

D 3.3.1 – USE CASE SCENARIOS SELECTION AND PRELIMINARY REQUIREMENTS DEFINITION

Activity 3.3 – Technical and functional requirements

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TABLE OF CONTENTS

Version control.....	3
Acronyms / Abbreviations.....	6
Reference documentation.....	6
1. Introduction.....	7
1.1 Purpose of the DOCUMENT.....	7
1.2 WORKING PRINCIPLE.....	8
2. Background information.....	9
3. SEGMENTATION AND SUB-SEGMENTATION.....	10
3.1 GENERAL INFORMATION.....	10
3.1.1 Zadar County.....	10
3.1.2 The city of Zadar.....	11
3.1.3 Zadar Port Authority.....	13
3.2 IDENTIFICATION OF THE KEY GROUPS OF FINAL USERS (PASSENGERS).....	14
4. USE CASE SCENARIOS IDENTIFICATION AND SELECTION OF THE REFERENCE USE CASE SCENARIOS.....	16
4.1 Port of Zadar - Peninsula.....	17
4.2 Luka Gaženica.....	19
4.3 Railway traffic.....	21
4.4 Air traffic.....	23
4.5 Bicycle system.....	25
4.6 TAXI SERVICE.....	26
4.7 USE CASE SCENARIOS.....	27
4.7.1 Passengers arriving with personal car from Ancona to Split by ferry with a goal of discovering Split and POI near Split reachable by personal vehicle in a 2-hour driving range.....	27

4.7.2	Passengers arriving to Split port by a ferry with a bike as a mode of transport (previously, to Ancona by train from Zurich, Switzerland)	30
4.7.3	Passengers arriving by a ferry from Ancona to Split without any kind of personal transportation vehicles (previously, to Ancona by airplane from London).....	33
5.	PRELIMINARY REQUIREMENTS DEFINITION FOR THE IDENTIFIED USE CASE SCENARIOS.	38

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
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1. INTRODUCTION

1.1 PURPOSE OF THE DOCUMENT

This document is relevant to activity 3.3 Technical and functional requirements of E-CHAIN project - Enhanced Connectivity and Harmonisation of data for the Adriatic Intermodal Network. The purpose of this document is to identify use case scenarios, explain the selection of reference use scenarios for connected mobility services provide initial user, and service provider needs, functional and non-functional requirements for features of a wide platform for transport and connected mobility services.

The information provided in this report, together with information supplied in "Technical and non-technical requirements" (D 3.3.2), serve for drawing design of all pilot sites implementation and specifications prepared for all equipment and systems involved.

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

- by the Task Manager (TM) and Project Team (PT) to provide detailed information E-CHAIN platform functional and technical requirements;
- by the Activity 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

Conceptual scenarios will be devised to better understand the HW/SW partitioning and distribution model in relation to the needs of specific use cases and application scenarios. The characteristics of the existing services within Consortium and standards will be taken into account. Technology and "users" from pilot sites will be represented. Technical and no-technical requirements will be gathered. It will establish and apply a methodology for defining use cases scenarios around possible reference services to be developed and replicated at the 3 project's pilot sites.

Initially, we were aiming that Port of Rijeka will be our focus, considering that head office of PP5, Jadrolinija, is in Rijeka. However, in agreement with other PPs, and considering importance for the maritime passenger sector in Croatia, the Port of Zadar will be our focus.

This document is based on the information and data gathered through the interview of Act. 3.2. and directly in the web sites of the main stakeholders involved in the mobility in the Port of Zadar.

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. SEGMENTATION AND SUB-SEGMENTATION

3.1 GENERAL INFORMATION

3.1.1 Zadar County

Zadar County is located in the central part of the Croatian coast, which is a very favourable geographical and geo-traffic position, especially for the development of road and rail transport and their connection with maritime transport. It connects the northern and southern Croatian coast and southern Croatia with other parts of it, and the position on the Adriatic is very important because it allows easy connections by sea with almost the whole world. The total area of Zadar County is 7,276.2 km² (land part 3,643.3 km², sea part 3,632.9 km²). The county borders Lika-Senj County in the north and Šibenik-Knin County in the south. In the east it borders Bosnia and Herzegovina with a 24 km long state border and in the west with Italy via an 83.4 km long sea border. Geographically, it is surrounded on the seaside by the Cres-Lošinj, Kornati,

The area of Zadar County is determined by its natural position in the Republic of Croatia, i.e., the area is a significant transport link. Zadar County is connected by state roads and the A1 Zagreb - Split motorway, by air, by ferry with Ancona (Italy) and by rail with the rest of Croatia. The A1 motorway passes through the Zadar County area, connecting the northern and southern parts of the national territory of the Republic of Croatia. It connects the two largest Croatian cities - Zagreb and Split and has a connection to Rijeka. Along the A1 motorway, the state road D8, which connects cities on the Croatian coast from Rijeka to Dubrovnik, is of great traffic and economic importance.



Picture 1: Geo-traffic position of Zadar County

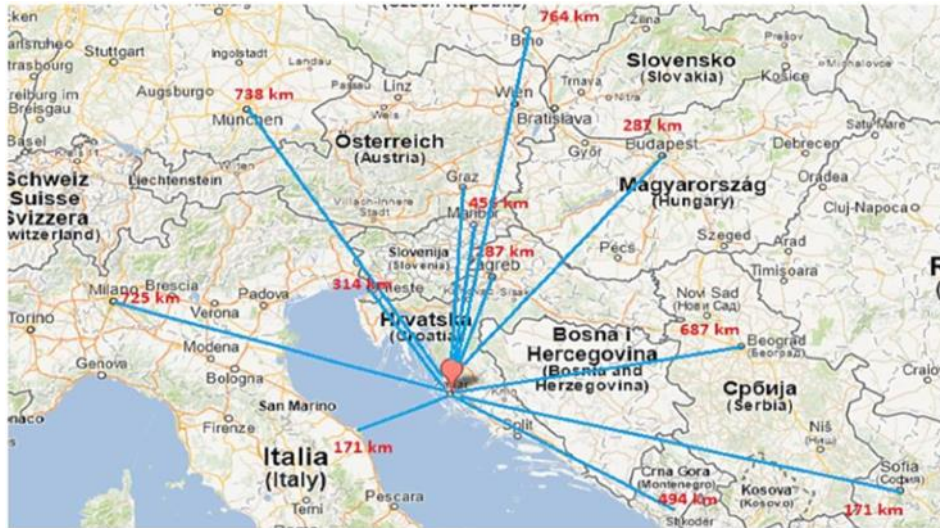
Source: Master plan of the Functional Region of Northern Dalmatia

The main relief feature of the Zadar County area is the number of islands, canals, sea passages, deeply indented sea surface, indented coast, fertile zone of Ravni Kotari and karst hilly and mountainous area. The highest peak of Zadar County is located on the mountain Kremen (1,590 m) in the north of the county.

3.1.2 The city of Zadar

The city of Zadar is the center of Zadar County, but also the region of Northern Dalmatia. Land area of the City of Zadar, an area of 194.02 km² and makes up 5.26% of the total area of Zadar County. It developed in a favorable position in the center of the Croatian part of the eastern coast of the Adriatic Sea, protected by a number of Zadar islands from the influence of the open sea, which was of great importance in the period of predominance of sailing maritime traffic. The mainland coast is the vast plain of Ravni Kotar, which allows it to expand freely, which distinguishes it from most other coastal towns in Croatia. The coastal area is morphologically separated by the Velebit massif, but also connected with Lika and the continental parts of Croatia. The city of Zadar as a unit of local self-government consists of 15 settlements with 75,062 inhabitants. The city of Zadar with 71,471 inhabitants is in fifth place in Croatian cities in terms of population, behind Zagreb, Split, Rijeka and Osijek, and among coastal cities it ranks third, behind Rijeka and Split. Zadar is in the area of the County, the center of the first order, with the largest concentration of jobs and central local functions, which should play the largest role in

encouraging polycentric development of the entire area. In the hierarchy and system of settlements in Croatia, it has the role of a larger regional center with more than 200,000 inhabitants.



Picture 1: Geo-traffic position of the city

Source: Zadar City Development Strategy

The area of the City of Zadar is surrounded by the sea of the Zadar, Iška and Pohlip Channels, and the Kvarner Gate, then the Vir Sea, the passage of Maknara and Sedmovraća, and the open sea part of the Adriatic Sea on the south sides of the islands Premuda, Škarda, Ist and Molat. The border of the City on the stretch of Premuda, Škarda, Ist and Molat is also the last land and water area in the territorial composition of the City of Zadar and the Republic of Croatia, in relation to the neighboring Republic of Italy. The mainland borders on the northwest with the area of the City of Nin, on the north with the municipality of Poličnik, on the northeast with the municipality of Zemunik Donji and on the southeast with the municipality of Bibinje.

The importance and peculiarities of the geographical position of the city of Zadar are manifested in:

- ▶ maritime exposure,
- ▶ near the fertile zone of Ravni kotari, a large gravitational area of the islands, coast and coast,
- ▶ the shortest maritime connection with neighboring Italy (Zadar-Ancona),
- ▶ the absence of relevant urban centers in the wider spatial environment,
- ▶ opportunities for good transport connections (sea route, roads, railways and international airport),
- ▶ water supplies nearby.

The total length of the associated coastline is 312.54 km, of which the mainland is 28.57 km (9.1%), and the island 283.97 km (90.9%). The extremely long and indented coastline offers

various possibilities for its use and emphasizes the maritime and tourist orientation of the economy.

Rich cultural and historical heritage, but also recent artistic and cultural monuments make Zadar a significant tourist center on the Adriatic and the Mediterranean.

3.1.3 Zadar Port Authority

The Zadar Port Authority was established by a decision of the Government of the Republic of Croatia of 18 February 1997 for the management, construction and use of ports open to international public transport, which have been declared ports of special international economic interest to the Republic of Croatia. Ports of special international economic interest for the Republic of Croatia managed by the Zadar Port Authority are:

- ▶ port of Zadar - passenger port,
- ▶ Gaženica port - passenger port,
- ▶ Gaženica port - cargo port,
- ▶ port of Vela Lamjana - fishing port.

The Zadar Port Authority grants concessions for port activities on the basis of the prescribed technical and technological conditions, and on the basis of a public tender. The bodies of the Port Authority are the Governing Board and the Director.

The main port activities are:

- ▶ loading, unloading, transshipment, storage, sorting and processing of goods,
- ▶ mooring and unmooring of ships,
- ▶ port cleaning,
- ▶ embarkation and disembarkation of passengers and vehicles,
- ▶ other services in the port for which the concession is granted, such as water, energy and telephone services, provision of services to passengers and ships, port mechanization services, agency and forwarding activities, quality and quantity control of goods and other services.

Effective protected areas and areas of the Natura 2000 ecological network are also one of the mechanisms for preserving the diversity and favorable condition of habitats and species. The Law on Nature Protection defines 9 categories of protected areas, the most famous of which are national parks and nature parks. There are 20 protected areas in the Zadar County that are taken care of by public institutions.

The area of protected areas in Zadar County covers 79,091.59 ha, which is 10.53% of the territory. The following is a list of all protected areas in the territory of Zadar County with the year of their proclamation:

3.2 IDENTIFICATION OF THE KEY GROUPS OF FINAL USERS (PASSENGERS)

The existing road network in the Zadar County consists of dividing and transverse routes. The most important road routes are Zagreb-Lika-Zadar-Split, Rijeka-Zadar-Split and Zadar-Benkovac-Knin. Roads passing through these corridors connect many settlements between which there is intensive state, county and local traffic. The construction of the A1 Zagreb-Split-Dubrovnik motorway enables optimal connection of Zadar County and inclusion in European traffic corridors. All state roads in the county are paved, arranged and equipped, but there is a need to build and arrange bicycle paths in the protection zone of roads.

In county and local roads, the situation is such that there are unpaved sections of the so-called macadam, 48.60 km of county roads and 181.97 km of local roads. A road network has been built on most of the islands, which is also a basic precondition for connecting all the settlements of each island into a homogeneous spatial and economic whole. The backbone of the county road network on the mainland of Zadar County consists of roads that connect the largest settlements of the County; Zadar, Nin, Pag, Biograd na Moru, Benkovac, Obrovac and Gračac, with each other and with the largest settlements of neighboring counties. These roads are also very intensive local traffic that arises from the needs of the population and the location of the settlements belonging to the area. According to the Central Bureau of Statistics, in 2018 the total length of road infrastructure in Zadar County was 1,799 km.

Favourable traffic-geographical position, good transport connections with state transport corridors, as well as constant investment in road infrastructure and positioning of Zadar on the national traffic map make Zadar one of the best traffic-connected cities in Croatia. Regardless of the good transport connection of Zadar with the state transport corridors, the existing transport system within the city area is not at a satisfactory level. A unified transport system was not achieved because individual transport branches were developed separately, which reduced the efficiency of transport as a whole. The basic street network of the city is characterized by insufficient throughput in times of peak load (especially in season), as well as the lack of a system of complete coordination of traffic lights.

transformation of port systems into modern logistics and distribution economic centres. The port system basically meets the needs of international maritime transport, so the focus of the development of the port system should be shifted to the improvement of domestic maritime transport and nautical tourism as a recreational aspect of maritime transport.

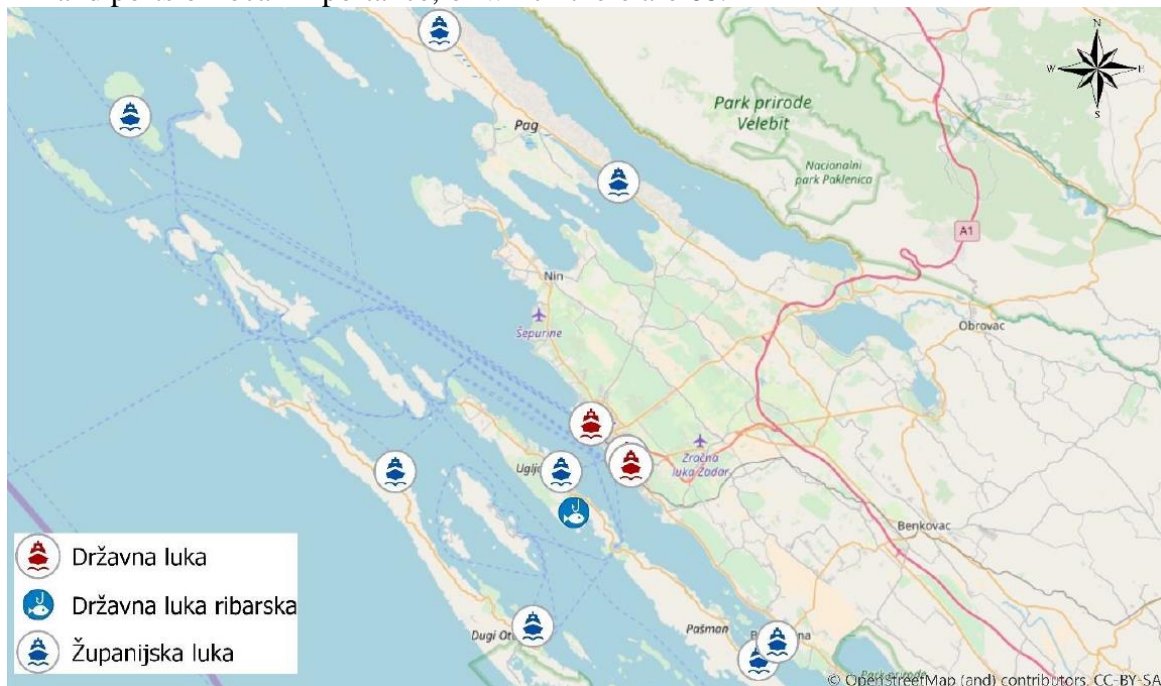
According to the Spatial Development Strategy of the Republic of Croatia, seaports of international economic interest to the Republic of Croatia are Rijeka, Šibenik, Zadar, Split, Ploče and Dubrovnik.

