites (Ancona, Split and Venice). A Business model suited to adapt the technology developed in the three applicative contexts will be created and specific needs will be taken into account.

The aim of WP3 is to design platform and services and to prepare the E-CHAIN services for deployment in the pilot sites (Ancona, Split and Venice).

The specific objectives of this WP are to:

- Establish the requirements and specifications for E-CHAIN services and for integration with existing services/systems
- Create a detailed reference architecture that complies with relevant standards and best practices
- Verify adapted services against the requirements and specifications before developing for pilot sites to WP4

3. 1ST BENCHMARK: PORT OF RIJEKA

Rijeka, as a TEN-T core port, is the Republic of Croatia's largest international deep sea cargo port, located in the Northern Adriatic. It serves as a gateway port to the Republic of Croatia and as main transit port to Slovak Republic, Czech Republic, Hungary and the Republic of Serbia. The Port of Rijeka handles primarily containers, liquid bulk, dry bulk, livestock and general cargo. Rijeka's cruise traffic is limited and passenger traffic consists mostly of local passengers. The

port's passenger traffic is not to be compared to the amounts of the country's "pure" passenger ports; Zadar, Split and Šibenik. The port is well connected through railway and highway road connections and is located on the TEN-T Mediterranean corridor, while it is also connected to an international pipeline system for crude oil.

3.1 Description of terminals

The port of Rijeka is spread across five main port basins. Containers and general cargo are handled in the Rijeka and Sušak basins, sharing the coastline with the city of Rijeka. The dry bulk terminal in the Bakar basin, the liquid bulk terminal in the Omišalj basin on Krk island as well as the livestock and timber terminals in the Raša basin on Istria are located away from the city interface. Currently, the main capacity constraints related to these terminals are associated with warehousing and storage facilities for general cargo in the Rijeka basin.

3.2 Traffic

Container traffic has shown a nearly 9% aggregated growth rate since 2006, with total throughput totalling 300,000 TEU in 2020. Other than containers, the port handled 13,6 million tons of cargo in 2020. Dry bulk throughput, however, is more than 25% below pre-crisis levels. Bulk cargo, in particular, has shown a sharp decline while general cargo and wood have increased on average by 3.5 and 5.5%, respectively, since 2006. Liquid bulk cargo has shown an increase and totalled nearly 8.1 million tons in 2020. The port of Rijeka's relatively meagre role in the national cruise and ferry market is reflected in its steadily declining number of passengers. In 2015, just over 150,000 passengers called at the port of Rijeka compared to nearly 225,000 in 2006, and just 81,000 in 2020. compared to pre-covid 133,000 in 2019.

3.3 Competition

Although Rijeka has a strong and strategic position for transit to Eastern Europe, the port of Rijeka faces stiff competition from the ports of Koper, Trieste and Venice, the main ports in the NAPA region. While being the smallest of the four NAPA ports in absolute numbers, Rijeka has outperformed its northern Adriatic competitors in terms of average growth since 2011 by nearly 1.5%-points. The Port of Rijeka has a 9.7% market share in the NAPA range. The port of Koper has a stronger foothold in Austria than Rijeka while Rijeka serves a larger share of the Hungarian market. In the dry bulk market, Rijeka faces especially strong competition from

Venice and Koper, who together possess nearly 80% of the NAPA market share. Koper and Rijeka both serve the Austrian market, one of Europe's main steel markets. Koper, however, has a far superior position having exported 3 million tons of iron ore and coal to Austria, six times as much as Rijeka.

3.4 Financial performance and forecast

The Port of Rijeka Authority has shown a steady increase in operating income since 2012. An increase from 62 million to 84 million Kuna is largely attributable to growing sales revenues and a new concession agreement between the port authority and Luka Rijeka, the main concessionaire. However, the port authority has shown only a marginal absolute decrease in the donations it receives from the national budget. Indeed, removing the donations shows that in 2015 the port authority still made a loss of over 5 million Kuna compared to a 11.5 million profit including the donations. Nevertheless, this is still a significant improvement compared to the 20 million Kuna loss incurred just three years earlier and points to steadily improving financial health.

Cargo traffic: It is recommended for the port of Rijeka to strive for a role as European cargo gateway and transit port, functioning as a point of entry and exit for Croatian overseas trade and the overseas trade of countries in the Central European hinterland, including, Hungary, Bosnia and Herzegovina, Serbia, Austria, Czech Republic, Slovakia and even the South of Poland and the South of Germany. The port of Rijeka's first priority should be to aim for a position as international cargo gateway and transit port.

Domestic passenger traffic: It is recommended for the port of Rijeka to maintain its current status with regards to passenger traffic. This implies that local passenger traffic between Rijeka and the islands of Rab and Pag will continue to be serviced from the port, as long as demand exists. Domestic passenger traffic will continue to have a secondary priority in the port of Rijeka.

International passenger traffic: International passenger traffic is not considered as priority activity for the port of Rijeka.

Cruise traffic: It is recommended for the port Rijeka to aim for a position as modest cruise port, in which the cruise business is considered as a secondary priority.

Passenger traffic	

Domestic traffic			The port of Rijeka should aim to maintain its current function in the passenger traffic to Rab and Pag, if the market demands so.	Domestic passenger traffic will continue to be handled at the passenger terminal in the Rijeka basin.	It is not expected that substantial growth will take place in this traffic segment.
International traffic			The port of Rijeka should not aim to be a port for handling international passenger traffic.	N/A	N/A
Cruise traffic			Although it is to be seen as a secondary priority, the port Rijeka should aim to be a modest cruise destination.	Cruise traffic is foreseen to be handled at the newly constructed passenger terminal. Smaller cruise ships can be handled on the inside of the breakwater, while larger vessels will need to be handled at either the container terminal or a new pier which is to be build.	The growth potential should be captured through: - Increased marketing of Rijeka has cruise destination. - Potentially, a new cruise berth should be constructed, in order to cater for larger cruise vessels. However, the market potential would have to be thoroughly researched and committed before building the berth(s).

Position in National Ports System: Within the wider national ports system, the port of Rijeka will continue its function as main Croatian gateway port, while it will expand its captive hinterland into the Central European region, especially driven by improvements in rail connectivity and rail operations.

- *City-Port Relation*: The port of Rijeka has historically been developed within the limits of the city centre and close interrelations still exists. Within the timeframe of this National Development Plan (up to 2030), the port of Rijeka will continue to be located in basins of Rijeka, Susak, Rasa, Bakar and Omisalj, at least until the concessions in these areas have expired (2042). The complex city-port interface between the city of Rijeka and the port, urges the Port Authority, the City Council and the Ministry of Sea, Transport and Infrastructure to find an alternative for the Rijeka city basin location after 2042.

- *Port Development towards 2030 and beyond:* Within the timeframe of the current National Development Plan, port development in the port of Rijeka, will be driven by superstructure and operational improvements carried out by concessionaires. Based on the traffic forecast and capacity benchmark, it is concluded that no major infrastructural investments on quays are required after Zagreb Pier has been completed. The emphasis will be focused on improving warehouse facilities and improving the hinterland connections. In the period after the current concessions have expired, the port of Rijeka could start the transition of Rijeka basin activities towards an alternative location. The feasibility for such an alternative location is to be investigated in detail. Development plan chart for the port is shown in Figure 1 on the next page.

- *Institutional setting:* As a result of port reform in the 1990s, the Port Authority of Rijeka currently acts as a landlord port authority, managing the port that is operated by the port's concessionaires. In the meantime, it is time for the Port Authority to work towards the next steps in port reform, specifically aiming to become a commercialized landlord port authority, with a long term aim to become a corporatized (or even privatised) landlord port authority.

- *Financial Self-Sustainability:* As part of the Port Authority's transition towards commercialization and corporatization, financial self-sustainability will quickly become one of the most relevant objectives for the Port Authority. As a result of the commercialization approach and increasing traffic, the Port Authority will have to aim to be financially independent from the national government, especially when it comes to repayment of the outstanding loans. It also implies that future capital investments, that may need additional loans, can only be implemented if the repayment of the new loan fits within the financial profile of the Port Authority. For future loans, financing should be organized preferably through the private sector and not through national government budgets, unless clear economic benefits exist.

- *Green Port Concept:* To increase focus on the environment and sustainability, the Port of Rijeka should aim to become a "green" port. The focus should be on continuation of implementing port-specific environmental management standards (PERS) which are promoted by the European Sea Ports Organisation (ESPO). The port should also introduce an incentive scheme to promote the low sulphur emissions by shipping lines. Further, the port is also to prepare itself for the introduction of low sulphur emission area in the Adriatic/Mediterranean, in which ships will be limited to low sulphur fuels utilisation by 2020. The port should also prepare for the provision of the clean bunkers, possibly also including LNG. Finally, the port should explore the possibilities for the introduction of clean energy technologies, both for the use of own electricity and that of clients and concessionaires.

Figure 1: Development projects of Port of Rijeka

4. 2ND BENCHMARK: PORT OF ZADAR

Zadar is one of the Republic of Croatia's three main passenger gateways. In pre-covid 2019. it welcomed 2,39 million ferry passengers both on domestic as well as international ferries, making it the country's second largest passenger port after Split. The port of Zadar also handles small quantities of general cargo, liquid bulk and dry bulk cargo.

4.1 Description of terminals

The Port of Zadar Authority governs four port areas. The Old City Port houses two berths for international and eight berths for domestic passenger traffic. The new passenger port at

Gaženica was opened in 2015. and boasts a modern overall infrastructure. It also has the benefit of direct highway access and its location relieves inner-city congestion. In total, Gaženica has five berths for international and seven berths for domestic ferry traffic. Also located in the Gaženica basin is the cargo port. The area comprises a total of six berths and serves all cargo types. Finally, the Vela Lamjana – Kali terminal located on Ugljan island provides facilities for fishing activities.

4.2 Traffic

Cruise traffic has shown a substantial increase in the past six years. Since 2009, the number of cruise passengers calling at Zadar has increased on average by nearly 34% per year, totalling 70,000 passengers in 2015. Ferry passengers, however, has shown mixed performances. Domestic passenger traffic has stagnated since 2006, with just under 2.2 million passengers calling at Zadar in 2015, while international ferry traffic has steadily declined from 69,000 passengers in 2006 to 33,000 passengers in 2015. Domestic car traffic aboard ferries has shown a moderate 2% annual compounded growth since 2006. With regards to cargo, the port of Zadar has seen a substantial decline in cargo throughput, down to some 150,000 tons in 2015. Liquid bulk products, in particular, have fallen sharply; a compounded annual growth rate of -60% since 2009 has seen throughput fall to just 1,000 tons in 2015. General cargo and dry bulk cargo have both shown moderate growth, although absolute throughput in tons is still relatively insignificant compared to other Croatian ports.

4.3 Competition

The port of Zadar competes primarily with Šibenik and Split for international ferry traffic and cruise traffic. Their locations vis-à-vis the nation's most high-profile natural parks – Plitvice, Paklenica, Krka and Kornati – and the package deals on offer to experience them are the main sources of competition. Finally, each of three ports is closely located to groups of Croatian islands. The respective proximities of the three ports to the islands is such that they are not competing for passengers on these routes.

4.4 Financial performance and forecast

The Port of Zadar Authority is not financially sustainable. Despite growing sales revenues, reaching over 8.5 million Kuna's in 2015, a nearly 50% year-on-year increase, the profit excluding donations from the national budget still produces a loss of nearly 20 million Kuna's. Compared to 2014, this marks a 34% improvement in the Port of Zadar Authority's profit.

Domestic passenger traffic: It is recommended for the port of Zadar to continue its strong current position as passenger port for the multitude of smaller islands in front of the Northern Dalmatian coast. Therefore, the port will continue to have an important public transport role. Domestic passenger traffic should be a first priority activity in the port of Zadar.

International passenger traffic: It is recommended for the port of Zadar to strive towards a significant role in international passenger traffic to and from Croatia. The port has the shortest distance to Ancona (IT) and is positioned in the midst of typical touristic attractions in the Croatian hinterland. This proposition should be strongly marketed. The handling of international passenger traffic should be a first priority activity for the port of Zadar.

Cruise traffic: It is recommended for the port of Zadar to capture its potential as a one of the most important cruise ports in Croatia. As such, the cruise business will be a first priority activity in Zadar.

Cargo traffic: It is recommended for the port of Zadar to continue its current status as cargo port. The focus of the port will be to serve the local Zadar hinterland and the currently active anchor clients. With regards to new activities, it is foreseen that the port will be able to cater for most activities within the current port infrastructure. In case the proposed new activities require additional port infrastructure, that new infrastructure will only be constructed by private initiative and based on private investments. The handling of cargo traffic will be a secondary priority for the port of Zadar.

Traffic Segment			Target	Location in port	How?
Passenger traffic					
Domestic traffic			The port of Zadar will continue its important public transport function in domestic passenger traffic, servicing the smaller islands off the North Dalmatian coast.	Domestic ferry traffic will be serviced through the newly established Gaženica passenger port.	No major growth in the domestic passenger traffic flow is anticipated. As such, the port will continue to service the current domestic operator.

International traffic			The port of Zadar will increase the importance of its role as international passenger traffic port.	International ferry traffic will be serviced through the newly established Gaženica passenger port.	Potential growth in the international passenger traffic will be captured through: - Increased marketing of the Zadar region as a holiday destination, to be carried out by the Port Authority of Zadar, as well as the city of Zadar. - Actively engaging ferry line operating companies to call at Zadar and promote Motorways of the Sea programs. - Facilitating smooth arrival and departure, amongst others by creating a passenger terminal at the Gaženica passenger port.
Cruise traffic			The port of Zadar will continue to grow into one of the most important cruise destination in	Cruise traffic will be serviced through the new Gaženica cruise berths.	Potential growth in the cruise traffic will be captured through: - Increased marketing of the

			Croatia.		Zadar region as a holiday destination, to be carried out by the Port Authority of Zadar, as well as the city of Zadar. - Actively engagingcruise companies to call at Zadar. - Marketing Zadaras a home-port destination, a combined effort of the port authority, hotels, the airport and the city of Zadar. - Facilitating smooth arrival and departure, amongst others by creating a passenger terminal at the Gaženica passenger port.

Position in National Ports System: Within the wider national ports system, the port of Zadar will continue its function as public transport port for passenger traffic to the islands along the North Dalmatian coast. Further, the port will benefit from its strategic position in the midst of the Croatian coastline, with flat hinterlands and close to many touristic attractions. This strategic position will primarily be reflected in the growth of the cruise business and the handling of international passenger and truck traffic. Finally, with regards to cargo, the port will continue to serve the local hinterland and current anchor clients. Potential infrastructure investments required for cargo-related activities will be initiated and financed by private parties.

- *City-Port Relation:* The Gaženica port of Zadar has been developed outside the city limits of Zadar's old town. As such, it has decongested the old city town and has improved the handling of local road traffic as well as for tourist handlings. In contrast to the port of Rijeka, ample space is available for development. The current National Development Plan foresees no change in the location of Zadar port.

- *Port Development towards 2030 and beyond:* Within the timeframe of the current National Development Plan, the port of Zadar is likely to be incrementally developed into an

important domestic and international passenger port, with increasing importance of the cruise business. These activities are all destined to take place within the limits of the recently constructed Gaženica passenger port, which is to be further enhanced by the creation of a passenger terminal building. With regards to the cargo port, no major expansions are foreseen to be undertaken at the initiative of the port authority. In case private parties find the port of Zadar to be the ideal location for a dedicated terminal for a single activity such as imports of finished cars or project cargo, requiring investments in specialized infrastructure, it is recommended to organize private funding for such a development.

- *Institutional setting:* As a result of port reform in the 1990s, the Port Authority of Zadar currently acts as a landlord port authority, managing the port that is operated by the port's concessionaires. The Port Authority of Zadar has two main functions. On the one hand, the authority has a public transport function for handling passengers from the domestic islands. On the other hand, the port has a commercial function in handling international passengers, cruise passengers and commercial cargo. With regards to the public transport function, it is to be expected that the Port Authority will continue to act as a public body, with limited focus on commercial targets and marketing. The commercial function of the port authority should be making preparations towards commercialization, reducing the need for government support. Amongst others, this implies that the Port Authority will monitor, measure and act on the performance of its concessionaires.

- *Financial Self-Sustainability:* With regards to the financial self-sustainability of the Port Authority of Zadar, it is to be stressed that the public transport function is not likely to be selfsustainable, especially when the system of port dues does not allow for the Port Authority to recap its investments. However, when it comes to the commercially driven function of the Port Authority, financial self-sustainability may indeed by expected on the medium to long term. When business units are created the commercial function versus public function would become measureable.

- *Green Port Concept:* To increase focus on the environment and sustainability, the Port of Zadar should aim to become a "green" port. The focus should be on implementing port-specific environmental management standards (PERS) which are promoted by the European Sea Ports Organisation (ESPO). The port should also introduce an incentive scheme to promote the low sulphur emissions by shipping lines. Further, the port is also to prepare itself for the introduction

of low sulphur emission area in the Adriatic/Mediterranean, in which ships will be limited to low sulphur fuels utilisation by 2020. The port should also prepare for the provision of the clean bunkers, possibly also including LNG. Finally, the port should explore the possibilities for the introduction of clean energy technologies, both for the use of own electricity and that of clients and concessionaires. Development plan chart for the port is shown in Figure 2.

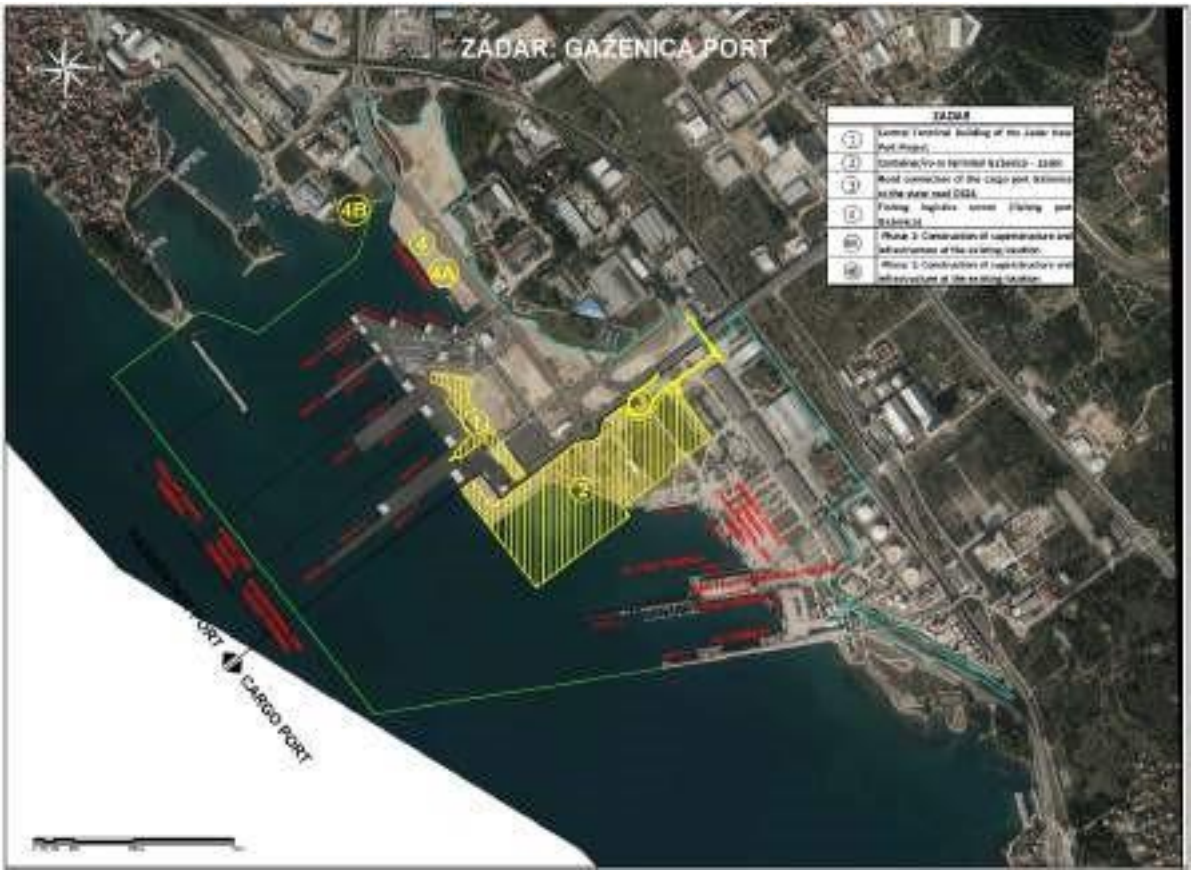

Figure 2: Development projects of Port of Zadar

5. 3RD BENCHMARK: PORT OF ŠIBENIK

Šibenik, as a TEN-T comprehensive port, is foremost a medium-sized passenger port located in the middle of the Republic of Croatia. The port welcomes international cruise passengers as well as domestic ferry passengers and vehicles. In addition, the port handles a small quantity of cargo

commodities including the import of aluminium and phosphates and the export of fertilizers and timber products.

5.1 Description of terminals

The port of Šibenik counts a total of four terminals. Firstly, the Vrulje terminal handles all cruise and ferry traffic. This is the port's main terminal and the port authority's main income generator. Additionally, three separate adjacent bulk terminals handle the import of phosphates, the import and export of various bulk and general cargo products and a terminal for the export of timber products.

5.2 Traffic

Since 2009, the port of Šibenik has developed itself as a passenger port while overall cargo throughput has shown a steady decline in the same period. A total of 480,000 tons were handled in 2015. Total passenger traffic has undertaken an average growth of 22.2% since 2006 to reach 277,000 passengers in 2015. Ferry passengers make up 94% of all passenger traffic and has shown remarkable growth, growing by more than five-fold in the past year alone. Conversely, general cargo has shown an annual compounded growth rate of -28.8% since 2016, amounting to just 3,000 tons in 2015. Bulk cargo has recovered in the past four years, totalling 479,000 tons in 2015, yet still marks a nearly 30% decrease compared to 2006 levels.

5.3 Competition

The port of Šibenik competes primarily for cruise passengers with Zadar and Split. The connection each of these ports can offer to some of the region's highest profile tourist attractions, notably the natural parks of Plitvice, Paklenica, Krka and Kornati, is key to attracting cruise vessels. Šibenik has the best road connection to Krka. Šibenik, like Zadar and Split, also provides domestic ferry connections to the surround islands. These connections, however, are largely uncontested by the other ports due to Šibenik's superior proximity. Finally, Šibenik exports fertilizers, the main dry bulk cargo of the port, for Kutina Petrokemija, a petrochemical plant in continental Republic of Croatia. This faces competition from Split, although Split typically only performs the export when the bulk terminal in Šibenik is unavailable or incapacitated.

5.4 Financial performance and forecast

The Port of Šibenik Authority has shown a moderate improvement in financial performance since 2013. Excluding donations from the national budget, the Port Authority operated at a loss of 1.1 million Kuna's in 2015, a nearly 50% improvement on 2014's loss of 2.1 million Kuna's. Sales revenues have grown at a strong pace since 2013, averaging 13% since 2012. The Port Authority's operating expenses exert considerable pressure on the port authority's finances. The obligatory provision of tug boat services account for one third of total operating expenses alone.

Domestic passenger traffic: It is recommended for the port of Šibenik to continue its modest current position as passenger port for some of the smaller islands in front of the Central Dalmatian coast. Therefore, the port will continue to have an important public transport role. Domestic passenger traffic should be a first priority activity in the port of Šibenik.

International passenger traffic: For the port of Šibenik, it is recommended to withhold from the competition for international passengers, as both the ports of Split and Zadar will be competing for this traffic flow. As such, international passenger traffic is not considered a priority for Šibenik. However, if any international passenger line operators have the ambition to call at Šibenik, the port should facilitate that, within the capacity limitations of current infrastructure.

Cruise traffic: It is recommended for the port of Šibenik to aim to be a high-end cruise port, facilitating demand for luxury cruises and other smaller scaled cruise activities. The cruise business is a first priority business for the port of Šibenik.

Traffic Segment			Target	Location in port	How?
Passenger traffic					

Domestic traffic			The port of Šibenik should continue its current position as domestic passenger port, in line with its public transport function.	The new Vrulje passenger pier will be the main location for handling passenger traffic. A new passenger terminal will smoothen the arrival and departure of passengers.	Port Authority of Šibenik will continue to facilitate port call of local ferry line operators.
International traffic			The port of Šibenik should not aim to become a port for international passenger traffic.	N/A	N/A
Cruise traffic			The port of Šibenik should aim to become one of the main Croatian cruise ports, with a focus on the higher segment, small scaled cruises.	The new Vrulje passenger pier will be the main location for handling cruise traffic. A new passenger terminal will smoothen the arrival and departure of passengers.	- Collaborative international marketing campaigns of both the Port Authority Šibenik, as well as the city of Šibenik will create an image of Šibenik as a luxury cruise destination. - Port Authority of Šibenik will proactively engage cruise operators in order to make cruise bookings.