Ports of public transport of county and local significance (76 in total) are managed by the County Port Authority, whose founder is the Zadar County, while the Port of Zadar is managed by the Zadar Port Authority. The County Port Authority manages 17 ferry ports that are intended to connect the island towns with the city of Zadar and the surrounding islands located on the route of

the same ferry lines. Ferry ports are in: Preko, Tkon, Biograd, Iž - Bršanj, Brbinj, Zaglav, Ist, Olib, Premuda, Rivnja, Sestrunj, Molat, Rava, Mala Rava, Zverinac, Brgulje and Zapuntel.

In accordance with the Decree of the Ministry of the Sea, Transport and Infrastructure 15, ports in the Zadar County are classified according to size and importance for the Republic of Croatia into:

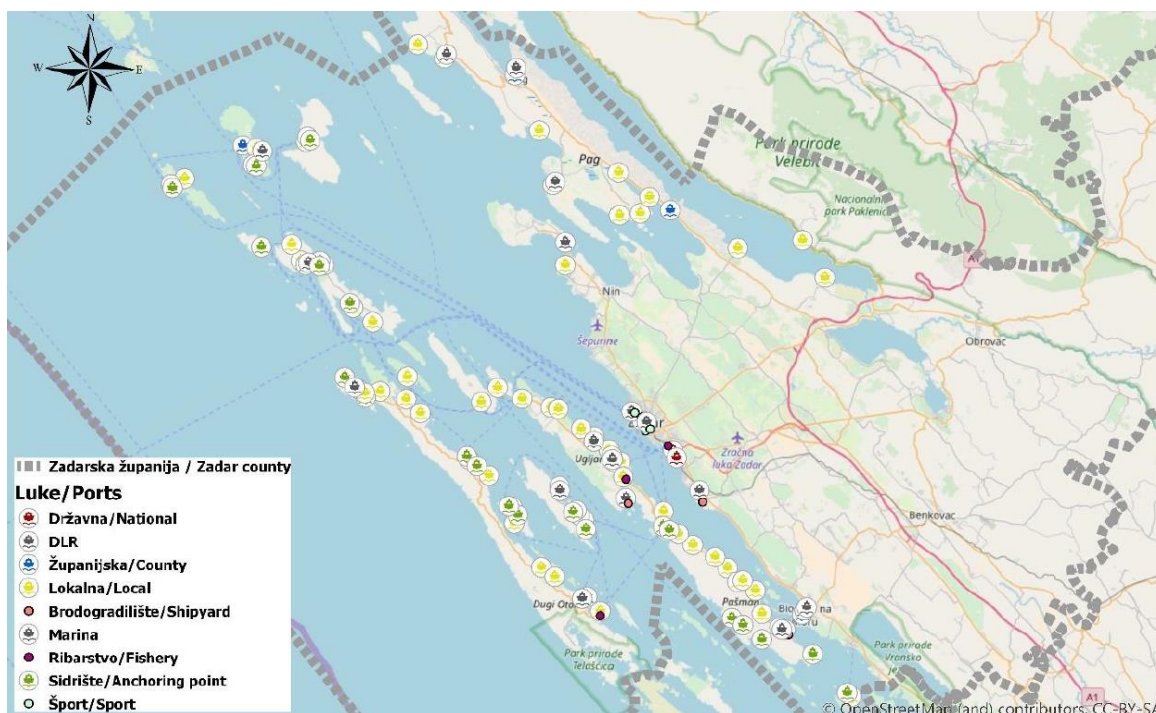
- ▶ ports of special (international) economic interest for the Republic of Croatia, of which there are 3, of which one is passenger, one cargo and one fishing,
- ▶ ports of county importance, of which there are 8,
- ▶ and ports of local importance, of which there are 68.



Picture 4: Ports of state and county significance of Zadar County

Source: Draft Transport Master Plan FR North Dalmatia

In the area of Zadar County, there are also special purpose ports, namely: nautical tourism ports, sports ports, military ports and fishing ports. There are 7 nautical tourism ports with more than 200 berths each, while 9 more are planned. In Zadar County, in the municipalities of Sukošan and Bibinje, there is the largest nautical port on the Adriatic D Marin, which covers an area of 35 ha. It is equipped with over 1200 berths in the sea and over 500 berths on land. There are two sports ports, while there are eight military ports and two fishing ports.



Picture 5: Seaports of Zadar County by importance

Source: Draft Transport Master Plan FR North Dalmatia

Problems of maritime traffic are related to insufficient equipment of ports of county and local importance, and insufficient number of shipping lines. The construction of the passenger port Gaženica has contributed to relieving traffic in the centre of Zadar and states the challenge of developing freight transport for which the basic condition is better railway infrastructure and connectivity and the need for inter-island connections.

4. USE CASE SCENARIOS IDENTIFICATION AND SELECTION OF THE REFERENCE USE CASE SCENARIOS

The port of Zadar - Peninsula and the new ferry port in Gaženica are of the greatest importance for passenger maritime traffic in the area of the city of Zadar. International, state and local maritime transport functions are performed in these ports. Ferries from Zadar (port Gaženica) operate on the following lines:

- ▶ Zadar - Ist - Olib - Silba - Premuda - Mali Losinj,
- ▶ Zadar - Ošljak - Preko,
- ▶ Zadar - Rivanj - Sestrunj - Zverinac - Molat - Ist,
- ▶ Zadar - Brbinj,

- ▶ Zadar - Bršanj - Rava - Mala Rava.

Speedboat traffic (port of Zadar - Peninsula) takes place on the following lines:

- ▶ Zadar - Premuda - Silba - Olib,
- ▶ Pula - Unions - Susak - Mali Losinj - Ilovik - Silba - Zadar,
- ▶ Zadar - Molat - Ist,
- ▶ Zadar - Rivanj - Sestrunj - Zverinac - Bozava - Brbinj,
- ▶ Zadar - Mali Iz - Veli Iz - Mala Rava - Rava,
- ▶ Zadar - Sali - Zaglav - Bršanj.

Ship traffic (port of Zadar - Peninsula) takes place on the following lines:

- ▶ Zadar - Mali Iz - Veli Iz - Mala Rava - Rava,
- ▶ Zadar - Sali - Zaglav,
- ▶ Zadar - Preko.

The eastern and western sides of the Adriatic are connected with the international line Zadar - Ancona.

The eastern and western sides of the Adriatic are connected with the international line Zadar - Ancona.

4.1 PORT OF ZADAR - PENINSULA

The existing passenger traffic (high-speed and ship) in the port of Zadar takes place in the area of Liburnska (730 m) and in the extension of the Istrian coast (260 m), which makes almost 1000 m of operational coast with 10 berths. The construction of the passenger port of Gaženica significantly relieved the traffic in the port of Zadar, mostly due to the relocation of ferry lines to the port of Gaženica, which increased the safety of entry and exit to the port, which was on the verge of sustainability.

Purpose of berths in the passenger port of Zadar (Peninsula):

- ▶ Berth 1b: Passenger ships in international navigation, border control of yachts and boats,
- ▶ Berth 1: Passenger ships in international navigation, border control of yachts and boats,
- ▶ Berth 2: Passenger ships in domestic and international navigation, passenger ships on regular and special passenger lines, excursion ships, tenders from ships at anchor, yachts,
- ▶ Berth 3: Passenger ships on regular and non-scheduled passenger lines in domestic traffic, excursion ships, yachts,
- ▶ Berth 4: Passenger ships on local lines, barkajoli,
- ▶ Berth 5: Passenger ships on local lines,
- ▶ Berth 6: Passenger ships on local lines,
- ▶ Berth 7: Fishing boats (out of season), pleasure boats, yachts,
- ▶ Berth 8: Fishing boats (out of season), pleasure boats, yachts,
- ▶ Berth 9: Fishing boats (out of season), pleasure boats, yachts.



Picture 6: Passenger port Zadar

Source: <http://www.port-authority-zadar.hr/poluotok/>



Picture 7: Port of Zadar - Peninsula

Source: eZadar

4.2 LUKA GAŽENICA

The new passenger-ferry terminal in Gaženica covers a total of 250,000 m² with a total of 3,000 m of operational shoreline and a depth of 13 - 15 m, which enables the reception of even the largest vessels. The Port of Gaženica, with its internal roads, terminal buildings and car waiting areas, has the condition for the following simultaneous boarding and disembarking of passengers and cars:

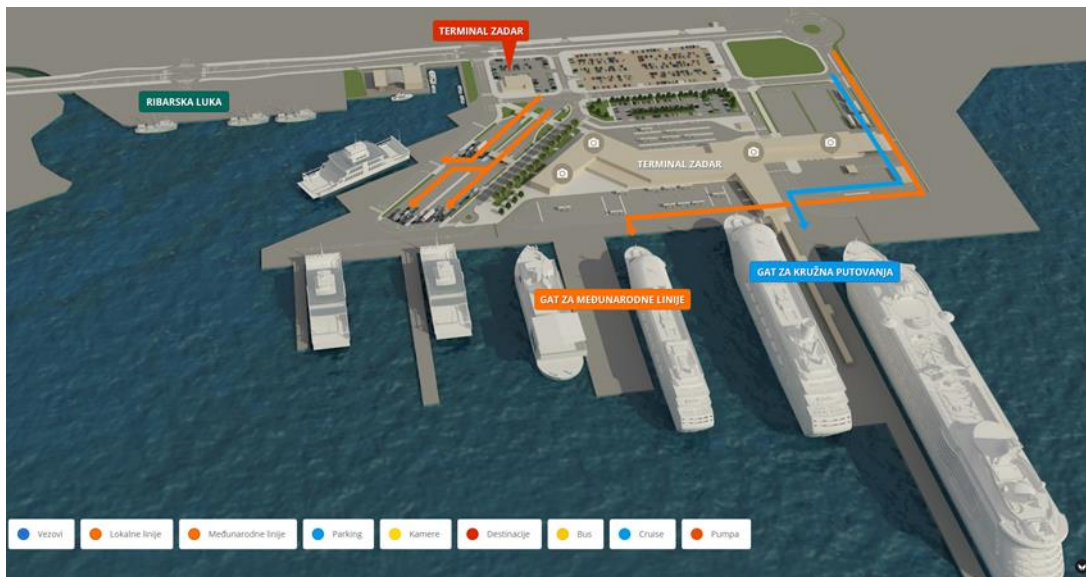
- ▶ 7 ferries on local lines 50-150 m long;
- ▶ 2 ships in international navigation 150-200 m long;
- ▶ 3 ships on cruises 200-350 m long as well as the possibility of accepting RO-RO ships on the same piers.

Back in 2015, the entire local and international ferry traffic was moved from the port of Zadar to the new port of Gaženica, which greatly relieved the traffic on the Peninsula.



Picture 16: Luka Gaženica

Source: Jutarnji list

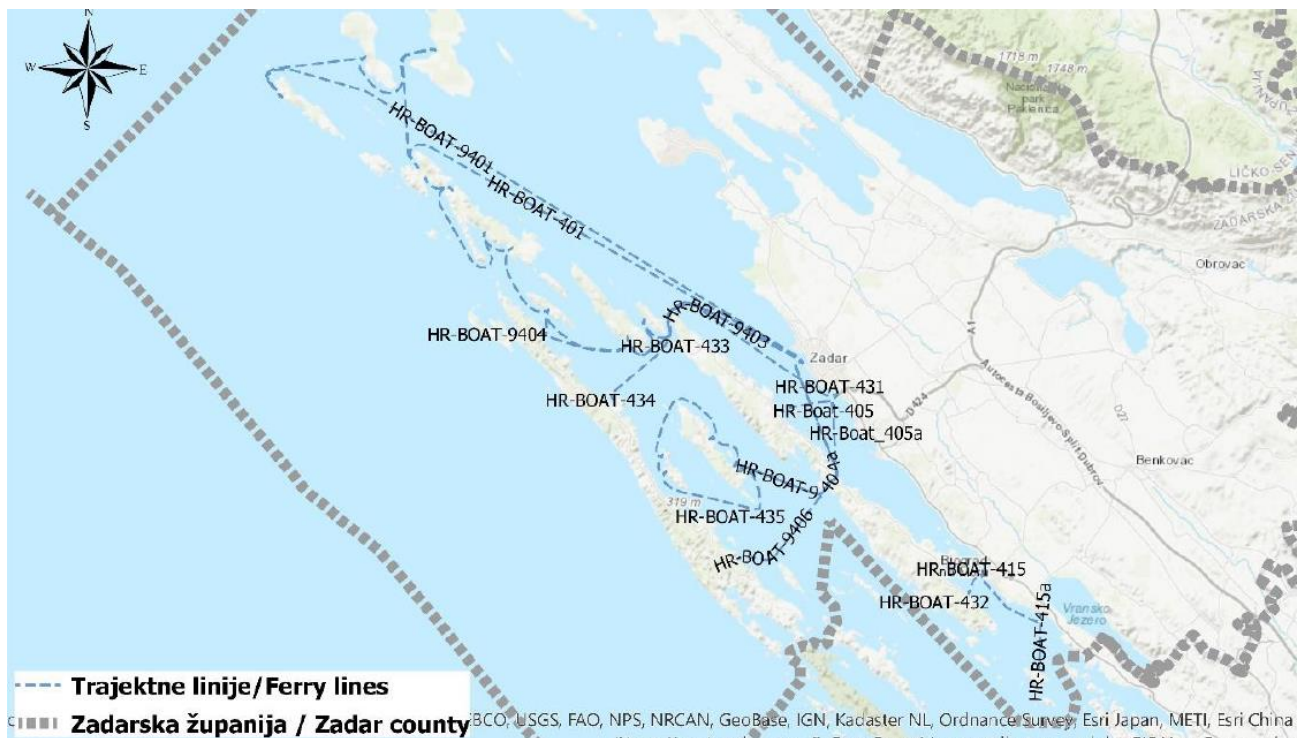


Picture 27: Map of the port of Gaženica

Source: Zadar Port Authority

Within a radius of less than 10 kilometers, the port of Gaženica integrates maritime, railway, road and air traffic. The main road connection is the 17-kilometer-long four-lane highway Zadar 2 - Gaženica, which directly connects the new port with the Zagreb-Split highway, the airport in Zemunik and the economic zone Crno.

The cargo port of Gaženica has favorable maritime characteristics, and the space in the hinterland is favorable for the construction of accompanying port and industrial facilities. The cargo port in Gaženica has a capacity of about 2.5 million tons of cargo per year and is technologically well equipped for transshipment of animal feed and soybean oil. The structure of traffic by type of goods in the cargo port shows that import traffic develops industrial functions and transshipment of liquid cargo, and exports refer to the products of Zadar and Lika region, while domestic traffic is in the function of supplying local consumption.