Position in National Ports System: Within the wider national ports system, the port of Šibenik will continue grow into a high-end luxury cruise port, combined with a public function as domestic passenger transport. Simultaneously, the port will continue to facilitate its local hinterland and current anchor clients, as long as the cargo flows are sufficient to facilitate financially viable port operations.

- *City-Port Relation:* The port of Šibenik is located relatively close to the city of Šibenik, with the port located along the road out of the city. In recent years, the touristic developments in Šibenik have created doubts on whether or not the cargo port activities should remain in the current area. The touristic developments create opportunities for waterfront development along the current port area. However, within the timeframe of the current National Development Plan,

this waterfront development is not envisaged to take place, especially since the current concessionaire has contract up to 2029.

- *Port Development towards 2030 and beyond:* Port Development in Šibenik will primarily be aimed at incremental improvements and superstructure projects to be carried out by the ports main concessionaire. The port authority's main future investments relate to the creation of a passenger terminal with funds from an already attracted loan. Especially with regards to cargo related activities, infrastructure investments will only be undertaken driven by business rationale and decent feasibility studies.

- *Institutional setting:* As a result of port reform in the 1990s, the Port Authority of Šibenik currently acts as a landlord port authority, managing the port that is operated by the port's concessionaires. The Port Authority of Šibenik has two main functions. On the one hand, the authority has a public transport function for handling passengers from the domestic islands. On the other hand, the port has a commercial function in handling cruise passengers and commercial cargo. With regards to the public transport function, it is to be expected that the Port Authority will continue to act as a public body, with limited focus on commercial targets and marketing. The commercial function of the port authority should be making preparations towards commercialization, reducing the need for government support. Amongst others, this implies that the Port Authority will monitor, measure and act on the performance of its concessionaires.

- *Financial Self-Sustainability:* With regards to the financial self-sustainability of the Port Authority of Šibenik, it is to be stressed that the public transport function is not likely to be selfsustainable, especially when the system of port dues does not allow for the Port Authority to recap its investments. However, when it comes to the commercially driven function of the Port Authority, financial self-sustainability may indeed by expected on the medium to long term.

- *Green Port Concept:* To increase focus on the environment and sustainability, the Port of Šibenik should aim to become a "green" port. The focus should be on implementing portspecific environmental management standards (PERS) which are promoted by the European Sea Ports Organisation.

- *The port should also introduce an incentive scheme* to promote the low sulphur emissions by shipping lines. Further, the port is also to prepare itself for the introduction of low sulphur

emission area in the Adriatic/Mediterranean, in which ships will be limited to low sulphur fuels utilisation by 2020. The port should also prepare for the provision of the clean bunkers, possibly also including LNG. Finally, the port should explore the possibilities for the introduction of clean energy technologies, both for the use of own electricity and that of clients and concessionaires.

Development plan chart for the port is shown in Figure 3.

Figure 3: Development projects of Port of Šibenik

6. 4TH BENCHMARK: PORT OF SPLIT

The port of Split, as a TEN-T comprehensive port, is the Republic of Croatia's primary passenger port, welcoming close to 5 million cruise and ferry passengers in 2015. The port of Split also handles a range of cargo products, including dry bulk products such as iron ore, coal, cement and cereals as well as liquid bulk products. Import cargo is destined primarily for local industries and consumption but also serves the Bosnian and Herzegovinian steel industry. Additionally, various commodities are exported to the Middle East, including timber.

6.1 Description of terminals

The port of Split governs a total of seven basins. The City Port basin houses a total of 26 operational passenger berths while two more cruise berths are currently under construction. Away from the city centre lies the Vranjic-Solin basin with a total of eight berths for the port's main cargo commodities. Furthermore, the Kaštela A, B, C and D basins are situated along the coastline directly above Split and house the liquid bulk terminals. Finally, the Komiža basin located on the island of Vis welcomes the port's fishermen.

6.2 Traffic

The strongest performing traffic component since 2006 has been cruise traffic. With an annual compounded growth rate of 21.5%, the port of Split now welcomes over 270,000 cruise passengers. Moreover, domestic and passenger ferry traffic continue to grow at a moderate to strong pace. Since 2006, domestic passenger traffic has grown on average by 3.4%, totalling 4.8 million passengers in 2015, while international traffic has shown an average compounded growth rate of 6.4% to reach over half a million passengers in 2015. Cargo commodities have performed less strongly. The port handled about 3 million tons of cargo in 2015. Overall bulk cargo has stagnated with total throughput in 2015 of 1.6 million tons only marginally outperforming 2006's total throughput. While cereals have more than doubled in throughput since 2006, coal, coke and cement have all shown moderate to strong declines since 2006. Finally, container traffic has also performed positively over the years, averaging a nearly 25% growth rate since 2006. 2015 saw 90,000 TEUs handled in Split, mostly destined for the regional Dalmatian economy. As such, Split does not represent a significant container port in a national or NAPA context.

6.3 Competition

The inferior connection to Zagreb vis-à-vis Rijeka means continental Republic of Croatia is largely unattainable for Split. The port therefore mainly serves the Dalmatian region. Competition is mainly centred around the European steel market. Split and Šibenik both have a foothold in the Bosnian and Herzegovinian steel market while Rijeka has clients in Austria, Hungary and the Republic of Serbia. The port of Split competes with Zadar for international ferry connections to Ancona, Italy. Despite it being located further away, the Split-Ancona connection is operated by three operators – Jadrolinija, BlueLine and SNAV – compared to just Jadrolinija in Zadar. Furthermore, Split competes with Zadar and Šibenik for excursions to the country's main natural parks: Plitvice, Paklenica, Krka and Kornati. Split is located furthest away from each of these natural parks. Finally, Split does not face competition from Šibenik or Zadar for its domestic ferry passengers, who travel mostly between Split and the surrounding islands.

6.4 Financial performance and forecast

The Port of Split Authority is the only port authority to perform at a profit. Profit excluding budget donations has grown by 64% compared to 2012. This is driven by strong growth in sales revenues, averaging at 10.6% per year between 2012 and 2015. Furthermore, donations from the budget represent only a fraction of the Port of Split Authority's total income. In 2015, budget donations represented just 3% of the organisation's total income, highlighting its financial independence.

Domestic passenger traffic: It is recommended for the port of Split to further build upon its current status as most important domestic passenger port in Croatia. Split, as "gateway to islands" will continue to facilitate connectivity to the large islands off the Dalmatian coast. This public transport activity in the port of Split will continue to be a first priority activity.

International passenger traffic: With regards to international passenger traffic, it is recommended for the port of Split to continue efforts to maintain its position as largest international passenger port, in competition with the port of Zadar. As such, handling international passenger traffic will continue to be a first priority activity for the port of Split.

Cruise traffic: It is recommended for the port of Split to continue its efforts to maintain its position as one of the most important cruise ports in Croatia. The cruise business will therefore remain a first priority activity in the port of Split.

Passenger traffic	

Domestic traffic			The target for the port of Split should be to continue the public transport function for islands inhabitants, as well as facilitate the tourism industry by handling domestic passenger traffic.	The ambition should be to maintain passenger only ferries within the city-port basin, while ferries including cars and trucks should be moved towards the to-be constructed Stinice area.	The basic driver for potential growth in domestic passenger traffic will be the growth in the tourism industry. Tourism growth, combined with the fact that the cabotage law in Croatia will cease to exist by 31st December 2016, could result in an increase of the domestic passenger flow.
International traffic			The target for port of Split will be to increase its importance for international passenger traffic to facilitate the tourism industry.	Similar to domestic ferries, international ferries that include cars and trucks should be moved towards the Stinice area, as much as possible. A basic volume of international traffic will remain within the cityport.	Also for international passenger traffic, the growth of the tourism industry is the main parameter for anticipated growth. In order to improve the arrival experience in Split, a passenger terminal in the city-port basin will be build.
Cruise traffic			The target for cruise traffic for port of Split will be to maintain its current position as second cruise port in the country.	Cruise traffic will continue to be located in the cityport basin, specifically at the newly constructed cruise berths on the outside of the breakwater.	For cruise traffic, the tourism industry is the main growth parameter. In order to improve the arrival experience in Split, a passenger terminal in the city-port basin will be build.

Position in National Ports System: Within the wider national ports system, the port of Split will continue its function as important regional cargo port, especially for serving the regional hinterland in Split and Dalmatia, the larger Dalmatian islands and the North-West of BosniaHerzegovina. Further, the port of Split will further build upon its strong position as

domestic and international passenger port, serving as both a public transport hub and an important facilitator of the tourism industry. Finally, the port of Split will build upon its strong position as secondary cruise port of Croatia.

- *City-Port Relation:* The cargo port of Split is traditionally developed north of the city-centre, in the Kastela bay. This location facilitates easy access to the regional hinterland by both road and rail connections and keeps traffic away from the (historic) city-centre. The passenger and cruise activities are currently located in the city-port near the historic city-centre of Split. This results in a quite some congestion in the city centre, both from tourists in the historic city of Split, as well as from traffic travelling to and from the ferry berths. The current National Development Plan foresees a partial move of the passenger traffic activities towards the Stinice area in order to relieve the congestion.

- *Port Development towards 2030 and beyond:* Within the timeframe of the current National Development Plan, development in the cargo port of Split is foreseen to be undertaken by the respective concessionaires. With regards to passenger facility development, the current National Development Plan foresees the creation of a new operational berth in the Stinice area on Kastela bay, the extension of the berths of Sv. Petar and Knez Domagoj, the creation of a berth at Znjan and the construction of a passenger terminal in the city-port basin. Most of the developments are aimed at facilitating peak demand in the summer season and distributing the flow of passengers over various areas of the port and city.

- *Institutional setting:* As a result of port reform in the 1990s, the Port Authority of Split currently acts as a landlord port authority, managing the port that is operated by the port's concessionaires. The Port Authority of Split has two main functions. On the one hand, the authority has a public transport function for handling passengers from the domestic islands. On the other hand, the port has a commercial function in handling tourist traffic towards the island, cruise passengers and commercial cargo. In the port of Split, these two functions are actually mixed, due to the fact that passengers travelling to the islands can be both local inhabitants or tourists. The commercial function of the port authority should be making preparations towards commercialization, minimizing the need for government support, in line with current operations. Amongst others, this implies that the Port Authority will monitor, measure and act on the performance of its concessionaires.

- *Financial Self-Sustainability:* The Port of Split Authority is already one of the port authorities that has a limited dependence on government donations. As part of the Port Authority's transition towards commercialization and corporatization, financial self-sustainability will quickly become one of the most relevant objectives for the Port Authority. As a result of the commercialization approach and increasing traffic, the Port Authority will have to aim to continue its financial independence from the national government, especially when it comes to repayment of the outstanding loans. It also implies that future capital investments, that may need additional loans, can only be implemented if the repayment of the new loan fits within the financial profile of the Port Authority. For future loans, financing should be organized preferably through the private sectors and not through national government budgets, unless clear economic benefits exist.

- *Green Port Concept:* To increase focus on the environment and sustainability, the Port of Split Authority should aim to become a "green" port. The focus should be on continuation of implementing port-specific environmental management standards (PERS) which are promoted by the European Sea Ports Organisation. The port should also introduce an incentive scheme to promote the low sulphur emissions by shipping lines. Further, the port is also to prepare itself for the introduction of low sulphur emission area in the Adriatic/Mediterranean, in which ships will be limited to low sulphur fuels utilisation by 2020. The port should also prepare for the provision of the clean bunkers, possibly also including LNG. Finally, the port should explore the possibilities for the introduction of clean energy technologies, both for the use of own electricity and that of clients and concessionaires.

Development plans chart for the port's two basins are shown in Figures 4 and 5.

Figure 4: Development projects of Port of Split (1/2)

Figure 5: Development projects of Port of Split (2/2)

7. 5TH BENCHMARK: PORT OF DUBROVNIK

Dubrovnik, as a TEN-T comprehensive port, is the Republic of Croatia's primary cruise port and home to one of the nation's most well-known tourist attractions, the UNESCO World Heritage listed Old Town of Dubrovnik. The port is located in the southern enclave of the country, with Bosnia and Herzegovina's small coastline disconnecting it from the rest of the Republic of Croatia. The port also provides domestic and international ferry connections. The port does not handle any cargo commodities.

7.1 Description of terminals

The port of Dubrovnik currently comprises a total of four areas. The cruise terminal has three berths, totalling 800 meters in length and being able to accommodate Oasis class cruise vessels, the largest cruise vessel classification. Batahovina I receives both cruise as well as passenger vessels. Finally, the passenger terminal with a total length of 425 meters and the Kantafiq quay handle small to medium-sized domestic and international ferries.