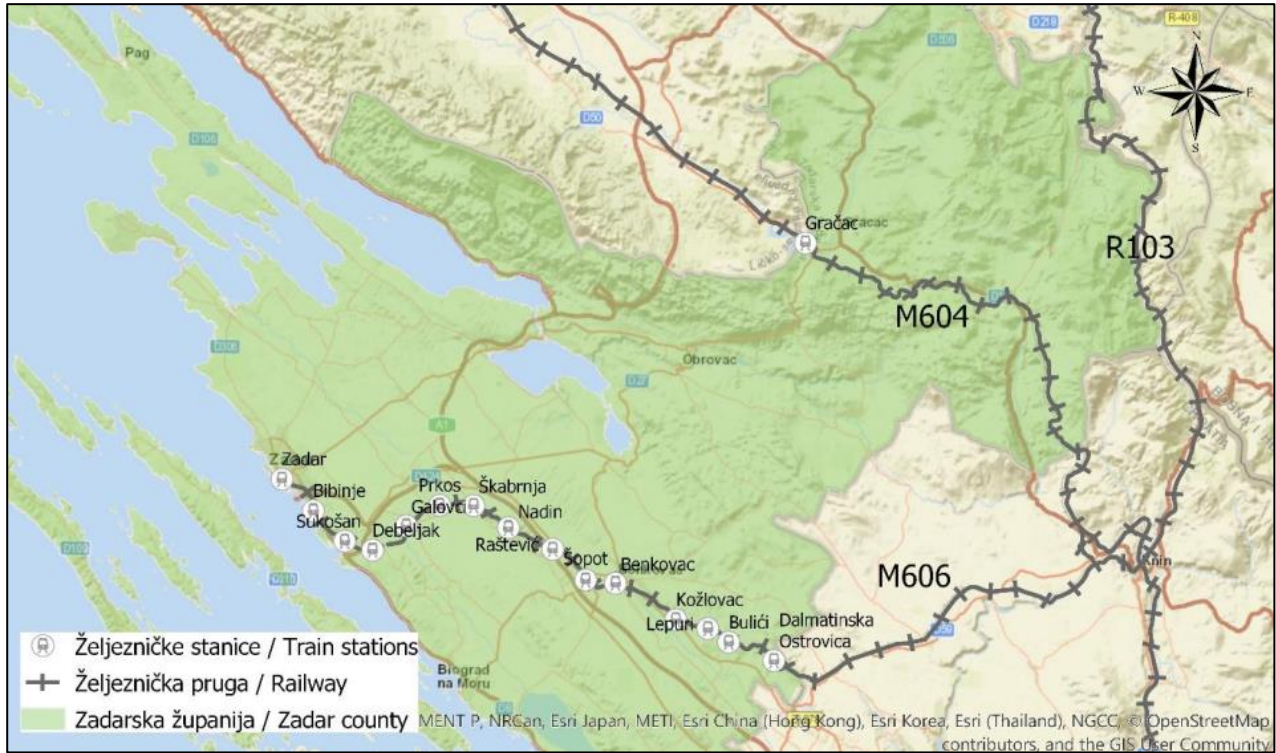


Picture 38: Ferry lines from the ferry port Gaženica

Source: Draft Transport Master Plan FR North Dalmatia

4.3 RAILWAY TRAFFIC

Three railways pass through the Zadar County, the Knin-Zadar line for international traffic marked M606, the line for international traffic Oštarije - Knin - Split marked M604 and the line for regional traffic Martin Brod - Dividing point km 119 + 444 - State border - Ličko Dugo Polje - Knin code R103. The M606 Zadar - Knin railway is also called the “Lika” railway, which connects the largest city centers of Dalmatia (Zadar, Šibenik, Split) with central Croatia via Knin.



Picture 19: Zadar County Railway Network
 Source: Draft Transport Master Plan FR North Dalmatia

Label	Relation	Length
M606	Knin - Zadar	41.5 km
M604	Oštarije - Knin - Split Partitions	52.7 km
R103	State border - Ličko Dugo Polje - Knin	16.4 km

Table 1: Length of railways in the area of Zadar County

Source: Draft Transport Master Plan FR North Dalmatia

The technical condition of the railway is unsatisfactory, both due to war damage and their failure and maintenance, as well as due to many years of non-investment in development and modernization, and inadequate investment in maintaining functional capacity and maintenance. Thus, there is a large backlog in the maintenance and renovation of railways. Due to the inadequate condition of the railway and the unfavorable duration of travel time, and due to the improvement of road connections, the establishment of frequent bus lines and the increase in the degree of motorization in general, rail transport has become absolutely uncompetitive. The trip to Zagreb takes 10 hours. The consequence is a significant decline in operational capacity, primarily speed,

and the degree of safety and reliability, and thus transport capacity, which makes rail transport uncompetitive.

According to the categorization of railways, Zadar - Knin has the character of an auxiliary main railway. For the further development of railway traffic in Zadar County, the reconstruction of this section of the railway is a necessity, as well as its electrification. The condition of the railway mostly depends on the Port of Zadar, which with its freight and passenger terminals can use additional routes of goods and passengers, mostly with an emphasis on the "Una" railway, which connects central Croatia with BiH.

The train station is located right next to the bus station, as shown in Picture 20 on the next page.



Picture 40: Zadar Railway Station

Source: <http://www.narodni-list.hr/posts>

4.4 AIR TRAFFIC

The air traffic infrastructure in Zadar County consists of one airport, Zadar Airport 4E category, which also houses a permanent border crossing for international traffic of passengers and goods in air traffic and one airport. Airports are also planned on Pag, Dugi otok, Ugljan, Tomingaj, Šepurine and Stankovci.

Zadar Airport is located in Zemunik Donji, 7 km from the city of Zadar. Zadar Airport is qualified to perform the duties of an airport operator and is intended for the reception and dispatch of aircraft, passengers, luggage and goods in domestic and international public air transport. Of the domestic flights, there are two operational flights to Zagreb and Pula, while there are 33 international flights, which connect Zadar with the cities: Oslo, Stockholm, Gothenborg, Hamburg, Bremen, Berlin (TXL, SXF), Duesseldorf (NRN, DUS), Frankfurt, Stuttgart, Munich, Cologne,

Karlsruhe, Memmingen, Vienna, Warsaw, Athens, Rome, Milan, Marseille, Barcelona, Bern, Zurich, Luxembourg, Paris (ORY, BVA), Brussels (BRU, CRL), London (STN, LTN), Manchester, Dublin.

Zadar Airport is the only airport in the Republic of Croatia that has two runways and is the most promising airport in the Republic of Croatia, in terms of space for expansion and further development. The runway 04-22 measures 2,000 x 45 m and has a load capacity of 44 / F / B / W / T. The dimensions of the runway 14-32 are 2,500 x 45 m, and the load capacity is 44 / F / B / W / T. For the needs of commercial outdoor firefighting traffic (Canadair CL 415 and Air Tractor AT-802A / F) and passenger airports, Zadar Airport uses both runways, with the runway 14-32 being the primary. The capacities of the airport are sufficient for the operation of aircraft for specialized operations of C category aircraft, such as Airbus A 319 and A 320 and Boeing 737. Operational infrastructure (runways,



Picture 51: Zadar Airport

Source: <https://www.zadar-airport.hr/fotogalerije>

In the area of Zadar Airport, there is the Zemunik barracks, which is the center of the 93rd Air Base of the Croatian Air Force and Air Defense, with a separate Transport Helicopter Squadron in the Knez Trpimir barracks in Divulje near Split. The 93rd Air Base is composed of:

- ▶ Aircraft squadrons
- ▶ Helicopter squadrons
- ▶ Transport helicopter squadrons
- ▶ Fire squadrons
- ▶ Airborne technical battalions for the second level of technical maintenance
- ▶ Command companies
- ▶ Commands.

Also, in the area of Zadar Airport, there is a training center for the Croatian Air Force and Air Defense "Rudolf Perešin". The center is composed of:

- ▶ Headquarters Commands for Croatian Air Force and Air Defense Training
- ▶ Pilot schools
- ▶ Training Department
- ▶ Training companies.

4.5 BICYCLE SYSTEM

Bicycle system Public bicycles are complementary to public transport and help reduce road traffic, solve ¹parking problems in a narrow urban center, contribute to the protection of the environment, enrich the tourist offer, position the city as a desirable cyclo-touristic destination and generally affect the quality of life in the city. The City of Zadar enabled the implementation of the NEXTBIKE public bicycle system.

The public bicycle system allows users a fast, easy, inexpensive and ecological way of transport with the slogan: "Sit and go!". Furthermore, the City of Zadar was a partner on the PRO-E-BIKE project, which promotes the use of electric bicycles and scooters as an environmentally acceptable alternative to fossil fueled vehicles for the purpose of delivering goods and cargo and for transporting passengers to European cities.

To this end, an Action Plan for the promotion of electric bicycles and scooters for the delivery of goods and transport of passengers has been made. Wider Zadar area has many attractive cycling paths categorized to match all users from hobbyist to professionals. Favorable geospatial propositions allow arrangement of new cycling routes but momentarily narrower city area either completely lacks cycling infrastructure or inadequately implemented. So far just a single digit number of bicycle lanes are organized and functioning, with a lot of room for upgrade. Although the usage of bicycle is forbidden in the city center (it's restricted to pedestrians only) outer areas of the town have a lot of potential to develop bicycle system.

¹ Sections 4.5 and 4.6 adopted from adopted from OptiTrans - Baseline Study - Public Transport City of Zadar, OptiTrans Interreg Europe, June 2018., https://www.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1537878144.pdf (accessed 24th March 2021.)

4.6 TAXI SERVICE

The number of taxi drivers in Zadar has increased significantly in recent years (the city has issued 110 permits in 2012., 115 by 2018.), as well as the number of passengers transported by taxi, primarily due to a large number of modernly equipped taxi services and favorable services, and partly because of its initial popularity. Particularly useful is the night drive because no public transport is available in the night. Although the popularity of taxis is on the rise, the taxi transport still does not participate in a significant measure in total public transport and is mostly used for specific needs.

As recent studies have shown, taxi services take up to 4% of total public transportation share. Recently, there has been a slowdown in the trend due to the increase in the number of taxi operators and the lack of service quality at the initial price level. Problems regarding the number of taxi service providers companies and their collective effort are due to legislative issues.

Although number of taxi service providers is 66, de facto they are organized in two larger collectives (Jadera and 023), two larger companies (Taxi Denis and Page | 9 Taxi Lulić) with some level of individual taxi providers that work on their own. Taxi drivers nowadays face the issues of sustainability and response to new competition in Uber has not been very effective. Taxi driver services are heavily reliant on touristic season, so seasonality of taxi driver's workload is an important factor of their public transport influence.

4.7 USE CASE SCENARIOS

As a part of this activity, appropriate use case scenarios for Port of Split as a project partner and as a reference point will be outlined while the port of Zadar has been previously covered as a certain benchmark. For the purpose of this paragraph, three situations will be taken into the consideration:

1. Passengers arriving with personal car from Ancona to Split by ferry with a goal of discovering Split and POI near Split reachable by personal vehicle in a 2-hour driving range
2. Passengers arriving to Split port by a ferry with a bike as a mode of transport (previously, to Ancona by train from Zurich, Switzerland)
3. Passengers arriving by ferry from Ancona to Split without any kind of personal transportation vehicles (previously, to Ancona by airplane from London)

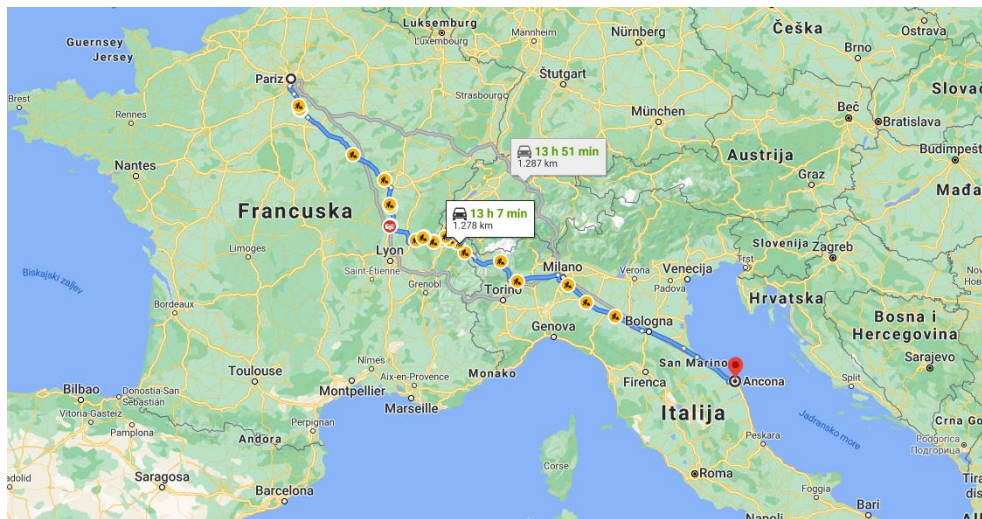
4.7.1 Passengers arriving with personal car from Ancona to Split by ferry with a goal of discovering Split and POI near Split reachable by personal vehicle in a 2-hour driving range

First example demonstrates a simple situation where a resident from Ancona or a tourist passenger which arrived to the port of Ancona to board the ferry which departs to Split. For the simplification purposes in this “traveller’s journey” passengers will be native Parisians.

Digital journey starts by checking the weather forecast in order to gain the maximal benefits of visiting Croatia while not being constricted by weather conditions. Second step includes exploring the prices of accommodations in Split, as the prominent Dalmatian city represents their final destination from where they will set to further explore the beauties of Croatian coast. Next step includes all the booking arrangements to be made (ferry, accommodation, guiding...) depending on the duration of the stay in Croatia as well as the willingness to explore multiple cities thus creating the need to book the accommodation in the cities in vicinity of Split.



Picture 22. Ancona (IT) – Split (CRO) ferry route
 Source: <https://www.croatiaferries.com/ancona-split-ferry.htm>



Picture 23. Ancona (IT) – Split (CRO) ferry route
 Source: Draft Transport Master Plan FR North Dalmatia

The journey starts from Paris from where the city of Ancona is roughly 1300 kilometers away. This part of journey could be broken into two parts or it can be done in one single trip without the need for an overnight stay somewhere along the route.

Prior to boarding the ferry to Split, one has to find the check in area in Ancona port where all the formalities are being cleared. After border clearance, cars and passengers are boarded on ferries from one of the two companies that regularly operate on Ancona – Split route (the crossing between Ancona and Split is served by **Jadrolinija** and **Snav** with a combined schedule of 8 weekly connections with typically evening departures and maximum duration of 11 hr 30 min. Ships that operate this crossing allow both vehicles and foot passengers. Various services and accommodation are available to provide on board).



Picture 24. Port of Ancona

Source: <https://www.porto.ancona.it/en/ports/port-of-ancona>

After the ferry trip of around 8 – 12 hours depending on the weather conditions, upon arriving in Split port and after the border clearance and check out, journey from the Parisians can continue. From the city of Split, most of the Southern Croatian gems can be seen without the need to drive more than two hours. Day trips can be very fulfilling experience as well as tiring, but it is worth mentioning few of them.

1) Trogir

Just a 30-minutes' drive from Split, Trogir is a hidden gem (**on the UNESCO world heritage list**). This small romantic coastal town (located on an island, but connected by bridge) will surprise you with its history and heritage. (You can drive to Trogir along the coastal road from Split, the ride might take 25 to 40 minutes, depending on the traffic (during summer months, you might expect traffic jams on the highway so it is sometimes better to go along the old road through Kaštela town).

2) Šibenik

Šibenik is definitely worth visiting. One of the oldest cities in Croatia (dating back to 11th century) is most famous for the **Cathedral of St. James (on the UNESCO world heritage list)** with an interesting exterior, containing sculpted human heads made after unknown individuals that were living in Šibenik at the time (15th or 16th century). **St. Michael's fortress** is another interesting historic monument. Built in the Middle Ages, on a nearby hill, it provides some breathtaking views over the city and the surroundings. The fortress is now the most prestigious venue for numerous open-air concerts and summer festivals. (You can drive to Šibenik via highway in about 1 hour alternatively or you can take the picturesque coastal road, due to traffic, this way might take you 30 minutes longer. Parking is available close to the old town.)

3) Zadar

Zadar is most famous for the **Sea Organ that uses wind and waves to create music**. Apart from that, you can visit the **Church of St. Donatus** (from 9th century – largest pre-romanesque building in Croatia). (By car following the highway, the trip should take you about 1 hour and 40 minutes, if you follow the toll-free coastal road duration is about 2.5-3 hours. Parking is available around the old town.)

4) National Park Krka

This is a day trip definitely worth taking, and **you can even swim at the specific places inside the park** (at Skradinski buk and Roški slap waterfalls!). Take a boat tour around the NP and enjoy the nature at its finest. (By car: Drive along the highway (following the signs for Šibenik) till you see the exit sign for Šibenik (you will pass through a toll station when you exit the highway) and

then take the regional road following the signs for Krka, until you reach the main entrance Lozovac. There you will find the parking lot and the NP reception)

4.7.2 Passengers arriving to Split port by a ferry with a bike as a mode of transport (previously, to Ancona by train from Zurich, Switzerland)

Second example of traveler's journey encompasses the voyage from the main train station in Zurich, Switzerland to the city of Ancona with the purpose of crossing the Adriatic Sea with a ferry and Split as it's final destination.

Digital journey starts by acquiring information on timetables, delays or cancellations regarding the planned routes and belonging modes of transportation. Information about the online ticket purchasing and other options have to be made as well as other basic information about the route to Split. Following basic information collection, accurate information on ferry timetables, luggage storage services, boarding procedures, availability of quick refresh&rest options, main tourist attractions, accommodation possibilities. Weather forecast and information in case of urgent situations (phone numbers, service shops, health care, police department...)

Physical journey from Zurich starts with boarding the train and checking in the bicycle as a luggage together with other basic necessities in main train station in Zurich.

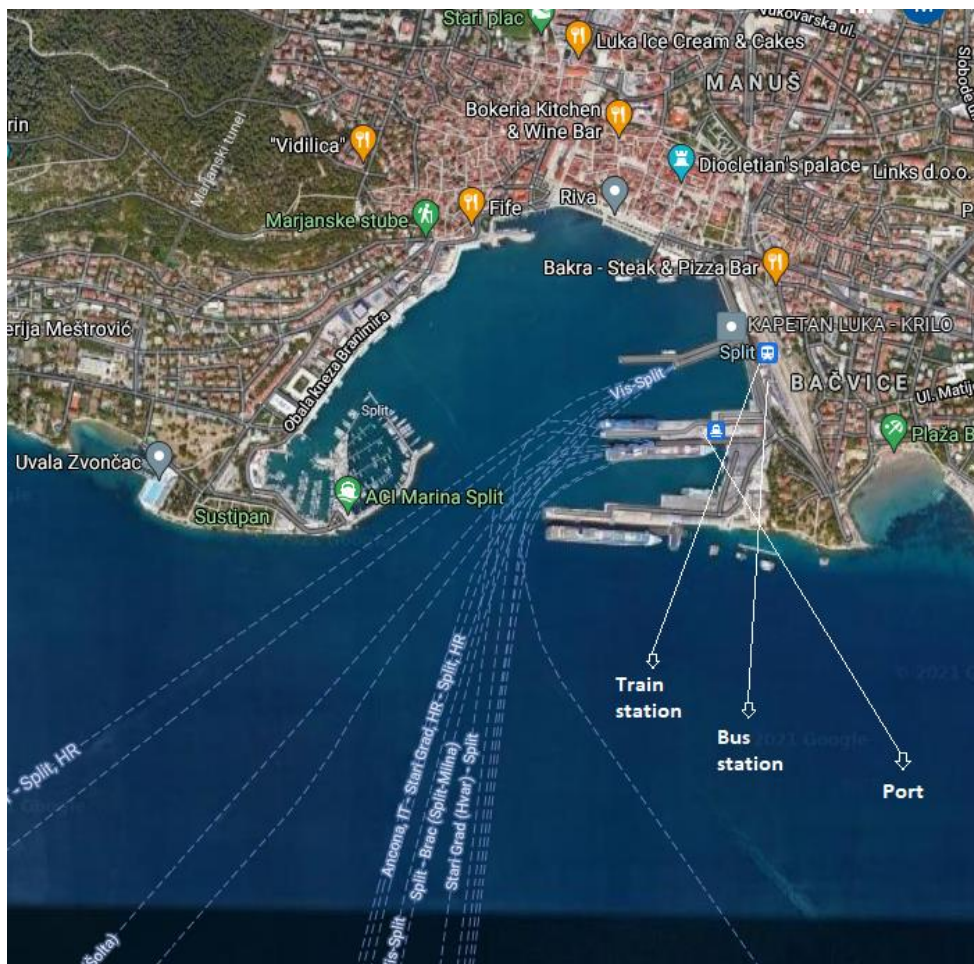


Picture 25. Zurich train station

Source: <https://www.seat61.com/stations/zurich-hb.htm>

The Journey from Zurich to Ancona by train does not support direct route, at least in the time of writing, so one change of trains with 15 minutes of interchange time has to occur in the Milan Centrale train station. The journey lasts approximately 7 hours. Following the arrival in the port of Ancona, waiting for ferry to Split takes place. Check-ins, boarding and other controls take place, so appropriate amount of time has to be taken in consideration prior to the journey across the Adriatic Sea. Bicycles as a part of luggage and further transportation vehicles are boarded accordingly.

Arrival in the port of Split is followed by disembarkation and continuation of the journey. Split port is in the walking distance from the main intercity bus station as well as the adjacent train station.



Picture 26. Aerial view of Split city center

Source: <https://www.google.com/maps>

4 examples of bike tours from the center of Split (Guided and self-guided):

1. Split: 3.5 Hour Scenic Cycling Tour with Ice Cream

1. Marvel at the impressive Diocletian Palace, built in the 4th century
2. Learn about Split's history on a ride through the oldest neighborhood, Varoš
3. Admire a selection of stunning churches including the Cathedral of St Dominus
4. Explore the city center and hear about local life from your guide
5. Enjoy a refreshing ice cream or a cup of coffee to end the adventure

2. Split 3-Hour Guided Bike Tour

1. Enjoy spectacular views from the top of Marjan hill of Split, the islands, and the beaches
2. Experience the best of nature, history, and culture on a guided cycling tour
3. Discover Sustipan, an old city park on the cliffs above the sea

3. Split: Dalmatian Hinterland Cycling Tour

1. Take a cycling tour through Vrlika
2. See some of the best works of nature
3. Encounter the Česma Fountain in a picturesque 19th century park
4. Pass by the old Church of Our Lady of the Rosary

4. Split: Old Town Guided Bike Tour with Poljud Stadium

1. Discover the history and local legends of the Old Town
2. Enjoy amazing views across the Adriatic Sea from the top of Marjan Hill
3. Take a tour of Poljud Stadium, home of Hajduk Split
4. Try some of the best Croatian craft beers at a local pub

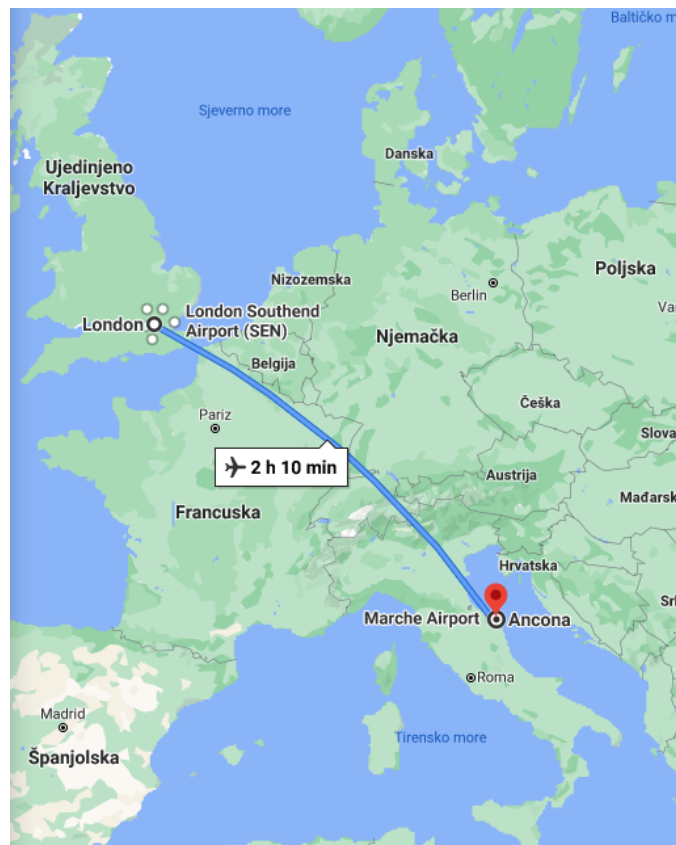


Picture 67: Biking in Split

Source: <https://splitadventure.com/biking-in-split/>

4.7.3 Passengers arriving by a ferry from Ancona to Split without any kind of personal transportation vehicles (previously, to Ancona by airplane from London)

Travel procedure for passengers that want to arrive to Split by ferry using the Ancona – Split ferry primarily have to research the flight options from London, UK to Ancona, Italy, following the coordination with ferry line from Ancona to Split as the flight from London to Ancona lasts only two hours. Planning phase of the digital journey starts the same way as the ones in previous examples with checking the weather forecast, researching, coordinating and booking flight and ferry transport options to secure a multimodal arrival in Croatia, gathering information about online ticketing for all the possible transport modalities (flight, shuttle bus, bus, taxi, ferry, rent-a-car).



Picture 78: Visual demonstration of flight from London to Ancona

Source: <https://www.google.com/maps>

Before the travel basic information about the transfer from Ancona airport to Ancona port has to be acquired together with the information regarded the route to Split, information about the boarding procedure, availability of transportation vehicles, tourist guides and tours, information

regarding the tourist attractions in Split as well as finding out “what to do in Split in 1/2/3 hours’ time”.

During the travel one can check the information about the availability of activities onboard, weather forecast in the final destination, gather information about the disembarkation procedures, info on road conditions and availability of parking (if renting a car in destination) or schedule of local transportation vehicles and their destinations. It is also advisable to collect the phone numbers from local authorities in case of urgent situations.

Once in Split, one can visit attractions in the walking distance from the port or half an hour – hour drive from Split

- **Diocletian’s Palace**

In (and) the heart of Split, the Diocletian’s Palace dates back to the latter part of the 3rd century AD when the Roman Emperor Diocletian had it built. In 1979 it was designated a UNESCO World Heritage site.

- **Riva**

Literally translated as the Quay of the Croatian National Revival, the Riva is a wide promenade on the waterfront, which runs along the south side of the Diocletian’s Palace. The Riva is known for its trendy and chic shopping, restaurants with outside seating and a reminder of all that Split has to offer: history and natural beauty.

- **The Cathedral of St Domnius and the Peristyle**

The Cathedral of St. Domnius was originally the mausoleum of Diocletian. The large courtyard where the Cathedral is located is known as the Peristyle and was once used as a ceremonial entrance to Diocletian’s quarters and to the mausoleum.

- **Jupiter’s Temple**

In the heart of the historic city on Kraj Sv Ivana. Originally built in honor of the Cult of Jupiter, it was eventually converted into a baptistery.

- **Šibenik, Trogir and Primošten**

Between 30 minutes and 1-hour drive from the cruise port in Split, these 3 jewels have a unique charm. The historic center of Trogir is in the UNESCO list of World Heritage Sites and so is the Cathedral of St. James in Šibenik. On the way to or from Šibenik, a stop at the quaint peninsula of Primošten is a must.

- **Salona**
The ancient Roman city where emperor Diocletian was born is a notable archeological site. **Distance from cruise port:** 5 miles (8.3 km) north of Split.
- **Krka National Park**
Scenic and nature lovers will marvel in the Krka National Park where the Krka River flows into cascading waterfalls. **Distance from cruise port:** 53.5 miles (86 km) west of Split.
- **Cetina Valley and Omiš**
The Cetina River meets the sea in the picturesque town of Omis where many active pursuits like rafting, kayaking, canoeing or rock climbing. **Distance from cruise port:** 16 miles (25.8 km) east of Split port.
- **Klis fortress**
Once the seat of Croatian kings, the medieval fortress of Klis was the setting for the fictional city of Meereen in the Game of Thrones series. **Distance from cruise port:** 9.7 miles (15.6 km) north of Split.
- **Bačvice Beach**
The closest beach to the Old Town and the cruise port, this tree-lined beach features bars, restaurants and cafés, and a true city beach scene. Distance from cruise port: 0.5-mile (900 meters) east of Split port.
- **Papalic Palace**
Built by the famous Croatian architect Juraj Dalmatinac, the Papalic Palace served as a home for noblemen during the Middle Ages. It now houses the City Museum of Split. Where: inside the Diocletian’s Palace on Papalićeva 1.
- **People’s Square**
The most important square of Split where the Town Hall (now a gallery) is located. Where: just outside the of the Diocletian’s Palace.
- **Golden Gate**
Once the main entrance of the Diocletian’s Palace on the north side, the enormous bronze statue of Grgur Ninski (Bishop Gregory of Nin) by Ivan Meštrović is a must-see.

- **Marjan Hill**
On a hilly peninsula, east of the city center and the cruise port, the Marjan Hills offers stunning views of the city, nice restaurants, and beaches.
- **Veli Varoš**
Veli Varoš is a charming old neighborhood with narrow and picturesque streets located on the slope of Marjan Hill, just northwest of Diocletian's Palace.
- **Republic Square or Prokurative**
The inspiration for the Republic Square came from St. Mark's in Venice. Three of its sides are lined with the beautiful neo-Renaissance buildings of the Prokurative, which were built in the late 19th century. Where: west of the Diocletian's Palace
- **Marmontova Street**
The main shopping street in Split next to Republic Square.
- **Fishmarket**
On Marmontova Street the fishmarket is fun to visit in the morning.
- **Croatian National Theater**
Dating back to 1893, the theatre is one of the first structures built outside the old city walls. Where: North of the Republic Square, at the end of Marmontova Street.
- **Fruit Square**
this small quaint square with nice restaurants and shops has a few major landmarks: the Milesi Palace, the Marko Marulić Statue by Ivan Meštrović, and the Venetian Tower. Where: Inside the Diocletian's Palace, next to the southern walls.
- **Ethnographic Museum** Founded in 1910, the museum displays a wide range of traditional Dalmatian embroidery and costumes, but also household items, woodcarving, and pottery. Where: Within the walls of the Diocletian's Palace on Severova 1.
- **Vidović Gallery**
the gallery displays the works of Emanuel Vidović (1870– 1953) the most celebrated painter of Split. Where: In the heart of the city on Poljana Kraljice Jelene.
- **Museum of Croatian Archaeological Monuments**
The museum houses a large collection of items such as tools, jewelry, weapons,

sculpture, and epigraphic monuments. Where: In the Marjan Hill, 3.6 miles (5.7 km) west of the port on Šetalište Ivana Meštrovića 18.

- **City Museum of Split or Split Municipal Museum City Museum of Split or Split Municipal Museum**

The museum displays a collection of artifacts, documents, photographs, maps and manuscripts telling the history of Split and the Dalmatian region. Where: in the Old Town on Papalićeva 1, housed in the Papal Palace

- **Archeology Museum of Split**

The oldest museum in Croatia, it displays archeological findings from pre-historic, pre-Christian, Greek and Medieval periods. Where: north of the city center on Frankopanska 25

- **Croatian Maritime Museum Split**

Inside the 16th-century Gripe fortress on Glagoljaška 18, the museum is devoted to all things nautical and displays such items as naval uniforms, lighthouse lanterns, and model ships.

- **The Gallery of Fine Arts**

Dating back to 1931, Split's main art gallery features over 3,500 works that represent regional art from the 14th century to the present. But also works by great masters such as Paolo Veneziano and Albrecht Dürer. Where: Just north of the Diocletian's Palace on Ulica kralja Tomislava 15.

- **Froggyland**

This unusual venue has on display a strange collection of over 500 stuffed frogs in human scenarios, like playing tennis, seating in class or washing clothes by a pool. Where: on Ulica kralja Tomislava 5, at the end of Marmontova Street

- **Split Science Museum and Zoo**

Small and modest zoo with local farm animals. Where: in the Marjan Hills on Kolombatićevo šetalište 2.

- **Saint Dominic's Church and Monastery** Renovated at the beginning of the 19th century, the church structure dates back to 1682. Where: opposite the Diocletian Palace's Silver Gate on Hrvojeva 2.