7.2 Traffic

Dubrovnik has continued to develop itself as Croatia's primary cruise destination. Since 2006, the port of Dubrovnik has seen cruise traffic growth on average by 9.3%, culminating in a total of 815,000 cruise passengers in 2015. This is triple the port of Split's total for cruise passengers in the same year, 270,000 passengers, and safely cements Dubrovnik's leading position in the Croatian cruise landscape. Conversely, ferry traffic has seen a moderate decline. In 2015, a total of 442,000 mainly domestic ferry passengers called at Dubrovnik compared to 528,000 in 2006. International ferry traffic has also slowed, but at a milder pace.

7.3 Competition

Dubrovnik's position in the Croatian port landscape is unique in that it faces no competition. This can be attributed to a number of decisive factors. Firstly, Dubrovnik's commercial potential as a tourist destination is unmatched in the country. Secondly, its geographic positioning means it is out of reach for the other passenger ports – Zadar, Šibenik and Split. Another implication of this is that many tourists coming to Dubrovnik come first and foremost for the Dubrovnik Old Town itself and are not seeking excursions to any of the national parks that can be accessed from Zadar,

Šibenik and Split. Lastly, Dubrovnik does not face any competition for cargo as it is the only port to exclusively handle passengers. Dubrovnik holds an additional opportunity to become a home port as it is located within proximity of the airport.

7.4 Financial performance and forecast

The Port of Dubrovnik Authority operated at a loss in 2015. While sales revenues showed a moderate decline of 6% compared to 2014, donations from the national budget fell by over 40%. Consequently, the profit excluding donations from the national budget fell from a profit of 552,330 Kuna in 2014 to a loss of 560,219 Kuna in 2015. Moreover, the ratio of total income to total expenses decreased from 2.0 to 0.7 between 2014 and 2015, pointing to a loss in overall efficiencies at the port authority.

Domestic passenger traffic: It is recommended for the port of Dubrovnik to maintain its current status with regards to domestic passenger traffic. This implies that local passenger traffic between Dubrovnik and the islands of Mljet, Sipan, Lopud and Kolocep will continue to be serviced from the port, especially in the tourist high season. Effectively, the handling of domestic passenger traffic is considered a secondary priority activity for the port of Dubrovnik.

International passenger traffic: It is recommended for the port of Dubrovnik to maintain its current status with regards to international passenger traffic. This implies that current international ferry lines between Dubrovnik and Bari (IT) will be maintained. Effectively, the handling of international passenger traffic is considered a secondary priority activity for the port of Dubrovnik.

Cruise traffic: It is recommended for the port of Dubrovnik to continue its current function as most important cruise port of Croatia. The cruise business will therefore remain a first priority activity in the port

Traffic Segment			Target	Location in port	How?
Passenger traffic					

Domestic traffic			Dubrovnik port will continue its public transport function for the islands of Mljet, Sipan, Lopud and Kolocep. Further, the domestic excursion boats will be an important part of tourism diversification of the Dubrovnik portfolio.	Domestic traffic will be continued to be serviced on both berths 7, 8 and 9 within the Gruz port. In peak season, some local services could be relocated to the new Bathovina berths.	The growth in domestic traffic is anticipated to come from growth in tourism, which is especially linked to cruises. As such, due to city-centre capacity restrictions, the growth is not anticipated to be too high.
International traffic			On the back of tourism growth in the Dubrovnik region, international ferry traffic from Bari will grow accordingly.	International passenger ferries will be relocated from berths 7,8 and 9 in the Gruz port, to the new Batahovina berths.	Building the new Batahovina berths will facilitate the safe berthing of multiple ferry vessels, compared to alongside berthing practices that are currently ongoing.

Cruise traffic			The port of Dubrovnik will remain the largest cruise port in Croatia. The capacity restrictions with regards to the number of people than can be in the historic citycentre, should be taken into account.	The cruise vessels will remain to berthed at the Gruz cruise berths, as well as the Batahovina 1 berth.	Although not much growth is anticipated, as a result of the citycentre capacity restrictions, the arrival experience in Dubrovnik will be improved through construction of modern passenger terminal building. The building creates the possibility of home-port activities in Dubrovnik. Whether homeport activities will actually be carried out there, depends on market interest and the cooperation with hotels and the airport.

Position in National Ports System: Within the wider national ports system, the port of Dubrovnik will have a clear position as leading Croatian cruise port. The port does not handle any cargoes and both domestic and international passenger traffic are substantially less relevant compared to the ports cruise business.

- *City-Port Relation:* The ports business strongly relates to the attractiveness of the city of Dubrovnik for cruise passengers. Effectively, the entire ports business is based on the touristic capabilities of the city. In recent years, the volume of cruise passengers has grown to a level at which the peak volume of passengers within the historic city centre is no longer sustainable. As a result, the city and port authority will need to continue their close cooperation and coordination with regards to the planning of cruise calls and excursions.

- *Port Development towards 2030 and beyond:* Within the timeframe of the current National Development Plan, port development in the port of Dubrovnik will be driven by an improvement in the facilities, logistics and planning of the various passenger flows. As such, the

construction of a passenger terminal building and the Batahovina 2 berths are considered logical developments.

- *Institutional setting:* As a result of port reform in the 1990s, the Port Authority of Dubrovnik currently acts as a landlord port authority, managing the port that is operated by the port's concessionaires. However, considering the large importance of the cruise business in Dubrovnik, which is practically managed by the Port Authority, the port is practically operating as a public port authority, with only mooring and unmooring being concessioned. In the meantime, it is time for the Port Authority to work towards the next steps in port reform, specifically aiming to become a commercialized landlord port authority, with a long term aim to become a corporatized landlord port authority.

- *Financial Self-Sustainability:* The Port of Dubrovnik Authority is already one of the port authorities that has a limited dependence on government donations. As part of the Port Authority's transition towards commercialization and corporatization, financial selfsustainability will quickly become one of the most relevant objectives for the Port Authority. As a result of the commercialization approach and increasing traffic, the Port Authority will have to aim to continue its financial independence from the national government, especially when it comes to repayment of the outstanding loans. It also implies that future capital investments, that may need additional loans, can only be implemented if the repayment of the new loan fits within the financial profile of the Port Authority. For future loans, financing should be organized preferably through the private sectors and not through national government budgets, unless clear economic benefits exist.

- *Green Port Concept:* To increase focus on the environment and sustainability, the Port of Split should aim to become a "green" port. The focus should be on continuation of implementing port-specific environmental management standards (PERS) which are promoted by the European Sea Ports Organisation. The port should also introduce an incentive scheme to promote the low sulphur emissions by shipping lines. Further, the port is also to prepare itself for the introduction of low sulphur emission area in the Adriatic/Mediterranean, in which ships will be limited to low sulphur fuels utilisation by 2020. The port should also prepare for the provision of the clean bunkers, possibly also including LNG. Finally, the port should explore the possibilities for the introduction of clean energy technologies, both for the use of own electricity and that of clients and concessionaires. Development plan chart for the port is shown in Figure 6.

Figure 6: Development projects of Port of Dubrovnik

8. SUPPLIERS ROLE

The development of transport and growth of tourism strongly influence each other. The development of traffic enables the development of tourism by improving terms of its functionality. Modern telecommunication infrastructure and its development are also a very important factor when it comes to the development of tourism. In Croatia, foreign tourists travel mostly by car or other road vehicles (91%), while the other transport vehicles are significantly less represented (aircraft 8%, ship 1%, and railway only marginally). Although the railroad transport marked the beginning of the development of mass tourism, its share is today very important only in small tourist trips. A great return of railway transport has been slowly taking place in the last 20 years with the introduction of super-fast trains, which significantly reduce travelling time and compete with air transport. Considering the time spent travelling to and from a destination, transport is also an important factor when short-term stays are involved, where it may take a significant share in the total time allocated for travelling experience, and thus its importance is additionally increased.

In areas where tourism is one of the main economic activities, construction and improvement of the transport infrastructure for the sole purpose of tourism is economically and socially justified. The choice of transport vehicle will depend on the:

- choice of destinations,
- length of the journey,
- organisation of a journey
- level of information availability,
- access to information,
- existing choices in transport,
- availability of other modes of transport and related information,
- buying power of individuals,
- price / cost of transport.

Real needs of tourists should also be taken care of, such as the type of tourism involved and tourists' determination about what they want to get, and the transport policy should be harmonised accordingly. There are four dimensions of transportation planning:

1. external transport accessibility,
2. internal transport accessibility,
3. service facilities along transport routes and
4. traffic standstill

SUPPLIERS OF TRANSPORTATIONAL SERVICES IN PORT OF SPLIT

By and large, public transport in Split is mostly confined to the yellow buses that operate on a number of routes in and near the city. Apart from the fact that the city is very walkable indeed and not too many options exist which would greatly benefit the development and advancement of E-CHAIN project, but public transport in Split is certainly useful when trying to reach the outskirts of the city, or some of the other nearby towns when the touristic opportunity arises.

Buses in Split are run by the company Promet Split. Promet Split runs 19 routes in the city itself, plus three night routes. There are also a number of 'suburban' lines to locations outside of the city itself. In particular, visitors may find useful the lines to Trogir (bus line 37, which also goes by Split Airport); to Klis,

for the fortress (bus line 34); to Solin (several bus lines); and to Omiš (bus line 60). Promet Split also runs buses on the islands of Čiovo and Šolta.

One must note that the local bus station in Split is *not* the same as the main (intercity) bus station. Instead, the local bus terminal - Sukoišan is located about 1km inland from the sea, while the intercity one is in the town's center next to the port and the adjacent train station.

Split train station is located adjacent to the main bus station and the port. It is highly unlikely that one will be using trains in Split to get around the general area, although there are connections to nearby cities of Solin (11 minutes by train) and the Kaštela region (20-30 minutes by train to Kaštel Stari, for example). You may, of course, arrive/depart Split train station if travelling from/to Zagreb which is the country's capital city. Train timetables are displayed on the Croatian Railways website.

As a bustling port, there are appurtenant ferry and catamaran lines connecting Split with the nearby islands and other towns and cities in Dalmatia. The one route within the confines of Split is a catamaran service that connects the port near Split Airport with the city. This summer-only service is run by Catamaran Line.

There are a number of sailing routes to places close to Split. For example, Bura Line run a boat service connecting Split with nearby Čiovo island and Trogir – it's a very pleasant way of travelling between these places. The island of Šolta is also very close to Split – it can be easily viewed from the city! Jadrolinija operate a car ferry service to Roga on the island, whilst the Krilo Shipping Company have a catamaran to the same location.

Collective efforts regarding the regular update activities and modernization of the user interfaces on websites of this transport suppliers should be a business imperative. The forward-looking narrative has to include the optimization of displayed information towards tourists regardless of their preferred mode of transport. All the aforementioned available transport options that Split has to offer would have to oblige in order to facilitate the transition to an overall digital narrative E-CHAIN platform has the potential to offer. Apart from the up-to-date timetables which focus on arrivals and departures, alternative modes of transport could be presented together with the approximate time reference for the chosen option. Multimodality is the key towards an overall development while enriching the tourist offer the city has. In the multimodaly equipped city, the capacity of the street is increased by a more balanced allocation of space between the modes. This redistribution of space allows for a variety of nonmobility activities such as seating and resting areas, bus stops, as well as trees, planting and other green infrastructure strategies.

For further advancement and focus on transferability in the end, suppliers of the transportation services should also focus on providing the platform with information such as the organizational levels of journeys offered, pricing references as well as availability of other modes of transport and related information. Carbon footprint of each mode would also be a potential factor but would also include a lot of equipment for exact and transparent results which can be very financially intensive. In order for everything above to be feasible, each transport modality should possess the option to be suggestive in nature but then the logic of free market would also be impaired.

Logical approach would be sharing of information that would not act as a factor which brings negative conotations to the modality of transport. Neutral information would consist only of exact times of arrivals and departures as well as other suggested points of interests that could be approached possibly only by using of the transport modality in question.

9. CONCLUSIONS

9.1 PORT OF RIJEKA

As-is situation

The port of Rijeka is the largest commercial port in Croatia, with a substantial market share in Croatia, Hungary and Serbia. The port primarily handles containers, dry bulk, general cargo, livestock and liquid bulk and some passengers for local islands. Container traffic has shown a nearly 9% aggregated growth rate since 2006, with total throughput totalling 200,000 TEU in 2015. Other than containers, the port handled 10 million tons of cargo in 2015. The port's primary competitors are the ports of Koper and Trieste, primarily for reaching the Central European hinterland.