- **Church of Our Lady of the Belltower**
Small chapel with the oldest bell tower in Dalmatia. Where: inside the Iron Gates on the west side of the Diocletian's Palace.
- **Church of Saint Francis**
Dating back to the 13th century, it is a stunning display of gothic-renaissance architecture. Where: next to the Republic Square
- **Church of Saint Martin**
The diminutive Church of Saint Martinis is possibly the smallest church in the world (1.64 meters wide and 10 meters long). Where: by the Golden Gate, on the north side of the Diocletian Palace.
- **Synagogue and Jewish cemetery.**
It isn't easy to find this small synagogue in a medieval building housing Split's Jewish cultural center. Where: north of the People's Square, on Židovski pro. 1. The remains of a 16th-century Jewish cemetery are located in the Marjan Peninsula.

5. PRELIMINARY REQUIREMENTS DEFINITION FOR THE IDENTIFIED USE CASE SCENARIOS

The city of Zadar and the area of Zadar County belong to the functional region of Northern Dalmatia for which the Traffic Master Plan was made (2018). Given that the Transport Master Plan (FRSD) is a fundamental strategic document of long-term transport development in a defined area, it should be analyzed separately. The purpose of drafting the FRY Master Plan is to establish the current and future needs of the region that affect traffic demand, such as the development of business infrastructure, scientific institutions, health rehabilitation institutions, shopping centers, sports and recreation facilities and cultural and entertainment facilities. The main development plan of the FRSD also includes the transport model of the functional region, which is a dynamic tool that can monitor the situation in space and help the development of transport in the future. This improves the operational settings of the system,

The transport model from the Master Plan for the Development of the Functional Region of Northern Dalmatia was also used as a basis for the analysis of traffic demand. The transport model is defined as a four-step model that covers the transport of passengers in road transport by personal

vehicles and the public transport system, as well as freight transport. For the needs of creating a traffic model, the software tool PTV Visum was used. The use of this model enables the assessment of the sustainability, efficiency and cost-effectiveness of individual transport solutions, if the obtained model is reasonably (expected) reliable. Data collection for the development of a multimodal transport model is described through the document "JASPERS Guidelines for evaluation (traffic) - use of traffic model in traffic planning and project evaluation, August 2014" as one of the key preliminary steps towards developing an appropriate,

The transport needs of the islanders and inhabitants of Zadar and the surrounding area were estimated on the basis of the demographic profile of each island (taken from public statistics) and on the number and structure of island cards or their use on individual lines. profile is based on the 2011 census with an estimate of trends in later years, where available (estimates for islands based in the islands).

Liburnia operates public, suburban and island public transport. Public city transport in Zadar is organized through a total of 12 lines with 22 buses. The existing lines cover all parts of the city of Zadar. Although 12 lines are present, some lines run on two different routes, so the number varies depending on the existing works in the City of Zadar. In addition to public transport, Liburnija doo Zadar also performs public regular transport within the Zadar County.

Bus departure intervals on public transport lines are 20 to 240 minutes, depending on the traffic line. The bus most often departs on traffic lines two and five, while the least frequent buses depart on line 9 (industrial zone) where there are only three departures per day for the arrival / removal of workers. The average number of lines per day on weekdays out of season is 23.2, while the average number of lines per day on weekdays in season is 23.7. The average number of lines per day on Saturdays is 18.5, and the average number of lines per day on Sundays is 12.8.

The largest share of passengers is transported in public city transport, while the smallest part on intra-island lines. About 6,700,000 trips are made by public transport. Observing the number of passengers on the lines, the most used line is the line Bili Brig-Stanovi, and among the most used are Dračevac-Petrići, Puntamika and Bokanjac - city cemetery. The least used lines in public transport are Bibinje and Gaženica. According to the data from the Traffic Master Plan of the functional region of Northern Dalmatia, more than 1,110,000 passengers are transported annually by public urban passenger transport lines operating on the Zadar peninsula. Line 2, which connects the peninsula and Arbanassi, travels about 624,000 passengers a year. Line 4, which connects the Peninsula and Crno, annually carries about 315,000 passengers, while line 9 (Peninsula - Gaženica) travels about 200,000 passengers.

Observing the number of passengers by months, a smaller number of passengers is observed in the summer months and in the first month, which can be related to school holidays in these periods. The largest number of passengers was recorded in the spring and autumn months. Observing the

categories of passengers with regard to the type of map / show they use, the most frequent users of public city transport are pensioners and students. The share of passengers who buy a ticket from a driver and who buy a two-way ticket together is only 13.4%.

The intervals of bus departure to the islands are closely related to the distance of the island from the mainland and the intervals of ferry lines to the islands. The most frequent buses depart for the islands of Pašman and Ugljan, where the departure interval is 50-120. According to Dugi otok, on the traffic line one bus has three departures a day, and on the traffic line two buses depart four times a day. Towards the island of Iž there is only one pick-up / drop-off per day to the ferry. The average number of lines per day to the islands on weekdays in the off-season is seven, and the average number of lines per day on weekdays in the season is 8.3. The average number of lines per day to the islands on Saturdays is 5.5, and the average number of lines per day to the islands on Sundays is four.

Liburnija operates on 4 lines within the island of Zadar County. The total number of passengers on these lines is about 385,000 passengers per year. The number of passengers per line is directly related to the population size of the settlements through which the lines pass, so the largest number of passengers (about 200,000 per year) is on the line Preko - Muline. About 25,000 passengers travel annually on the Sali-Luka line. The annual number of passengers on the line Brbinj - Veli Rat is about 19,000, while the line Preko - Tkon travels about 150,000 passengers a year.

Pedestrian traffic as a characteristic form of traffic in the organization and structure of redistribution of traffic / public space has a significant role in the concept of mobility due to its nature. Given the specificity of planning and managing pedestrian traffic flows, pedestrian infrastructure should be planned and designed so as to create preconditions that encourage pedestrian mobility. Encouraging pedestrian mobility is related to the quality of infrastructure projects, i.e., the benefits that pedestrians have from roads and other public areas.

The preliminary requirements of the passengers' needs can be deducted from outlined chapters. Table 2. shows all information that could be helpful for the passengers into the following key groups:

<p>General information</p>	<p><i>Country information</i> <i>Covid statistics and information</i> <i>Weather forecast</i> <i>Road conditions</i> <i>Info in case of urgent situations - phone numbers, other contacts (car service, firefighters, health care, police office)</i> <i>Car assistance (road assistance, Croatian Car Club)</i></p>
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General information for the travel	<p><i>Information about the road routes to Zadar</i></p> <p><i>Route planners including alternatives</i></p> <p><i>Information about the documents needed (visas, car green card etc.) and health related obligations</i></p>
Travel information	<p><i>Information on timetable, delays or cancellations</i></p> <p><i>Information about the shuttle bus from / to the airport</i></p> <p><i>Information about the available local transports, timetables, prices and ticketing</i></p> <p><i>Information about rent-a-car</i></p> <p><i>Information about taxis</i></p> <p><i>Information about left luggage and baggage storage services</i></p> <p><i>Information about boarding and disembarking procedure</i></p> <p><i>Information about parking (geolocation, availability, price)</i></p> <p><i>Information about the charging of electric vehicles</i></p> <p><i>Information about onboard activities</i></p> <p><i>Possibility of return travel information</i></p>
Tourist information (in case of available free time in Zadar while waiting for travel)	<p><i>Information about e-mobility (rent a bike) (availability, location, price)</i></p> <p><i>Information about rest refresh options in Zadar</i></p> <p><i>Information about tourist guides and available tours in Zadar for 1/2/3 hours</i></p> <p><i>Information about main city attractions</i></p> <p><i>Information what to do in Zadar in 1/2/3 hours' time</i></p>
Information about the final destination	<p><i>Weather forecast</i></p> <p><i>Road conditions</i></p> <p><i>Tourist information about the final destination (as previously outlined)</i></p> <p><i>Information about parking and local transport</i></p>

Table 2: Preliminary passengers' needs – Port of Zadar

Previous Interreg projects' experience is that Zadar region lacks in eco-friendly transportation means. Although some arrangements have been made via Liburnija, implementation of ecofriendly vehicles on field is yet to be seen. Some taxi drivers use gas as fueling method, but no designated eco-friendly services are implemented. Bicycle public transport, as one way of ecofriendly mode of transport, is yet to become a possibility, with setbacks in infrastructure planning and lack of the general interest of the public. Railway system is nonexistent, with yet undefined position of it being unnecessary or just not explored enough as efficient transport mode. One other aspect of

public transport in Zadar region is the lack of “new” user-oriented services that rise the likeability of public system. Mobile applications, names on the bus stations, intermodal planners are some of the easily-implemented solutions that could improve existing infrastructure and resources.

City of Zadar is connected efficiently via public bus system, but that can not be said in full scale regarding the rest of the region. At this point, questions of sustainability arise, especially with depopulation processes that take trend nowadays. Depopulation process harm the regions in a twofold way; beside the problem of having less and less population, costs for transport system become even larger, and inefficient transport system just fosters the depopulation process. Railway is completely outdated way of transport and its economic potential is not exploited. Transport routes should be revised, especially ones that include daily migrations to work/school from rural areas. Although the city itself was not planned in a way that enables efficient transport system, spacial planning is something that needs to be addressed in future plans to make transport system and city itself more efficient and pleasant place to live.

Issues of sustainability exist, with some encouraging news of railway transport providers taking an interest in rural public passenger transport. There is a pronounced intermodal connectivity in the region, something that E-CHAIN could address through aggregated passenger route planning, information sharing and possibility to purchase tickets for all links of the transport chain. Communication among relevant stakeholders and transport services providers should be supported, and it should be emphasized that efficient and eco-friendly transport system requires that different modes of public transport do not overlap, but support each other and fill in the distance gaps of the other. To conclude, E-CHAIN implementation phase should take a holistic approach to define its measures. Finding the best way to synthesize urban planning with different modes of transport, taking in count distance among locations for the best low-carbon transport modes, with innovations to make the public transport system more approachable should be taken into consideration. Innovations such as e-ticketing and intermodal planner would ease the transport planning.

To do so, public transport system should become more integrated, with common goal in line for all of the stakeholders. Action plan should make a number of activities should support each other and enable the next ones, to make the transport system fully connected with the region and to fully connect all regional means of transport (air, sea, road and railway) with public transport.

D 3.3.1 – Use case scenarios selection and preliminary requirements definition

Activity 3.3 – Technical and functional requirements

March, 2021, Version final

Partner: Municipality of Ancona LP

Authors:

Email:

Project Acronym	E-CHAIN
Project ID Number	10048282
Project Title	Enhanced Connectivity and Harmonization of data for the Adriatic Intermodal Network
Priority Axis	4 - Maritime Transport
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TABLE OF CONTENTS

Version control.....	2
Acronyms / Abbreviations	4
Reference documentation	4
1. INTRODUCTION	5
1.1 Purpose of the DOCUMENT.....	5
1.2 WORKING PRINCIPLE.....	5
2. Background information	5
3. SEGMENTATION AND SUB-SEGMENTATION.....	7
3.1. general information	7
3.2. ANALYSIS OF THE SEGMENTS	8
3.3. Activities.....	13
4. PRELIMINARY REQUIREMENTS DEFINITION FOR THE IDENTIFIED USE CASE SCENARIOS	24

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	<p>Application Form – E-CHAIN - Enhanced Connectivity and Harmonization of data for the Adriatic Intermodal Network</p> <p>2014 - 2020 Interreg V-A Italy - Croatia CBC Programme Call for proposal 2017 Standard - E-CHAIN</p>	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

This task will gather requirements for design and development of the services realized and integrated in E-CHAIN platform for the deployment in the pilot sites. The aim is to draw up the complete design of all pilot sites implementation and to prepare specifications for all equipment and systems involved.

1.2 WORKING PRINCIPLE

Conceptual scenarios will be devised to better understand the HW/SW partitioning and distribution model in relation to the needs of specific use cases and application scenarios. The characteristics of the existing services within Consortium and standards will be taken into account. Technology and “users” from pilot sites will be represented. Technical and no-technical requirements will be gathered. It will establish and apply a methodology for defining use cases scenarios around possible reference services to be developed and replicated at the 3 project’s pilot sites.

The pilot site of Ancona will be our focus.

This document is based on the information and data gathered through the interview of Act. 3.2. and directly in the web sites of the main stakeholders involved in the mobility in the port of Ancona.

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. SEGMENTATION AND SUB-SEGMENTATION

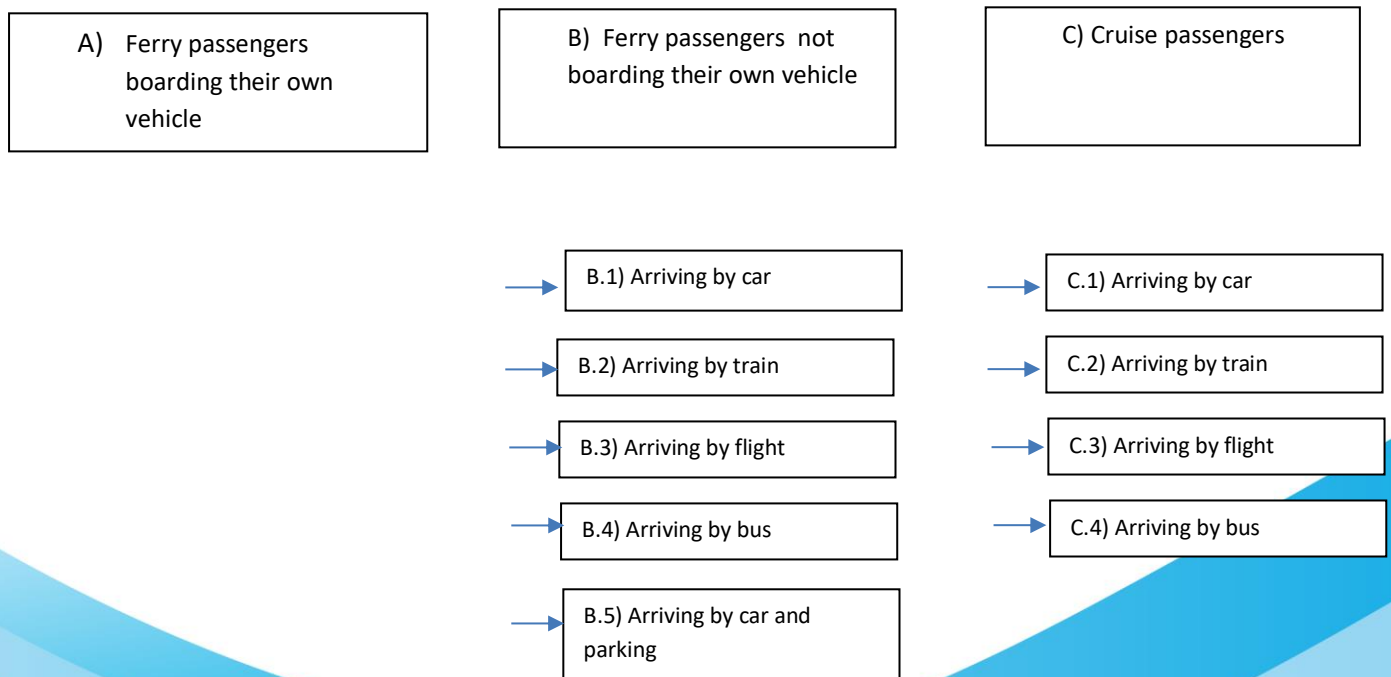
3.1. GENERAL INFORMATION

For the purpose of the feasibility of the project, we consider opportune and necessary to focus attention on specific categories of passengers :

- Passengers of the Jadrolinija ferries who already booked a ticket from Ancona to Split;
- Passengers of the cruise ships departing from Ancona (before covid pandemic, MSC company was leaving once a week from April to October)

Then, we would value how the travellers use to reach the port of Ancona from their own cities.

With these premises, we can define three big segments of passengers departing from Ancona and other sub-segments considering the mean of transport used to reach the port.





3.2. ANALYSIS OF THE SEGMENTS

3.2.1 FERRY PASSENGERS BOARDING THEIR OWN VEHICLE

Analysis of statistical data shows that about 75% of the passengers departing from Ancona to Split embarks in the ferry the same vehicle used to reach the port of Ancona. Considering the width of this specific segment), it is important to focus the attention on its needs and behaviour.

Where		What	Useful Info	When
Hub 1	→ City of departure	Travel planning	Reminder Timetables and Check In Reminder passport or id to go abroad Sending link about form to fill in to enter a country Reminder outgoing health obligation Useful contacts and phone numbers Forecast information Route planner to Ancona weather forecast	Day before departure
Hub 2	→ Parking of Ferry Terminal	Walking from Parking to check-in desk	Collection of passengers' passports	To be defined
Hub 3	→ Maritime Station - Ferry Terminal	Check in Procedures		
Hub 2	→ Parking of Ferry terminal	Activities and leisure	Things to do in Ancona in case of long transit times	On demand
Hub 4	→ Embarkation Dock	Driving from Parking to dock	Route planner Terminal-Dock	To be defined
Hub 5	→ Ship	Sailing	Activities to do once onboard	To be defined
Hub 6	→ Port of landing	Split	Disembarkation procedures of passengers with their own vehicles weather forecast Road condition in the city of final destination Warning in case of local strike/demonstration Currency Various information: tourist offices/museums opening hours... Restaurants Shopping Local products/traditional food Events/not to be missed Excursions Parking/local transport	

3.2.2 FERRY PASSENGERS NOT BOARDING THEIR OWN VEHICLE

Pur rappresentando solo il 25% dei passeggeri in partenza, questa tipologia di passeggeri deve ricevere informazioni il più corrette ed aggiornate possibili per poter combinare in modo efficiente i diversi mezzi di trasporto utilizzati.

3.2.2.1 FERRY PASSENGERS NOT BOARDING THEIR OWN VEHICLE ARRIVING BY TRAIN

Where		What	Useful Info	When
Hub 1	→ City of departure	Travel planning	Reminder Timetables and Check In Reminder passport or id to go abroad Sending link about form to fill in to enter a country Reminder outgoing health obligation Useful contacts and phone numbers Forecast information Route planner to Ancona weather forecast	Day before departure
Hub 2	Railway Station	Moving from railway station to Ferry Terminal	Useful info to reach Ferry Terminal From Railway station (walking, taxi, bus 1/4, bus n.20)	To be defined
Hub 3	→ Maritime Station - Ferry Terminal	Check in Procedures	Collection of passengers' passports	
		Activities and leisure	Things to do in Ancona in case of long transit times	On demand
Hub 4	→ Embarkation Dock	Moving from Ferry Terminal to Embarkation Dock	Info about bus connection (Bus n.12) from Ferry Terminal to the Dock	To be defined
Hub 5	→ Ship	Sailing	Activities to do once onboard	To be defined
Hub 6	Port of landing	Split	Disembarkation procedures of passengers on foot weather forecast Road condition in the city of final destination Warning in case of local strike/demonstration Currency Various information: tourist offices/museums opening hours... Restaurants Shopping Local products/traditional food Events/not to be missed Excursions local transport	To be defined

3.2.2.2 FERRY PASSENGERS NOT BOARDING THEIR OWN VEHICLE ARRIVING BY BUS

Where		What	Useful Info	When
Hub 1	→ City of departure	Travel planning	Reminder Timetables and Check In Reminder passport or id to go abroad Sending link about form to fill in to enter a country Reminder outgoing health obligation Useful contacts and phone numbers Forecast information Route planner to Ancona weather forecast	Day before departure
	↓			
Hub 2	Bus Station	Moving from bus station to Ferry Terminal	Useful info to reach Ferry Terminal From Bus station	To be defined
Hub 3	→ Maritime Station - Ferry Terminal	Check in Procedures	Collection of passengers' passports	
	↓	Activities and leisure	Things to do in Ancona in case of long transit times	On demand
Hub 4	→ Embarkation Dock	Moving from Ferry Terminal to Embarkation Dock	Info about bus connection (Bus n.12) from Ferry Terminal to the Dock	To be defined
	↓			
Hub 5	→ Ship	Sailing	Activities to do once onboard	To be defined
	↓			
Hub 6	Port of landing	Split	Disembarkation procedures of passengers on foot weather forecast Road condition in the city of final destination Warning in case of local strike/demonstration Currency Various information: tourist offices/museums opening hours... Restaurants Shopping Local products/traditional food Events/not to be missed Excursions local transport	To be defined

3.2.2.2 FERRY PASSENGERS NOT BOARDING THEIR OWN VEHICLE ARRIVING BY PLANE

	Where	What	Useful Info	When
Hub 1	→ City of departure	Travel planning	Reminder Timetables and Check In Reminder passport or id to go abroad Sending link about form to fill in to enter a country Reminder outgoing health obligation Useful contacts and phone numbers Forecast information Route planner to Ancona weather forecast	Day before departure
	↓			
Hub 2	Airport	Moving from Airport to Railway station	Useful info to reach Ferry Terminal From Airport Aerobus Raffaello	To be defined
Hub 2	Railway Station	Moving from railway station to Ferry Terminal	Useful info to reach Ferry Terminal From Railway station (walking, taxi, bus 1/4, bus n.20)	To be defined
Hub 3	→ Maritime Station - Ferry Terminal	Check in Procedures	Collection of passengers' passports	
	↓	Activities and leisure	Things to do in Ancona in case of long transit times	On demand
Hub 4	→ Embarkation Dock	Moving from Ferry Terminal to Embarkation Dock	Info about bus connection (Bus n.12) from Ferry Terminal to the Dock	To be defined
	↓			
Hub 5	→ Ship	Sailing	Activities to do once onboard	To be defined
	↓			
Hub 6	Port of landing	Split	Disembarkation procedures of passengers on foot weather forecast Road condition in the city of final destination Warning in case of local strike/demonstration Currency Various information: tourist offices/museums opening hours... Restaurants Shopping Local products/traditional food Events/not to be missed Excursions local transport	To be defined

3.2.2.2 FERRY PASSENGERS NOT BOARDING THEIR OWN VEHICLE ARRIVING BY CAR

Where		What	Useful Info	When
Hub 1	→ City of departure	Travel planning	Reminder Timetables and Check In Reminder passport or id to go abroad Sending link about form to fill in to enter a country Reminder outgoing health obligation Useful contacts and phone numbers Forecast information Route planner to Ancona weather forecast	Day before departure
Hub 2	↓ Parking Lot	Moving from Parking lot to Ferry Terminal	Useful info to reach Ferry Terminal From Parking Lot	To be defined
Hub 3	→ Maritime Station - Ferry Terminal	Check in Procedures	Collection of passengers' passports	
	↓	Activities and leisure	Things to do in Ancona in case of long transit times	On demand
Hub 4	→ Embarkation Dock	Moving from Ferry Terminal to Embarkation Dock	Info about bus connection (Bus n.12) from Ferry Terminal to the Dock	To be defined
Hub 5	→ Ship	Sailing	Activities to do once onboard	To be defined
Hub 6	↓ Port of landing	Split	Disembarkation procedures of passengers on foot weather forecast Road condition in the city of final destination Warning in case of local strike/demonstration Currency Various information: tourist offices/museums opening hours... Restaurants Shopping Local products/traditional food Events/not to be missed Excursions local transport	To be defined

3.2.3 CRUISE PASSENGERS

With reference to cruise passengers arriving/departing from Ancona, the analysis their flows is based on the following aspects.

From a quantitative point of view, on the basis of the data acquired, we can assume that each call of the ship sees 2,000 home-port cruise passengers who end the cruise disembarking in the morning and the same number embarking in the afternoon (4,000 users per day overall).

The 2,000 users can be divided according to the following hypotheses:

200 cruise passengers (about 90 cars) reach the Terminal area, leaving their vehicle parked at the **parking lot** managed directly by the Company.

350 cruise passengers are accompanied by **private vehicles** or taxis (about 120 cars);

1000 cruise passengers reach the Terminal from the collection points in various cities using **coaches** made available by the shipping company (20 coaches);

The remaining 450 users reach the Terminal using the shuttle buses from the **railway station or the airport**.

As a matter of fact, the hubs to be taken into consideration to better manage the flows of cruise passengers are the same of the ferry passengers. How cruise passengers can receive these information will depend on how our platform will be accessible to final users and/or Shipping Company.

3.3. ACTIVITIES

The objective of this chapter is to define for the target users of the port area (cruise passengers, tourist marina passengers, ferry passengers) an articulated and well-structured program of available services and activities, also based on the types of transport combinations available in the area (car, bus, train, plane).

It is therefore intended to achieve a real physical customer journey map, i.e. a representation of all combinations of physical movements from the users' home to boarding and vice versa.

Here below are the types of services/activities of interest to tourists that can be offered to travellers. As we will see, some services are already offered by the port authority of the city of Ancona.

We distinguish the types of services according to their use inside the port area and outside.

INSIDE THE PORT AREA

- Left luggage office with tourist info point (service already available)

- Breakfasts, appetizers, snacks, quick meals (service already available)
- Equipped stations for remote working
- Bike / scooter tours through sharing system

12

- Walking tours with local guides / tourist information
- Online language courses through agreements with dedicated apps (languages available: Italian and other ADRION countries)
- Multimedia room with film projection on Ancona, possibly in 3D

OUTSIDE THE PORT AREA (IN TOWN AND NEARBY)

- Breakfasts, aperitifs and snacks at the bars in the area
- Lunches / Dinners at local restaurants
- Food & Wine tastings at the farms in the area
- Craft demonstrations at the craft stores in the area
- Workstations equipped for smart working at cafeterias and/or qualified accommodations in the area
- Bike / scooter tours through the sharing system
- Walking tours with local guides / tour operators
- Dog trekking and dog areas
- **Visits to sites and realities of tourist interest divided into three themes:**
 - Art and culture
 - Nature and landscapes
 - Typical food and wine museums and cultural sites
 - Typical craftsmanship
- **Short itineraries distinguished by the time required for fruition**
 - 100 minutes
 - 200 minutes
 - 300 minutes
- **Unmissable destinations for those arriving from**

- North
- South
- West
- Travel ideas near Ancona
- Other last minute services (e.g. hairdresser, beauty center, various stores, e.g. clothing, bookstores, etc.)

In order to offer a wide range of opportunities to tourists in transit in Ancona, it is necessary to create a circuit of services/activities that have agreements with port users, with dedicated discounts and plus services. In this sense, accommodation facilities, for example, can offer dedicated promotions to allow travellers to anticipate their arrival in Ancona (or postpone their departure) and thus enjoy the beauty of the city and surrounding areas.

In case of delay, the port authority is advised to compensate the customer for the inefficiency by offering a range of services to choose from (subject to free agreement with the companies involved), such as: breakfast, a tasting in a wine shop, a visit to a museum, etc.

To that end, it is considered extremely important to practice targeted actions of stakeholder engagement, through the involvement of local businesses and professionals who can bring value to the user.

Now Let us analyze specifically the activities of tourist interest that can be offered to travellers in transit from the port of Ancona and that, in part, are already presented through the Welcome to Ancona app.



VISITS TO SITES AND REALITIES OF TOURIST INTEREST

ART AND CULTURE

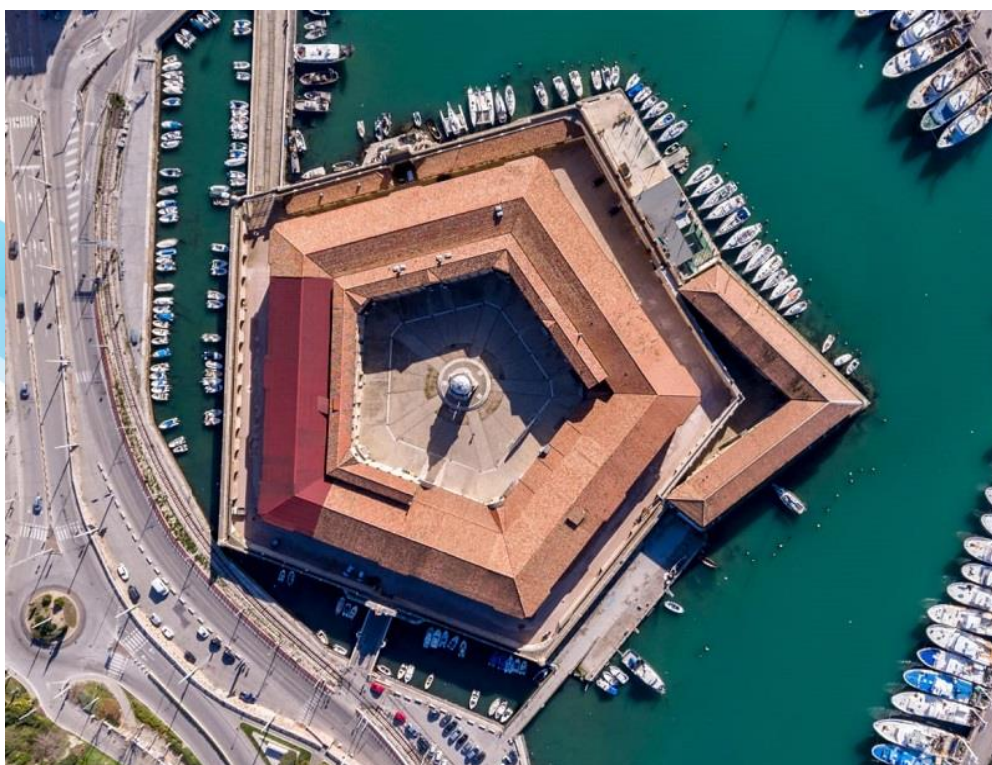
Where to breathe the history and the local creative genius

- Calamo Fountain (20 min on foot)
- Cathedral of San Ciriaco (20 min on foot)
- Church of San Domenico (15 min walk)
- Santa Maria della Piazza Church (15 min walk)
- Church of Jesus (15 min walk)
- Fountain of the two suns (10 min walk)
- Monumento ai Caduti (Il Passetto) (40 min by foot; 25 min by bus; 10 min by car)
- Le Muse Theater (15 min on foot)
- Loggia dei mercanti (15 min by foot)
- Mole Vanvitelliana (20 min by foot)

- Palazzo degli Anziani (15 min by foot)
- Piazza del Plebiscito (15 min walk)
- Porta Pia (20 min walk)
- Arch of Trajan (5 min walk)
- Herb Market (20 min walk)
- Diocesan Museum (20 min walk)
- Toy and Children's Museum (15 min walk)
- City Museum (20 min walk)
- Omero State Tactile Museum (20 min walk)
- Marche Archaeological Museum (15 min walk)
- Francesco Podesti Civic Art Gallery (15 min walk)

It is recommended to present each attraction through photos, videos and texts, by specifying opening hours and how to book and use them.

It is also suggested, for each attraction, to illustrate the approximate time of travel by foot, by car and by bus from the port. Users are invited to leave reviews and a photo taken next to the site of interest.



NATURE AND LANDSCAPES

Where to regenerate the spirit

- Porto Antico (10 min on foot)
- Red Lantern (20 min on foot)
- Piazzale del Duomo di San Ciriaco (20 min on foot)
- Cardeto Park (40 min on foot; 35 min by bus; 10 min by car)
- Il Passetto and the Grotte del Passetto (40 min on foot; 25 min by bus; 10 min by car)
- Belvedere Posatora Park (60 min on foot; 35 min by bus; 15 min by car)
- Cittadella Park (35 min on foot; 30 min by bus; 10 min by car)
- Scalaccia Beach (75 min on foot; 35 min by bus; 15 min by car)

It is recommended to present each attraction through photos, videos and texts.

We also recommend, for each attraction, to illustrate the travel time by foot, by car and by bus from the port. Users are invited to leave reviews and a photo taken next to the site of interest.