Targets & Measures

As part of this National Development Plan, the port of Rijeka is envisioned to remain its position as most important Croatian cargo port, acting as a gateway and transit port for Croatia and substantial parts of the Central European hinterland. The development of rail infrastructure and rail services are crucial success factors for realizing this target, and the port of Rijeka will benefit from its status as TEN-T core port, located on both the Mediterranean and Baltic-Adriatic TENT-T corridors. Simultaneously, the Port of Rijeka Authority will engage in a transition towards a modern port authority, with a commercialized port management, ambition to become

financially self-sustainable, increased focus on environmental impact and environmental management (PERS) and state-of-the-art IT technology and applications.

Projects

Presently, the port is involved in the construction of the Zagreb Pier, which is to be used as container terminal in the period after 2022. Further projects in the port mainly relate to improving existing facilities. (Re)construction of rail tracks and warehouses and the construction of rail terminals will create the necessary improvements of hinterland accessibility and in port storage capacity. Further, the port's concessionaire will be responsible for the upgrade of port superstructure and equipment.

Capacity versus Demand

It is concluded that the current port and terminal facilities in the port of Rijeka will suffice to handle demand up to 2030, especially when (1) the Zagreb Pier container terminal has been implemented, and (2) the existing concessionaires increase the port's performance with new superstructure and equipment investments.

Financial Feasibility & Cost-Benefit Analysis

The financial feasibility assessment shows that the Port of Rijeka Authority could increasingly be able to contribute to the interest payments and loan repayments of the loans that the Authority is currently engaged in. From 2027 onwards, when all outstanding loans are repaid, it is to be expected that limited financial support from the national government will be required. Until that period, major new projects (currently not foreseen) are to be financed from sources outside of the Port Authority balance or national government budget. In this respect, increased use of PPP arrangements and the application of EU Funds are likely to solve potential funding issues.

9.2 PORT OF ZADAR

As-is situation

The port of Zadar is the second largest passenger port in Croatia, handling 2 million ferry passengers both on domestic as well as international ferries in 2015. As such, the port has an important public function for island inhabitants. The port of Zadar also handles small quantities of general cargo, liquid bulk and dry bulk cargo. The new passenger port at Gaženica was opened in 2015 and boasts a modern overall infrastructure. It also has the benefit of direct highway access and its location relieves inner-city congestion. In total, Gaženica has five berths for international and seven berths for domestic ferry traffic. Also located in the Gaženica basin is the cargo port. The area comprises a total of six berths and serves all cargo types. The port of Zadar competes primarily with Šibenik and Split for international ferry traffic and cruise traffic. Their locations vis-à-vis the nation's most high-profile natural parks – Plitvice, Paklenica, Krka and Kornati – and the package deals on offer to experience them are the main sources of competition.

Targets & Measures

As part of this National Development Plan, the port of Zadar is envisioned to remain its position as important passenger port, with increased focus on the attraction of international passengers. With regards to cargo, it is recommended to maintain the current focus on handling of key clients. Large scale expansions of the cargo port or deemed unnecessary based on current market developments. In case future demand for cargo port expansion exist, it is envisioned that such development will take place through private investments. Simultaneously, the Port of Zadar Authority will engage in a transition towards a modern port authority, with a commercialized port management, ambition to become financially self-sustainable, increased focus on environmental impact and environmental management (PERS) and state-of-the-art IT technology and applications.

Projects

In the port of Zadar, the most important project is the construction of a new modern passenger terminal building in the Gaženica port. This new building will increase the ports ability to receive large cruise vessels, potentially through home-port operations. A project for expansion of the cargo is currently under consideration but the feasibility of the project should be re-established.

Capacity versus Demand

With current passenger and cargo port facilities, the port of Zadar is envisaged to be ready for future market developments, at least up to 2030.

Financial Feasibility & Cost-Benefit Analysis

The recently constructed Gaženica port as well as the passenger terminal that is currently under construction have resulted in a substantial quality improvement and capacity expansion for the port of Zadar. Simultaneously, the capital expenditures that have been done are yet to be recovered from the ports operational revenues. It is foreseen that over the course of this National Development Plan, the Port Authority of Zadar will increasingly be able to contribute to loan repayments for the Gaženica project. However, government assistance will be required due to the fact that operational revenues are envisioned to fall short. Until that period, major new projects (currently not foreseen) are to be financed from sources outside of the Port Authority balance or national government budget. In this respect, increased use of PPP arrangements and the application of EU Funds are likely to solve potential funding issues.

9.3 PORT OF ŠIBENIK

As-is situation

Šibenik, as a TEN-T comprehensive port, is foremost a medium-sized passenger port located in the middle of the Republic of Croatia. The port welcomes international cruise passengers as well as domestic ferry passengers and vehicles, through its recently

constructed Vrulje passenger pier. In addition, the port handles a small quantity of cargo commodities including the import of aluminium and phosphates and the export of fertilizers and timber products for some key clients connected to the port. The port of Šibenik competes primarily for cruise passengers with Zadar and Split. The connection each of these ports can offer to some of the region's highest profile tourist attractions, notably the natural parks of Plitvice, Paklenica, Krka and Kornati, is key to attracting cruise vessels

Targets & Measures

As part of this National Development Plan, the port of Šibenik is envisioned to maintain its position as a luxury cruise port, accommodating smaller sized cruise ships. Further, the port is envisioned to maintain its position for several of its anchor clients that handle their cargo through Šibenik. Simultaneously, the Port of Šibenik Authority will continue its transition towards a modern port authority, with a commercialized port management, ambition to become financially self-sustainable, increased focus on environmental impact and environmental management (PERS) and state-of-the-art IT technology and applications.

Projects

For the port of Šibenik, the project that is currently most relevant is the construction of the passenger terminal building, through which both cruise and domestic ferry passenger can be accommodated. Other projects in the port concern the rehabilitation of rail and road infrastructure, specifically for the cargo port. The feasibility of such projects strongly relate to the continuity of cargo handling of the ports main client (Petrokemija). Further, the port's concessionaire has ambitious plans to increase cargo

handling, through the installations of new port equipment as well as liquid bulk storage tanks.

Capacity versus Demand

The facilities currently existing in the port of Šibenik are considered to be sufficient to handle forecasted demand for both cargo and passengers.

Financial Feasibility & Cost-Benefit Analysis

The port of Šibenik is envisioned to increasingly contribute to repayments of the loans for the Vrulje pier project. Increasing levels of passenger transport and cargo will result in increasing revenues, that can be allocated more and more to the repayment of the loan. It is envisioned that the government will need to continue its support in the repayment of the loan at least until 2025. Until that period, major new projects (currently not foreseen) are to be financed from sources outside of the Port Authority balance or national government budget. In this respect, increased use of PPP arrangements and the application of EU Funds are likely to solve potential funding issues.

9.4 PORT OF SPLIT

As-is situation

The port of Split, as a TEN-T comprehensive port, is the Republic of Croatia's primary passenger port, welcoming close to 5 million cruise and ferry passengers in 2015. The port of Split also handles a range of cargo products, including dry bulk products such as iron ore, coal, cement and cereals as well as liquid bulk products. The port of Split competes with Zadar for international ferry connections to Ancona, Italy. Despite it being located further away, the Split-Ancona connection is operated by three operators – Jadrolinija, BlueLine and SNAV – compared to just Jadrolinija in Zadar. Furthermore, Split competes with Zadar and Šibenik for excursions to the country's main natural parks: Plitvice, Paklenica, Krka and Kornati.

Targets & Measures

Within the wider national ports system, the port of Split will continue its function as important regional cargo port, especially for serving the regional hinterland in Split and Dalmatia, the larger Dalmatian islands and the North-West of Bosnia-Herzegovina. Further, the port of Split will further build upon its strong position as domestic and international passenger port, serving as both a public transport hub and an important facilitator of the tourism industry. Finally, the port of Split will build upon its strong position as secondary cruise port of Croatia. Simultaneously, the Port of Split Authority will continue its transition towards a modern port authority, with a commercialized port management, efforts to remain financially self-sustainable, increased focus on environmental impact and environmental management (PERS) and state-of-the-art IT technology and applications.

Projects

For the port of Split, the most relevant projects all concern the creation of additional capacity for the handling of domestic and international ferry passengers. Congestion in both the city-centre and surrounding roads necessitate the port to find alternative locations. These locations are found in the Stinice area as well near Znjan. Further, in

order to increase the image and service of Split as a cruise port, a passenger terminal building is envisioned to be created near the newly constructed cruise berths.

Capacity versus Demand

After implementation of the mentioned projects, the port of Split's capacity is assumed to be sufficient to handle forecasted demand.

Financial Feasibility & Cost-Benefit Analysis

The port of Split's financial feasibility assessment shows that the port will be able to contribute to repayment of the loans for port of Split projects. The assessment further shows that the Port of Split Authority could be able to attract new loans in the period after 2018. However, also for the Port of Split Authority, it is recommended to increasingly use PP arrangements and EU funds where possible.

9.5 PORT OF DUBROVNIK

As-is situation

Dubrovnik, as a TEN-T comprehensive port, is the Republic of Croatia's primary cruise port and home to one of the nation's most well-known tourist attractions, the UNESCO World Heritage listed Old Town of Dubrovnik. The port is located in the southern enclave of the country, with Bosnia and Herzegovina's small coastline disconnecting it from the rest of the Republic of Croatia. The port also provides domestic and international ferry connections. The port does not handle any cargo commodities.

Targets & Measures

Within the wider national ports system, the port of Dubrovnik will continue to have the position as leading Croatian cruise port. The port does not handle any cargoes and both domestic and international passenger traffic will be substantially less relevant compared to the ports cruise business. Simultaneously, the Port of Dubrovnik Authority will continue its transition towards a modern port authority, with a commercialized port management, continued efforts to remain financially self-sustainable, increased focus on environmental impact and environmental management (PERS) and state-of-the-art IT technology and applications.

Projects

The most relevant project for the port of Dubrovnik is the construction of a passenger terminal building, which is to be financed and operated by a private consortium. The second most important project is the construction of the Batahovina 2 berths for handling of both domestic and international ferries.

Capacity versus Demand

With the expansion of berthing capacity through the Batahovina 2 project, the port of Dubrovnik is envisioned to have sufficient capacity for at least up to 2030.

Financial Feasibility & Cost-Benefit Analysis

The port of Dubrovnik's financial feasibility assessment shows that the port will be able to contribute to repayment of the loans for port of Dubrovnik projects. The assessment further shows that the Port of Dubrovnik Authority could be able to attract new loans in the period after 2017. However, also for the Port of Dubrovnik Authority, it is recommended to increasingly use PP arrangements and EU funds where possible.

Across the European Union, the implementation of Port Community Systems (PCS), either in individual ports or as national systems is widespread. A Port Community System is an electronic platform that connects the multiple systems operated by various organisations that operate in a seaport or inland port community. It is shared in the sense that it is set up, organised and used by firms in the same sector – in this case, a port community.

A PCS offers for the electronic exchange of information amongst all port and logistics sectors and is recognised as the most advanced method for the exchange of information within a single or national port community infrastructure. A PCS has the ability to serve as a National Single Window or to integrate into a National Single Window which European Member States are developing anticipating on recent Directives and policy from the European Commission. A PCS is therefore pivotal in the Single Window concept and will reduce duplication of data input through efficient electronic exchange of information.

In most of the European ports in which a PCS has been implemented, the port authorities in those ports played a key role in the creation and setting-up of the PCS. The PCS in Rotterdam, Amsterdam, Antwerp, Barcelona, Hamburg, Venice and various other ports have been set up through involvement of the port authority.

Considering that the project of creation of a national PCS system is ongoing with completion date until beginning of 2022., additional process digitalization of passenger traffic will significantly increase capabilities of the future integration with the PCS system and enable data processing for statistical purposes. Initial linking all ports of national significant for passenger traffic through E-CHAIN project will have positive transfer effects and create a preparatory base for introduction of the PCS system.

D 3.2.1 – BENCHMARK, TRANSPORT NEEDS & SUPPLIER'S ROLES

Activity 3.2 – Stakeholders analysis (Transport needs)

February, 2021 - Version final

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Project Acronym	E-CHAIN
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Project Title	Enhanced Connectivity and Harmonization of data for the Adriatic Intermodal Network
Priority Axis	4 - Maritime Transport
Specific objective	4.1 - Improve the quality, safety and environmental sustainability of marine and coastal transport services and nodes by promoting multimodality in the programme area
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Work Package Title	Mobility Maritime Design
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TABLE OF CONTENTS

ACRONYMS / ABBREVIATIONS

ACRONYM	DEFINITION
SoA	State of the Art
PP	Project partners
PT	Project Team
TC	Technical task coordinator
WP	Work package
IT	Information Technologies

REFERENCE DOCUMENTATION

No	TITLE	REPORT No.	PUBLISHED BY
1	**Application Form – E-CHAIN - Enhanced Connectivity and Harmonisation of data for the Adriatic Intermodal Network** 2014 - 2020 Interreg V-A Italy - Croatia CBC Programme Call for proposal 2017 Standard - E-CHAIN Priority Axis: Maritime transport	Application ID: 10048282	Lead Applicant: Municipality of Ancona

1. INTRODUCTION

1.1 PURPOSE OF THE DOCUMENT

This document is relevant to the activity 3.2 Stakeholders analysis (Transport needs).

The purpose of this document is to collect user needs based on selected use cases and needs survey. The analysis's primary goal is to collect the requirements gathered from identified stakeholders and transport needs according to the current situation and future plans. Transport needs refer on the one hand to commercial/organisational activity in the port area (for example, supporting travellers for check-in and boarding operations). On the other hand, there is the analysis of mobility management around the port area at a touristic level for those travellers who are, for example, waiting for the transfer or for visiting the worth sites. In the analysis, the scopes from the Sustainability Urban Mobility Plan (SUMP) are also included.

It is the operational document for the implementation of the project being used:

- by the Task Manager (TM) and Project Team (PT) to provide detailed information about the stakeholders and the transport needs;
- by the Activities 3.3 Technical and functional requirements for D 3.3.1 and D 3.3.2, and 3.4 Platform and service design information needed for D 3.4.1 – E-CHAIN platform design and high-level architecture.
- by the Activities of WP 4 Platform and Service Implementation.

1.2 WORKING PRINCIPLE

The main source of data on the Stakeholders analysis and transport needs are project partners and other major stakeholders as potential users of the platform on the side of service providers whose services will be provided by the platform.

In order to get a realistic picture of requirements that the E-CHAIN platform needs to meet, questionnaires have been prepared for the project partners and main stakeholders identified through previous activities.

The questionnaire is designed as a stakeholder interview conducted by the project partner and is relevant to the activities of WP3. It consists of several series of questions related to:

- identification data of the partner and of the person conducting the interview,
- stakeholder data,
- the relevance of the stakeholder and his interest in participating in the project,
- the current state of the level of equipment and stakeholder integration.

This document contains a summary of the answers collected by the questionnaire, their analysis and conclusions related to the stakeholder's interest and their level of equipment and integration.

Regarding the fact that it was not possible to provide an interview with some of the stakeholders, some information for this analysis was also collected on the stakeholder's web pages.

2. BACKGROUND INFORMATION

E-CHAIN (Enhanced Connectivity and Harmonisation of data for the Adriatic Intermodal Network) main objective is to enhance connectivity and harmonisation of data for the Adriatic Intermodal Network, through the realisation of a modular integrated software (E-CHAIN platform) for the management of intermodal transport services in port areas for passenger transport. To enhance the current situation, E-CHAIN will focus on providing new services such as an improved Port multimodal info mobility system for the passengers, a ticketing system integrated with other transport modes, an advanced touristic co-marketing tool for the operators. These services will be designed and deployed in the selected pilot sites (Ancona, Split and Venice). A Business model suited to adapt the technology developed in the three applicative contexts will be created and specific needs will be taken into account.

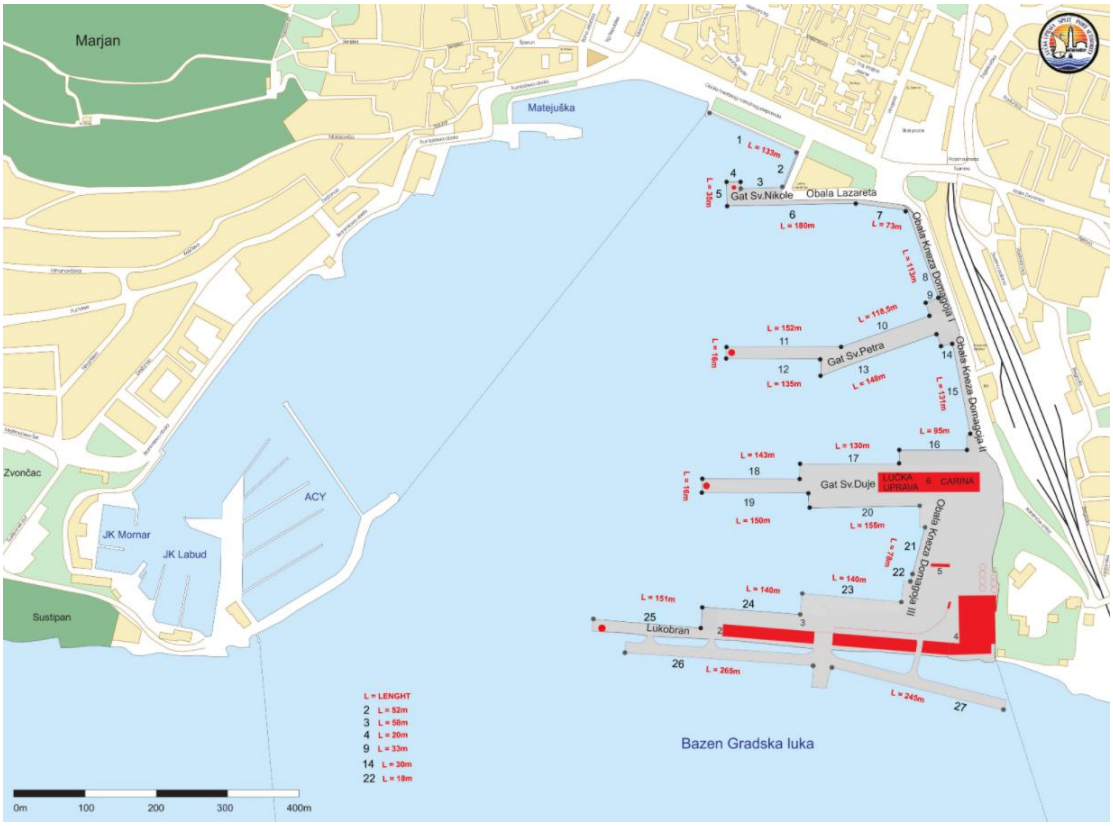
The aim of WP3 is to design platform and services and to prepare the E-CHAIN services for deployment in the pilot sites (Ancona, Split and Venice).

The specific objectives of this WP are to:

- Establish the requirements and specifications for E-CHAIN services and for integration with existing services/systems
- Create a detailed reference architecture that complies with relevant standards and best practices
- Verify adapted services against the requirements and specifications before developing for pilot sites to WP4

3. THE PORT OF SPLIT: POSITION, FIGURES AND VALUES

Port of Split is situated in central Adriatic, and it is the largest port in Dalmatia. The coastal part of the City port basin comprises the area from the west breakwater to the junction of Obala Lazareta and Obala hrvatskog narodnog preporoda, offering 2,136.5 m long operative coast and 25 berths. Berths 23, 24 and 25, intended for mooring of passenger and ro-ro passenger ships in national and international traffic are provided on the breakwater's north (inner) side.



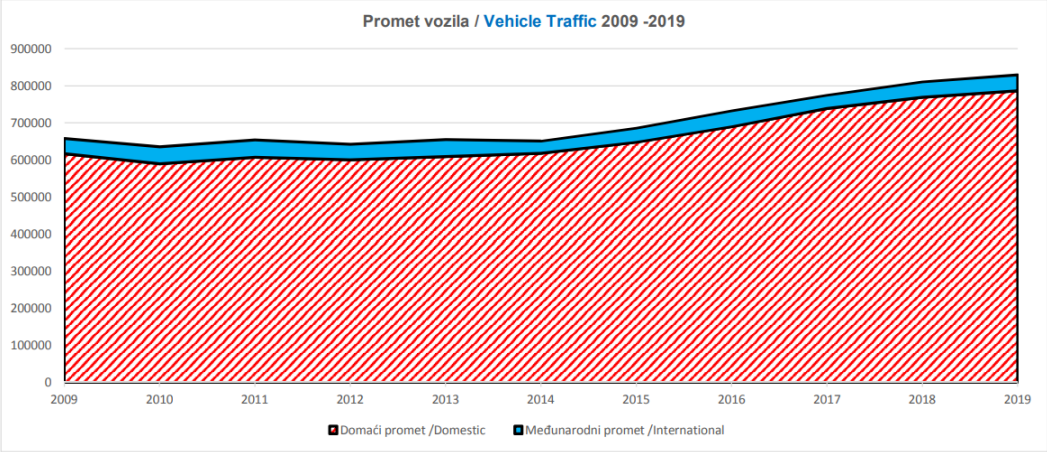
The Port of Split is the leading passenger's and vehicle's port for Dalmatian destinations on the islands and along the coast. From the Split's port are also maintained the daily ferry connections to Italy.

Above all, the Port of Split's importance is to transport the local population, connect the medieval islands to the mainland, and serve a large number of tourists, both in transit and at the final destination. Passenger traffic is dominated by domestic traffic, with around 90 % of all transported passengers, of which over 40 % is generated in the summer. Passenger numbers are on the increase annually, and in

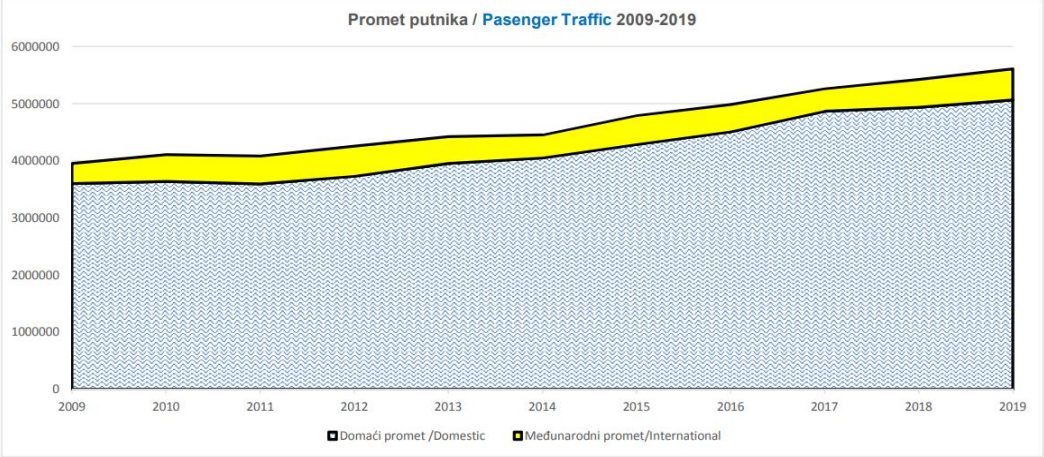
2016 the number of passengers crossed the border of five million passengers and continued to increase. In 2019, five million passengers were already registered for the first nine months. In the last four years, excepting the Covid year 2020, the number of passengers rose on average by 5 % per year and has tripled the number of passengers over the last two decades. The number of vehicles carried is increasing by similar yearly rates.

In 2019, almost 830,000 vehicles were transported through the Port of Split, 5.6 million passengers and 282 Cruise ships with nearly 360,000 passengers.