TYPICAL FOOD AND WINE

How to satisfy hunger and thirst

- Brodetto all'anconetana
- Codfish all'anconetana



- Moscioli
- Vincisgrassi
- Conero red
- Verdicchio of Jesi

It is recommended to present each attraction through photos, videos and texts.

For each attraction, it is suggested to indicate the restaurants that offer in their menus these dishes and the time of travel by foot, by car and by bus from the port. Users are invited to leave reviews and a photo taken near the site of interest

TYPICAL CRAFTSMANSHIP

Where to experience Marche's know-how

- La Congrega of Valeria David (15 min on foot)
- Timbrificio Dubbini by Patrizia Dubbini (50 min on foot; 30 min by bus; 10 min by car)
- Berardi Artigiani Foschi (20 min on foot)
- Burattini gioielli d'arte (40 min on foot; 20 min by bus; 10 min by car)
- Gioacchini (50 min on foot; 30 min by bus; 10 min by car)
- Etc.

It is recommended to present each attraction through photos, videos and texts.

We also recommend, for each attraction, to illustrate the travel time by foot, by car and by bus from the port. Users are invited to leave reviews and a photo taken near the site of interest.

SHORT ITINERARIES



100 minutes Itinerary: "Wandering through history".

Places to visit: Roman excavations, Old Port with Trajan's Arch and Mole Vanvitelliana

200 minutes Itinerary : "The Genius of Ancona".

Places to see: Old Port with Trajan's Arch and Mole Vanvitelliana, Teatro delle Muse, Piazza del Plebiscito, Clock Tower, Government Palace, San Domenico Church, Gesù Church, Palazzo degli Anziani, Marche National Archaeological Museum, Cathedral of San Ciriaco, Roman Amphitheater, Church of Santa Maria della Piazza

300 minutes Itinerary : "Between sky and sea".

Places to see: Old Port with Trajan's Arch and Mole Vanvitelliana, Il Passetto and its caves and the Monumento dei Caduti, Cathedral of San Ciriaco, Calamo Fountain, Pope's Square

It is recommended to present each attraction through photos, videos, texts and a map.

It is also suggested to make the itineraries accessible through an audio guide.



UNMISSABLE DESTINATIONS

For those arriving from the north:

- Senigallia, the city of velvet sand and Summer Jamboree

For those arriving from the west:

- Jesi, the city of Federico II
- The Natural Park of Gola della Rossa with the wonderful Frasassi Caves.

For those arriving from the south

- Monte Conero Park (Numana, Sirolo and Portonovo)
- Recanati, the city of Giacomo Leopardi and Beniamino Gigli
- Loreto, the city of the Holy House

It is recommended to present the following places through photos, videos, general texts of the destination and synthetic texts of the various attractions present.



PLACES TO SEE NEARBY

- Castelfidardo, the town of accordions
- Offagna, the village of medieval festivals



- Osimo, the town of "headless" people
- Camerano, the village of underground caves
- Sassoferrato, the village out of a fairy tale
- Cupramontana, the town of Verdicchio wine
- Arcevia, the village set between hills and mountains
- Staffolo, the balcony of Vallesina

- Corinaldo, the town “palcoscenico”
- Ostra, a town surrounded by greenery and peace
- Sassoferrato, the town of Monte Strega
- Maiolati Spontini, the town of the Abbey of Santa Maria delle Moie
- Serra San Quirico, an enchanting medieval village
- Mergo, a small village in the Vallesina area
- Falconara, the city with a zoo suitable for families

It is suggested to present the following places through photos, videos, texts and icons representative of the distinctive positioning of the place (for example music for the town of Castelfidardo, glass of wine for Cupramontana, etc.)

The heterogeneity of the cultural and touristic offer of the historical center of Ancona and of the nearby locations can allow, after a work of structuring the offer side by side with the community, to offer to the user in transit in the port of Ancona a highly satisfying and stimulating experience.

The offer of goods, services and activities can in fact respond to a plurality of targets, starting from families, couples, groups, solitary travellers - both national and international.



4. PRELIMINARY REQUIREMENTS DEFINITION FOR THE IDENTIFIED USE CASE SCENARIOS

This last chapter will try to identify the preliminary requirements for features of a wide platform for transport and connected mobility services.

The preliminary requirements in the meaning of the travellers' needs can be seen from the above chapters. In this stage, we are merging all kind of information that could be helpful for the passengers into the following key groups:

General information	<p>Weather forecast</p> <p>Conditions on the road</p> <p>Info in case of urgent situations - phone numbers, other contacts (car service, health care, police office)</p>
General information for the travel	<p>Information about the route to Ancona</p> <p>Route planners</p> <p>Information about the documents needed and ongoing health obligation</p>
Travel information	<p>Accurate information on timetable, delays or cancellations</p> <p>Information about the shuttle bus from / to the airport</p> <p>Information about the available local transports, timetables, prices and ticketing</p> <p>Information about rent-a-car</p> <p>Information about left luggage and baggage storage services</p> <p>Information about boarding and disembarking procedure</p> <p>Information about parking (location, availability, price)</p> <p>Information about the charging of electric vehicles</p> <p>Information about activities to do once onboard</p> <p>Return travel information</p>
<p>Tourist information</p> <p>(in case of available free time in Ancona, while waiting for travel)</p>	<p>Information about public bicycles (availability, location, price)</p> <p>Information about quick refresh&rest options in ancona</p> <p>Information about tourist guides and available tours in Ancona for 1/2/3 hours</p>

	<p>Information about the main attractions</p> <p>Information what to do in Ancona in 100/200/300 minutes (walking tour, experiences, etc.)</p> <p>Special services dedicated to “remote workers”</p>
<p>Information about the final destination</p>	<p>Weather forecast</p> <p>Conditions on the road</p> <p>Tourist information about the final destination</p> <p>Information about parking and local transport</p>

Ancona has a specific situation since the Port is located within walking distance to the city centre, the central bus station and the central train station. All these points are within a 20-25 minutes by walk. The Port area is crowded, especially during the high tourist season months, from May to September.

With the E-CHAIN project and through the identified use case scenarios, the key points that should be addressed are the following:

- To give the passenger information and service that will allow him to access the ferry as smooth as possible, without stops in the Port area if he didn't plan to because of other reasons;
- In case the passenger plan to stop by in Ancona, give him detailed information in real-time about available parking near the Port and navigate him to the nearest possible, without unnecessary driving around;
- In the case of delays or cancellations, inform the passenger as soon as possible and offer him alternative possibilities and suggestions about spending available time, including information about parking his vehicle;
- To give real-time information about available e-chargers for electric vehicles and information about special offers for electric cars owners (free parking, available parking in specific parking zones, etc.).
- In case the passenger has available time before embarking on the ferry/ship/catamaran, give him information about available public bicycles;
- The Municipality of Ancona, also thanks to the new tourism project of city branding (2021), can encourage the developers and tenderers of tourism products to prepare and offer products that involve green, sustainable transport solutions.

D 3.3.1 – Use case scenarios selection and preliminary requirements definition

Activity 3.3 – Technical and functional requirements

Version Final

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Activity Number	3.3
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TABLE OF CONTENTS

Version control.....	2
Acronyms / Abbreviations	4
Reference documentation	4
1. Introduction	5
1.1 Purpose of the DOCUMENT.....	5
1.2 WORKING PRINCIPLE.....	5
2. Background information	6
3. SEGMENTATION AND SUB-SEGMENTATION.....	7
3.1. General information.....	7
3.1.1. Venice port’s Terminals.....	13
3.1.2. Transportations possibilities.....	24
3.2. ANALYSIS OF THE SEGMENTS	24
3.2.1. Cruise passengers (or ferry passengers without car) that have their departure from Venice Port	24
3.2.2. Ferry passengers boarding their own vehicle.....	27
3.2.3. Cruise passengers that are in transit in the Venice Port	27

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	<p>Application Form – E-CHAIN - Enhanced Connectivity and Harmonization of data for the Adriatic Intermodal Network</p> <p>2014 - 2020 Interreg V-A Italy - Croatia CBC Programme Call for proposal 2017 Standard - E-CHAIN Priority Axis: Maritime transport</p>	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

This task will gather requirements for design and development of the services realized and integrated in E-CHAIN platform for the deployment in the pilot sites. The aim is to draw up the complete design of all pilot sites implementation and to prepare specifications for all equipment and systems involved.

1.2 WORKING PRINCIPLE

Conceptual scenarios will be devised to better understand the HW/SW partitioning and distribution model in relation to the needs of specific use cases and application scenarios. The characteristics of the existing services within Consortium and standards will be taken into account. Technology and “users” from pilot sites will be represented. Technical and no-technical requirements will be gathered. It will establish and apply a methodology for defining use cases scenarios around possible reference services to be developed and replicated at the 3 project’s pilot sites.

The pilot site of Venice will be our focus.

This document is based on the information and data gathered through the interview of Act. 3.2. and directly in the web sites of the main stakeholders involved in the mobility in the port of Venice.

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. SEGMENTATION AND SUB-SEGMENTATION

3.1. GENERAL INFORMATION

Checking the number of passengers departed, passed through and arrived at the port of Venice during the 2019 (Pre COVID pandemic) we find:

Type of passengers	IN	OUT	TOTAL
Number of local and ferry passengers	100.232	96.308	196.540
Local passengers (<20 miles)	56.926	46.328	93.254
Ferry passengers	53.306	49.980	103.286
Cruise passengers			1.617.945
Home Port	698.309	699.119	1.397.428
Transits (to be counted once)			220.517

Table 1 Source of data <https://www.port.venice.it/en/the-ports-in-figures.html>

The four types of passengers reported in the Table 1 have different needs, that we will try to describe in this document.

We decided to remove from the analysis the “local passengers” because they are represented by people that use the port service regularly, with really few needs during their trip.

So in order of importance (due by the number reported in Table 1) we will analyze:

- Cruise passengers that have their departure from Venice Port
- Cruise passengers that are in transit in the Venice Port
- Ferry passengers boarding their own vehicle
- Ferry passengers not boarding their own vehicle

Because doesn't exist particular differences between Cruise passengers and Ferry passengers not boarding their own vehicle, we will consider them as one category

All of them (excepted for in transit cruise passengers) need to reach the terminal trough this two primary hubs:

- Tronchetto
- Piazzale Roma

And this secondary hubs:

- Marco Polo Airport of Venice
- Canova Airport of Treviso
- Mestre F.S. Railway station
- Venezia Santa Lucia F.S. Railway station

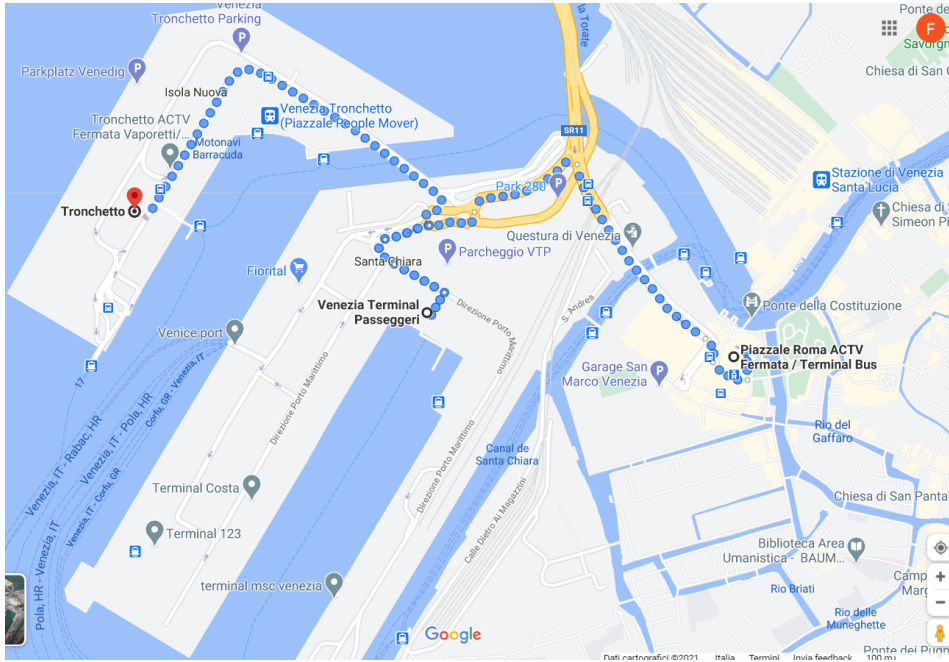


Figure 1 Path between Cruise Terminal and the Hubs of Tronchetto and Piazzale Roma

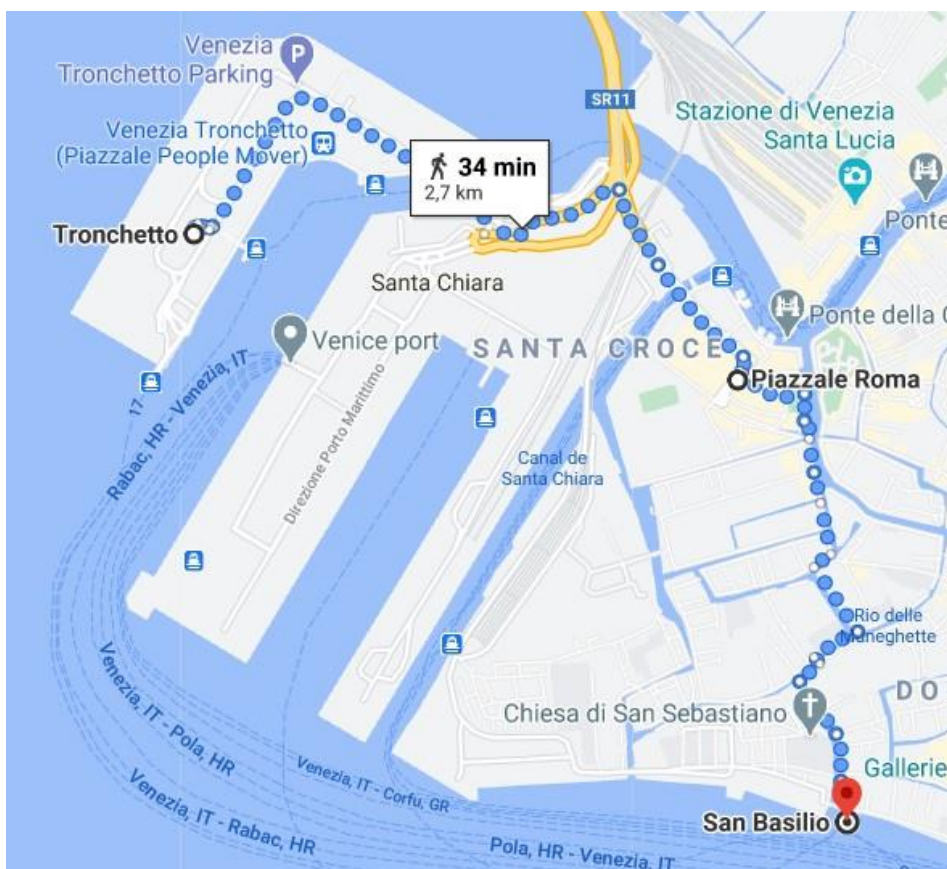


Figure 2 Path between Terminal of San Basilio and the Hubs of Tronchetto and Piazzale Roma

From the primary hubs of Tronchetto and Piazzale Roma is possible to reach the cruise terminal in different ways:

- Taxi
- Water Taxi
- People Mover (except for San Basilio Terminal)

People Mover

Venice's People Mover is a small-scale automated guideway public transit system which connects the Piazzale Roma—the major transportation hub of the city—and the Tronchetto island with a car parking facility. The train also makes a stop at the Marittima station where the passenger terminal of the Port of Venice is located.

The whole 870-metre-long (0.5 mi) journey takes just over three minutes, including the stop next to the cruise ship terminal.[6] The rail gauge is 1220 mm, difference in altitude between terminal stations 0.58 m.