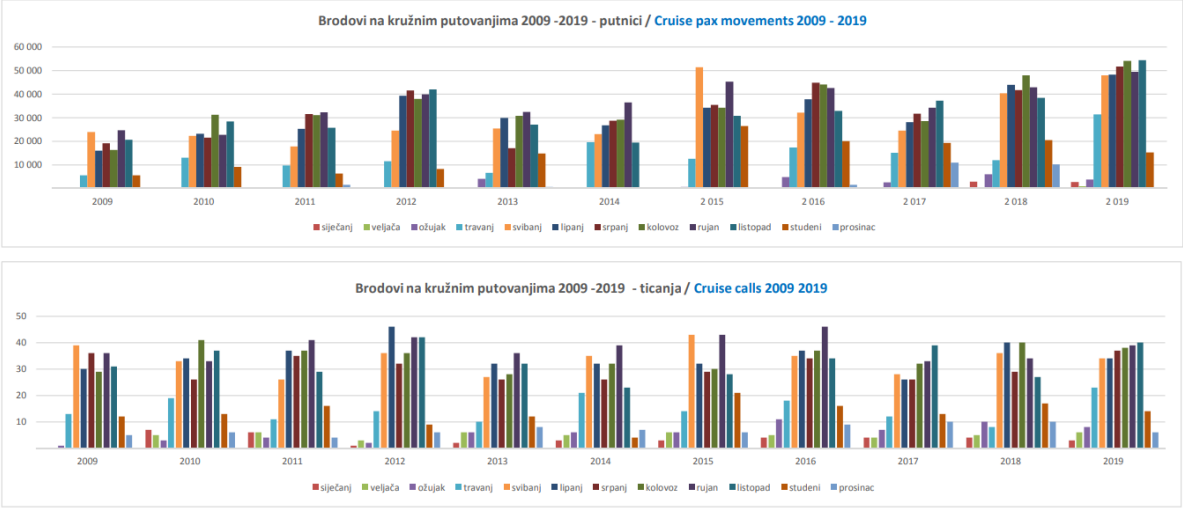
Vehicle Traffic in the Port of Split in the period 2009-2019:



Passenger Traffic in the Port of Split in the period 2009-2019:



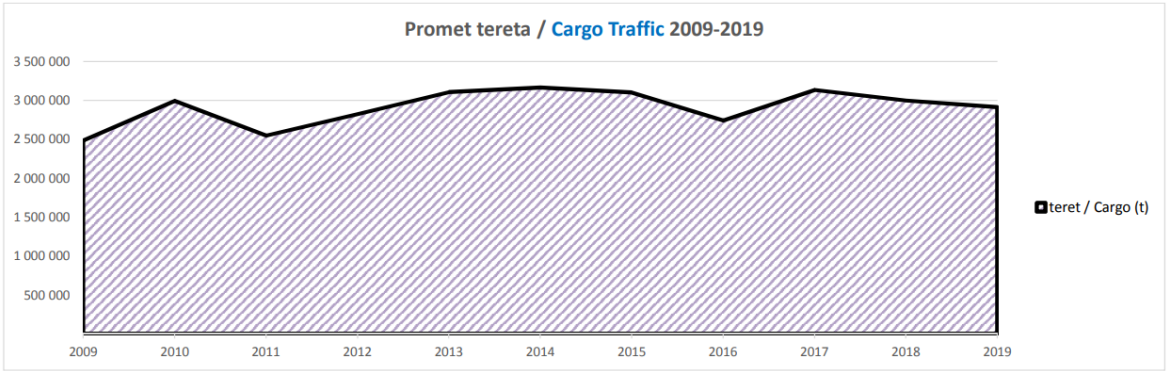
Cruise Traffic in the Port of Split in the period 2009-2019:



For 2021, there is currently an announcement for 312 cruise ships arrivals (in 2019 there were 282 and in 2018 were 260 arrivals).

The majority of the passenger and vehicle traffic in the connections between the mainland and the islands is carried out by the Croatian shipping company Jadrolinija, which also connects Split to Ancona's international port. Next to Jadrolinija, there are few private-lead operators: Kapetan Luka – Krilo, Bura Line and Krilo Shipping Company (KSC), which maintain the lines between Split, medieval islands and Dubrovnik. The international route Split-Ancona-Split is operated by the Croatian company Jadrolinija and by the Italian companies SNAV and Blue Line.

Port of Split maintains the continuous annual volume of cargo traffic of about three million tones per year.



In the following text, we are concentrating on the passenger's transport which is the topic of the E-Chain project.

4. ACCESS TO THE PORT AND TRANSPORT LOGISTICS

The main passenger terminals of road, maritime and railway traffic in Split are located on the eastern part of the city's port of Split, where public transport is taking place, and busses' departure and arrival. Such location enables fast and easy communication and transfer of passengers.

Access to the Port of Split from the sea:

Due to deep protrusion in island area, the port's access is enabled by coastal or internal access waterways through Drvenik, Šolta and Brač channel and "Splitska vrata" ("Split's door").

The passage "Splitska vrata "("Split's door") is the shortest coastal access waterway to Port of Split. The passage in the length of ca. 2 M is situated between the island Šolta and Brač. The access to the Port of Split through Hvar and Brač channel in the length of 55 M is the longest access waterway from the open sea, and less used due to its length.

Access to the Port of Split from the mainland:

The Port of Split is located practically in the centre of the Split city. This is a specific location where all transport services, except the Airport, are located – the port, the central bus station, the central train station, taxi station. The central bus and train station are located only across the road from the port.

Road connectivity is provided by the A1 motorway and the D8 and D1 state roads.

Railway traffic to and from Split takes place via the north-south corridor, which, in the long-term development of railway transport at the level of the European Union, will form a segment of the Adriatic-Ionian corridor. The said corridor consists of two sections under the designations M604 and M202.

Split Airport is located 20 kilometres by road from the centre of Split and provides transport connections with the most important European destinations. Several possibilities are to reach the port from the Airport:

- shuttle bus,
- public bus,
- land taxi or

- rent-a-car, which is available also at the Airport (several rent-a-car operators).

In some cases, the access Airport to the Port of Split can also be the Airport of Zadar (153 kilometres by road) and Airport of Dubrovnik (248 kilometres by road).

5. STAKEHOLDERS ANALYSIS

The stakeholder analysis identifies all main stakeholders involved in the passenger's transport activities in the Split's port area first and, after that, analysing their services and their initial requirements. In the services' scope, we were especially curious about their digitalisation range and e-aspects in their services. We have analysed this through the personal interviews, using the questionnaires prepared as a part of this project.

5.1. IDENTIFICATION OF THE MAIN STAKEHOLDERS

In the meaning of the transport analysis on the Split's port area, we have identified the following main stakeholders:

- Split Port Authority,
- Promet Split,
- Association of taxi carriers Split,
- A shuttle bus Airport Split – Split – Airport Split provider (Pleso prijevoz)
- Central bus station (as an institution),
- Croatian State Railways (Hrvatske željeznice),
- Jadrolinija,
- Krilo – Kapetan Luka,
- KSC,
- Bura Line,
- Split Airport (as an institution),
- Split Parking.

Some other stakeholders who are not directly involved in the transport sector but are for this project at great importance are the following:

- Split-Dalmatia County,
- Tourist Board of the City of Split,
- The Association of Tourist guides Split.

5.2. ANALYSIS OF THE STAKEHOLDER'S SERVICES

We have made contact with most of the abovementioned stakeholders, with the goal to do the interviews with the prepared questionaries with them. The interviews are done with the following stakeholders:

- Split Port Authority,
- Promet Split,
- Association of taxi carriers Split,
- A shuttle bus Airport Split – Split – Airport Split provider (Pleso prijevoz)
- Split Parking,
- Split-Dalmatia County,
- Tourist Board of the City of Split.

These are the conclusions:

- There is relatively low knowledge about the available IT platforms in transport which support the CO_2 reduction.
- There is significant awareness of the impact of the transport burden in ports areas on CO_2 emissions.
- A general belief is that the E-CHAIN project will contribute to the reduction of CO_2 emissions caused by the passenger's transport.
- A general opinion is that the best way to manage the multimodal transport IT platform for the port's areas includes:
    - improvements in the digitalisation of service processes,
    - creation of an open database and to foster the development of various solutions from the application's developers, the market itself will identify the best possible,
    - networking of stakeholders,
    - transparency of data,
    - continuous up-to-date and transparent information.
- A general belief is that the realisation of the E-CHAIN project will improve the quality, safety and environmental sustainability of maritime and coastal transport services (due to better information for passengers, reducing traffic congestions and the traffic burden in the city centre etc.).
- A general belief is that integrating different services/systems for multimodal transport in the complete solution (that contains timetables, travel solutions that optimise resources, events in real-time etc.) will improve mobility.

- The interest in the cooperation in the development phase of the E-CHAIN project is relatively high from all interviewed stakeholders.
- The interviewed stakeholders evaluate the level of information about their services' availability to potential users as medium to high. They all believe that the E-CHAIN platform can increase the visibility of their services significantly.
- The interviewed stakeholders evaluate the degree of integration of their services with other services (e.g. transport, tourist information, culture) differently, from low to medium and high. The most often limiting factors for higher integration are current commercial policy and level of technical and technological readiness of the stakeholders themselves and/or other service providers/stakeholders).

Besides provided interviews, we have also checked available information on the stakeholder's web sites and other publicly available resources. We have also reviewed available information by some other connected services providers. These are the conclusions:

Main stakeholders and other connected services providers	**Mobile Application**	**Online Reservation / Ticketing**	**Web page / Available languages**
Port of Split	No	n/a	CRO / EN
Jadrolinija	Yes	Yes	CRO / EN / DE / IT
Kapetan Luka – Krilo	No	Yes	CRO / EN
Krilo Shipping Company (KSC)	No	Yes	CRO / EN
Bura Line	No	No	CRO / EN
Promet Split	No	No	CRO / EN
Central Bus Station	No	No	CRO / EN
Central Train Station	Yes	Yes	CRO / EN
Shuttle Bus Airport-Split-Airport	No	Yes	CRO / EN
Taxi carriers	Yes (only the biggest company)	Yes (web, Facebook profile application, e-mail)	CRO / EN (only the biggest company)
Split Parking	Yes (Split parking, Next bike)	Yes	Web: CRO Mobile app: CRO / EN
Electric Chargers	Yes: puni.hr and Tesla. No: Elen	No	CRO (Elen) CRO / EN (Tesla, puni.hr)
Split Airport	No	n/a	CRO / EN
Split-Dalmatia County	No	n/a	CRO / EN
Tourist Board of Split	No	n/a	CRO / EN / DE / FR / IT / ES
The Association of Tourist guides Split	No	No	CRO / EN

The main shortcoming is that there are practically no integrations between systems. Under integration, we consider integration on two levels:

- the first or the lower level of integration is the integration of systems among transport services providers;
- the second or the higher level of integration is the integration among transport services providers and other complementary services to transport services.

The state-of-the-art analysis (Delivery 3.1.1) showed that the integration level is very low. The second-level integration does not exist.

6. SWOT ANALYSIS

This is the SWOT analysis of the pilot site Split regarding the intermodal transport in the port area:

Strengths:

- Location: All passenger's transport operators are centralised at one location, which makes it easier to combine different transport options.
- Location: The Port of Split is situated practically in the historical city centre, which brings easiness and a broad range of possibilities to combine different services available on the platform.
- Tradition: A long tradition of a port with excellent knowledge capacity and rich experiences.
- Tradition: A long tradition of the vacancy on dalmatian islands by the travellers from the multiple European countries.
- Available destinations: The Port of Split connects Split with multiple island destinations and destinations along the coast.
- Readiness to enhance the digitalisation of services: Jadrolinija, the leading operator in the Port of Split, has already made an important step to digitalise services to come closer to the user's needs. The same situation is with the Split Parking for both the parking and the public bicycle system. Promet Split plans to digitalise services during 2021.
- Awareness: Among the key stakeholders is an excellent understanding of digitalisation and intermodal transport services' potential benefits. Also, they encourage the intermodulation of transport and complementary services.
- Availability of multiple services: In the port area and its surroundings, multiple transport and other services are available. The E-CHAIN project is an excellent opportunity to connect them and made them available as an intermodal service.

Weaknesses:

- Location: Often traffic congestions on the roads to the port and in the port area, especially during the tourist season.
- Parking infrastructure: Only a small number of parking places are available at the port's location and its vicinity.
- Lack of E-mobility services: They are not sufficiently available (electric chargers, (electric) bikes, car sharing etc.).
- Low digitalisation level of available services: There is a great mass of services available, but, they are not adapted to today's traveller who seeks digitalised services, transparent and quick information available whenever the need occurs, but without pushing him.
- Low integration level: There is practically no integration between service providers/services/stakeholders.

Opportunities:

- Potential: There is a lot of space available for improvements in service quality. A step forward of the state-of-the-art can be enormous.
- Integration of services on two levels and synergy potential: First level integration: transport services. Second level integration: transport services with complementary services. Tourism is one of the most complex industry with enormous synergies among services.
- Horizon Europe: Digitalisation and decarbonisation are two main areas that will be a high-level priority in the EU programmes for 2021-2027. Lots of opportunities will be available to finance those actions, including e-mobility and digitalisation.
- Sustainable Urban Mobility Plan (SUMP) of the City of Split: Objectives set in the SUMP are excellent, high-standing targets which will be a strong motivation for all stakeholders involved in the E-CHAIN project.
- Contribution to the air quality in the port area: The digitalisation of services, their integration and offering the user a better mobility experience, a significant contribution to the air quality in the port area can succeed, due to lower CO_2 emissions from the transport.

Threats:

- Competition: Other ports could be prepared better and sooner to attract today's, digitally oriented passenger.
- Cruising companies' policies and business strategies: Cruising companies could select other destinations as priorities for their cruising programmes.

7. INTEGRATION OF THE E-CHAIN PROJECT INTO THE SUMP SCOPES

The City of Split is required to compile the Sustainable Urban Mobility Plan (SUMP). The City of Split has recently finalised the SUMP, and it is ready for admission to the submission procedure by the city of Split.

In the SUMP, the following objectives for sustainable urban mobility are set:

1. Ensuring equal rights of mobility for all users.

The promotion of sustainable modes directly impacts the reduction of motorisation, reducing congestion in cities, increasing the level of safety and reducing emissions of harmful gases. Fostering equal rights to mobility for all users can be implemented through: improving the pedestrian traffic, improving cycling traffic, strengthening and popularising public passenger transport, strengthening and stimulating maritime transport, ensuring accessibility of public spaces and space for vulnerable groups (persons with disabilities, older people, and disadvantaged social status), popularising sustainable local mobility.

2. Safety transport.

One of the most critical aspects of the transport system in a city is to maintain security. To increase the level of security in transport in Split, SUMP defines objectives, which primarily contribute to the safety of pedestrians, cyclists, and also other road users.

3. The City of Split and its sub-urban areas are connected with sustainable mobility.

The main prerequisite for reducing the rate of motorisation and the number of vehicles in Split is the disincentive to travel within the area of Split by car and a reduction in the number of vehicles migrating daily to Split. The main prerequisite for all this is to provide a good alternative. One of the main options is strengthening public transport modes and their integration with individual modes of operation. There are several options available to connect Split and the sub-urban with sustainable forms of transport. For example, it is necessary to enhance public transport, increase the multimodal possibilities in favour of sustainable mobility, establish an integrated passenger transport options, improve the development of P & R, the B & R system etc.

4. Sustainable freight/delivery transport.

Likewise, fostering sustainable freight/delivery can be achieved by increasing the availability of goods to everyone in an optimal way. For example, by ensuring safe and optimal loading/unloading locations, the timing of delivery and delivery of goods to eco-friendly vehicles.

5. The City of Split — energy-efficient and environmentally clean city.

The objective of the SUMP is also to foster the environmental performance of the city by reducing the consumption of fossil fuels in transport, reducing emissions of harmful gases and air pollution, reducing noise emissions in particular in the city centre, smart traffic management and reducing the intensity of motor vehicles in residential areas, and thereby also reducing the level of occupation of public car space.

The E-CHAIN's project's overall objective is "to enhance connectivity and harmonisation of data for the Adriatic Intermodal Network, through the realisation of modular software (E-CHAIN platform) for the management of intermodal transport services in port areas for passenger to improve efficiency, quality, safety and environmental sustainability of marine and coastal transport services.

E-CHAIN will:

- allow integration between different services/systems for a multimodal transport providing timetables and trip solution optimising resources, real-time events in a seamless solution;
- include booking&ticketing to allow integrated payment of transport modes operated by different operators in a "single windows". This will be possible thanks to the integration between IT systems and stakeholder involvement.

Those joint efforts for enhancing the quality and environmental sustainability of services and node will surely contribute to a reduction of the CO_2 emissions for transport scopes."

Let us compare the objectives from SUMP with the objectives of the E-Chain project.

We can conclude that the project will contribute to all objectives from the SUMP, aiming to improve the sustainability of the passenger's transport. Among them, the E-Chain project will contribute the most to two objectives:

- safety transport (SUMP objective no. 2):
    - safe walking for all age groups,
    - safe cycling for all age groups,
    - a safe way to school, home, kindergarten,

  - safe travelling;
- the City of Split – energy-efficient and environmentally clean city (SUMP objective no. 5):
  - reducing the consumption of fossil fuels in transport,
  - reducing emissions of harmful gases and air pollution,
  - reducing noise emissions, especially in the city centre,
  - smart traffic management,
  - reducing the intensity of motor vehicles in residential zones in the city centre.

8. BENCHMARK ANALYSIS

Regarding the whole concept, the most appropriate seems to be a comparison to the local ports, Zadar and Dubrovnik. These are the ports with the comparable infrastructure, destinations, services, passengers, and finally, the passengers' mentality and expectations. As we can conclude from the publicly available information, the transports and other services in the ports Split, Zadar and Dubrovnik are on a similar digitalisation level and intermodality level, even though the Zadar Cruise Port is practically new.

Zadar Cruise Port

Zadar Cruise Port is situated 4 kilometres from the historical centre of Zadar and 7 kilometres from the international Airport Zadar. Zadar Cruise Port serves cruise passengers as well as international ferry, Ro-Ro and vehicles. The cruise ports infrastructure includes a maximum draft of 13m and 1170m of total pier length, accommodating ships of any sizes.

Zadar Cruise Port joined Global Ports Holding network in 2018. In 2019 new passenger terminal at Zadar Cruise Port was inaugurated. In the same year, Zadar Cruise Port has been named the Port of the Year at the Seatrade Cruise Awards 2019. In 2020 Zadar Cruise Port terminal has received New Terminal Development award by Cruise Insight. The award-winning terminal marks the next step in the development of Zadar as an exciting and essential cruise destination. The terminal extends over 18,000 m^2 on two-storeys. Hosting both cruise and Ro-Ro passengers, the modern passenger terminal is compliant with high security and safety standards. There are check-in, luggage delivery, and customs areas, large-sized x-rays and a large parking facility that allows efficient turnaround operations. The terminal has shops, cafes and a supermarket providing comfort for passengers and crew members. Zadar Cruise Port has been fully committed to introducing the best port management practices to achieve operational excellence and enhanced guest experience. The port has one terminal and five berths.

Regarding international lines, Zadar Cruise Port has an international line to Italian international Port of Ancona.

The following pictures are presenting the Zadar Cruise Port:

The City of Zadar and ZADRA NOVA, the City of Zadar's development agency, provides several projects on sustainable mobility. Multiple such projects are also yet finished. One of the projects on sustainable mobility currently providing and is almost finished is the project named "SMILE - FirSt and last Mile Inter-modal mobiLity in congested urban arEas of Adrion Region".

SMILE is focused on the first and last mile of mobility in some variegated and paradigmatic urban areas of Adrion Region, embracing coastal, inland and bordering cities of different size (capital, middle, little). Urban areas are the place where everyday residents, commuters and tourists face consequences of unsustainable mobility models and lack of effective multimodal solutions: air pollution, aggravated in many urban areas involved in SMILE by the circulation of obsolete diesel vehicles, congestion and related waste of time, CO_2 emission, noise, accidents, too public spaces occupied by cars. SMILE will address these issues through a logical sequence of actions and related outputs: depiction and comparison of mobility scenarios to enable policymakers and key stakeholders to understand consequences of inaction/action better; elaboration of a transnational SUMP-Sustainable Urban Mobility Plan as a common cognitive umbrella under which to elaborate (or reinforce, where already initiated) local SUMPs mirroring local specific situations; to test by residents, commuters, tourists, freight and bus tour operators some IT-Information Technology solutions (APPs/Platforms) aimed at reducing/curbing congestion, promote intermodal solutions and make more efficient traffic flows. SMILE will strongly contribute to the achievement of EUSAIR strategy (Pillars 2 &3: "Connecting the Region"; Sustainable Tourism").

SMILE is financing through the INTERREG Adrion - Adriatic-Ionian programme of transnational cooperation 2014-2020. A lead partner is Regional development centre Koper. Zadar County Development Agency ZADRA NOVA is a project partner.

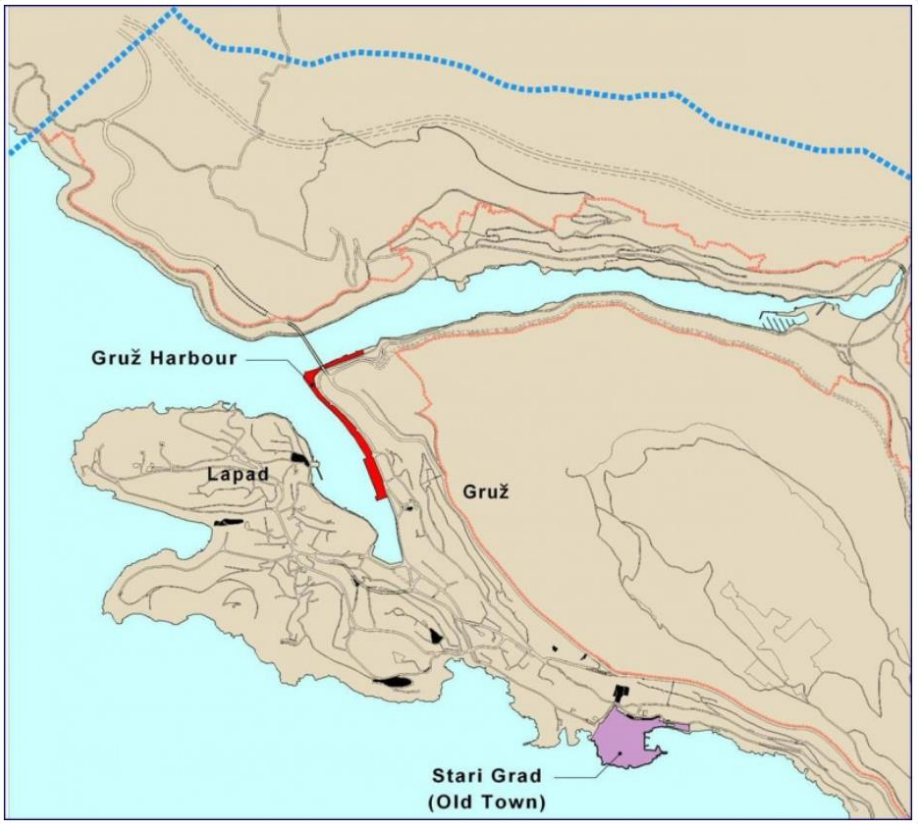
The Port of Dubrovnik – Gruž

The Port of Dubrovnik is situated 2 kilometres from the historical town Dubrovnik and 20 kilometres from the international Airport Dubrovnik. From the seaside, the port is approached from the south-west through "Velika Vrata"; the north-west entrance is through Koločep channel.

The Port of Dubrovnik has one passenger's terminal and nine berths. The ports infrastructure includes a maximum draft of 11m and 1600m of total pier length, accommodating ships of any sizes. In the port area, there are 300 public parking places.

Regarding international lines, The Port of Dubrovnik has an international line to Italian international Port of Bari.

The following picture is presenting the Port of Dubrovnik:



The City of Dubrovnik has ended with the development of the SUMP and is already providing several plans and programmes to achieve the objectives of the SUMP. The City of Dubrovnik and its development agency are implementing multiple transport and mobility projects in international cooperation with various partners. One of them is Interreg Adrion project INTER-PASS.

"INTERPASS - Intermodal Passenger connections between ports and airports" is a project approved by the INTERREG ADRION programme. The project started in January 2018 and has finished at the end of 2020. The project involved eight project partners from Italy, Croatia and Greece and one associate partner. Dubrovnik Airport and Dubrovnik Port Authority were projects partners.

Dubrovnik is one of the many maritime cities that have to deal with a very high number of passengers during the peak season. Cruise tourism is an essential factor of regional and local development. However, most of these "homeports" for cruisers&ferries are suffering from lack of integration within various modes of transport, especially with regional airports. The overall objective of the INTER-PASS project was to enhance the intermodal connections between ports and airports in the Adriatic-Ionian

Region to improve passengers' processing, mainly cruise tourists and travellers reaching tourist destinations on Adriatic and Ionian coasts during the peak season. During two years of project duration, the partners worked together to concretely improve the current situation by contributing to a higher transnational coordination among countries in the development and implementation of the integrated passenger transport system and intermodality, reducing existing disparities and creating the opportunity to implement smart solutions to the identified challenges in the field of tourist transport.

The project has produced three concrete outputs:

- Cooperation networks on intermodal and multimodal connectivity between ports and airports located in the Adriatic-Ionian Region. The established network should become a place where partners and other stakeholders can exchange knowledge on innovative solutions (techniques, methods, operating codes etc.) that could be easily and successfully adapted in the Adriatic-Ionian context.
- Action plan for each territory which defines solutions to be tested and implemented in involved cities. The testing of four identified solutions to be implemented in Dubrovnik, Pula, Bari, and Corfu to speed up the tourist processing between ports and Airport concretely.
- Elaboration of a joint Integrated Strategic Plan for multimodal passenger transportation between ports and Airports to be shared with other ports, airports, and authorities located in Adriatic-Ionian Region.