Figure 3 Map of the track of the People Mover



Figure 4 The People Mover

3.1.1. VENICE PORT'S TERMINALS

In this chapter we will describe the Terminals of Venice Port

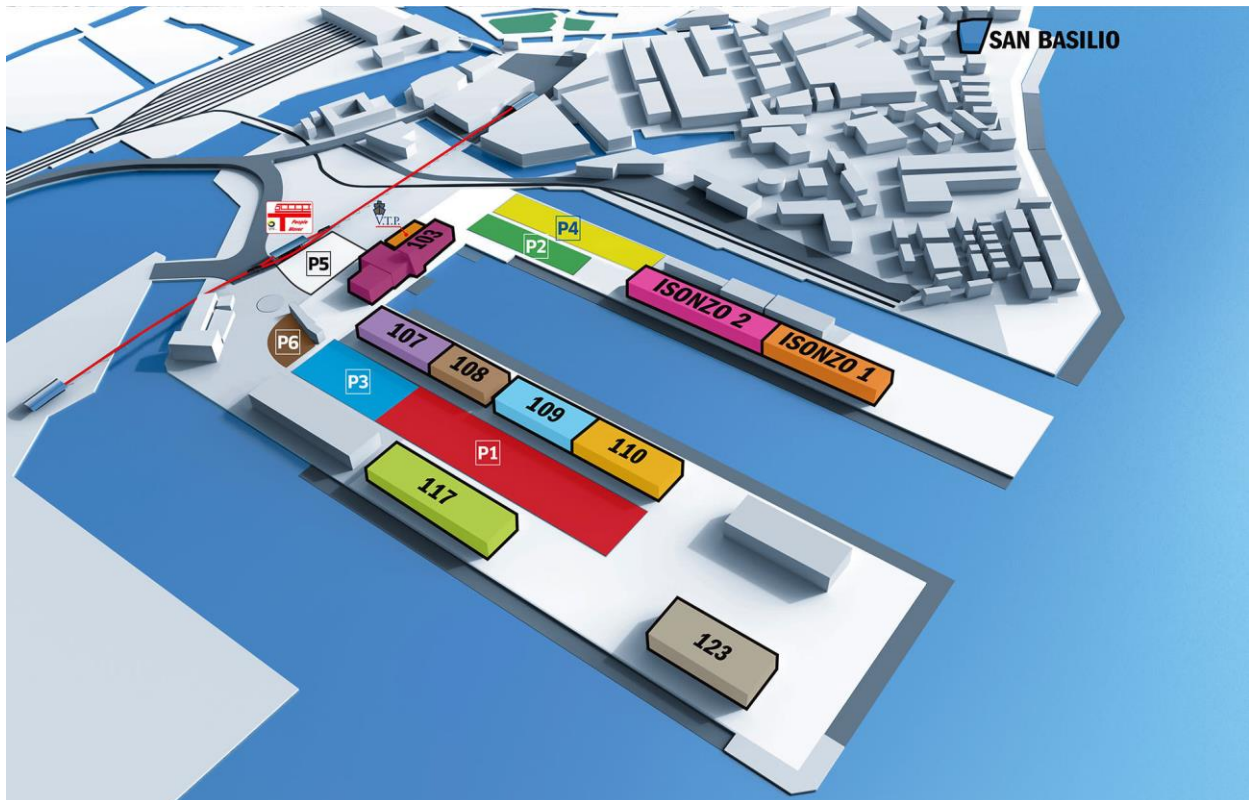


Figure 5 Terminals of the Venice Port

Some services of the Port Area

PARKING AREAS

The only located in the Port Area, at walking distance from the embarkation. Up to 40 buses, 2325 cars (spaces reserved for passengers with reduced mobility). Located in the Port Area equipped with a customs point and so at walking distance from the embarkation, VTP's parking facilities are the ideal choice for leaving the car during your cruise.

PASSENGERS' INFORMATION DESKS

Information points dedicated to the needs of passengers are located in the arrival and departure areas. Fully qualified hostesses will provide free information regarding Venice, transportation service, transfers, city sights, events and exhibitions, including a complimentary City map.

WI-FI

Inside the Cruise Port some areas are served by a free WI-FI service available for both passengers and operators.

ATM SERVICE

The service is located at Terminals Isonzo 1/2, and in the Place in front of Terminal 103.

DUTY FREE AND SHOPS INSIDE THE TERMINALS

Duty free and shops are available for departing passengers in Cruise Terminals Isonzo 1/2, 107/108, 109/110 and 117.

NEWSSTAND

Located outside the arrival hall of Terminal 107 and outside the arrival hall of Isonzo 1.

SHOPPING AREA, TOBACCONIST AND PARAPHARMACY

Located outside the arrival hall of Terminal 107.

FOOD AND BEVERAGE AREAS

Self service, bar and vending machines are available for the passengers in the arrivals and departures areas.

FIRST AID SERVICE (with doctor and ambulance)

Located in the building 255 the service is available during the days when ships are embarking and disembarking calling the following Ph. + 39 041 5334739.

LEFT LUGGAGE DEPOSIT AND LOST & FOUND SERVICE

The left luggage deposits are located on the ground floor of Terminals 103, 117, Isonzo 1/2, 123 and St. Basilio and are open during the days when ships are embarking and disembarking cruise passengers.

TERMINAL 103

Terminal 103 is a state of the art facility, opened in 2003. The closeness to a short stay area available for drop off and pick up of passengers as well as the proximity of a car park, located just a few minutes walk from the facility, grant an easy access to the facility.

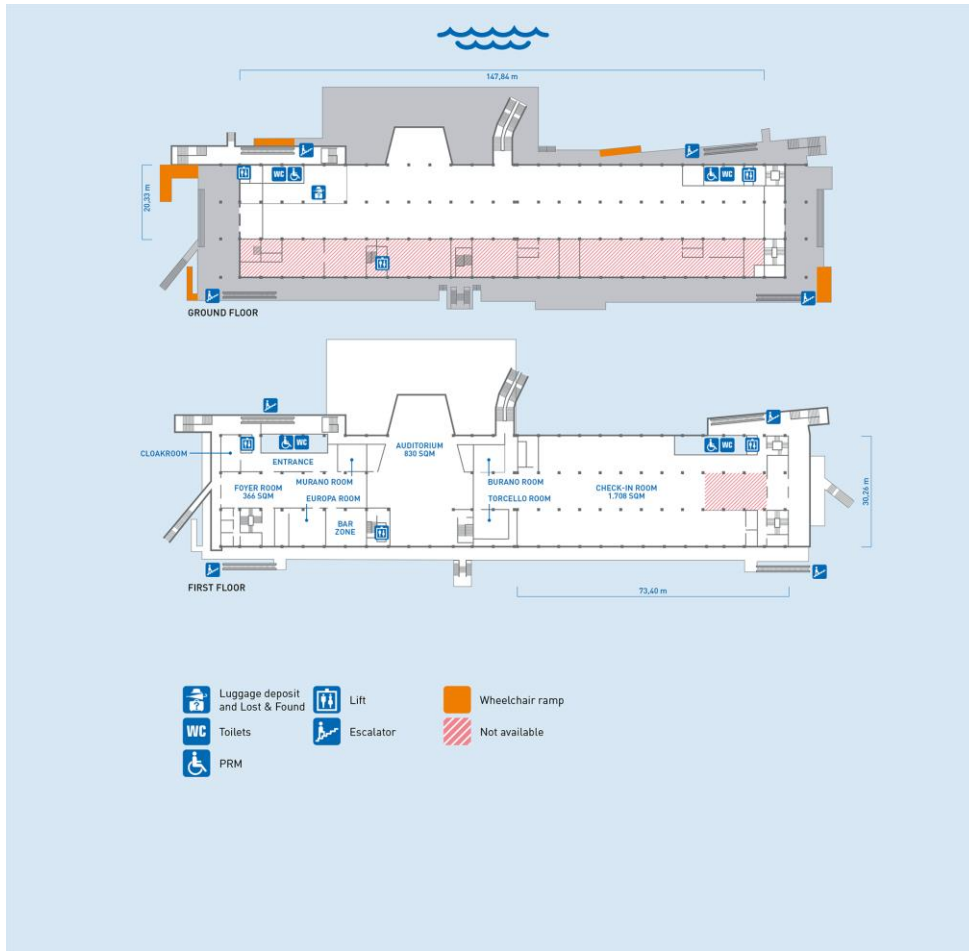


Figure 6 Map of Terminal 103

TERMINAL 107-108

The Terminal 107/108 is a two-story facility restored at the end of 90s. Easy access to the Terminal 107/108 is granted by the closeness of a short stay area available for drop off and pick up of passengers as well as by a car park, located just a few minutes' walk from the facility.

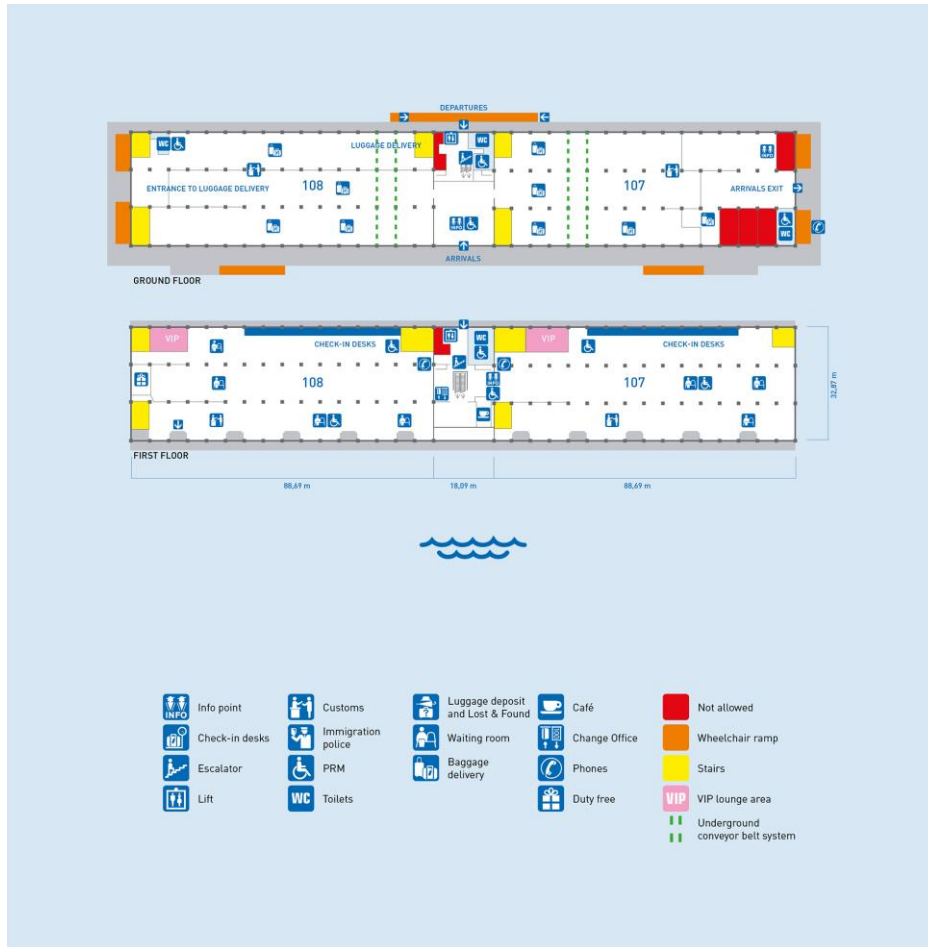


Figure 7 Map of Terminals 107 and 108

The embarkation and disembarkation of passengers is safely carried out using a Ship Boarding Bridge, while the baggage handling benefits from an innovative underground conveyor belt system, delivering pieces of luggage directly on the quay side

TERMINAL 109-110

Thanks to its dimension of 14.000 square meters divided on two floors, Terminal 109/110 is the widest cruise facility of the Mediterranean with a standard – never reached so far – of 2 square meters of available surface for each passengers waiting to embark during the peak phases. Inaugurated in April 2014, Terminal 109/110, a former warehouse, has being refurbished to become an independent Passenger station located in Tagliamento Quay, in order to fluently serve a maximum of two cruise ships simultaneously berthed in front of Terminal 107/108 and in front of the renewed Terminal 109/110, respectively. From the technological systems to the air-conditioning and the fire systems, from the elevators to the escalators, all the structural refurbishment interventions have followed a philosophy based on energetic savings and eco-sustainability, emphasizing the industrial archeology aesthetic, thanks to its elegant and minimal furniture. The embarkation and disembarkation of passengers is safely carried out using a Ship Boarding Bridge, while the baggage handling benefits from an innovative underground conveyor belt system, delivering pieces of luggage directly on the quay side.

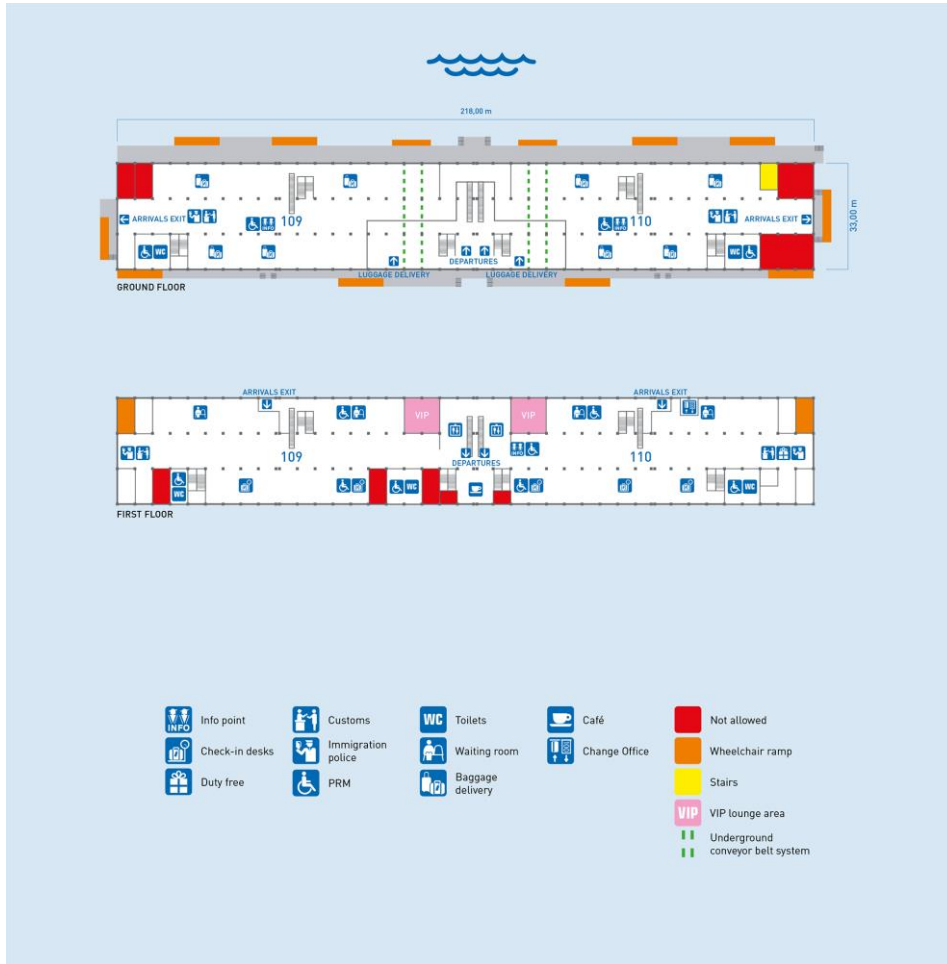


Figure 8 Map of Terminal 109 and 110

TERMINAL 117

The Terminal 117 is a single-storey facility restored and opened in 2006. The proximity of the car park 1 and the car park 3 as well as the adjacency of dedicated taxi areas for drop off and pick up of passengers ensure an easy access to the facility.

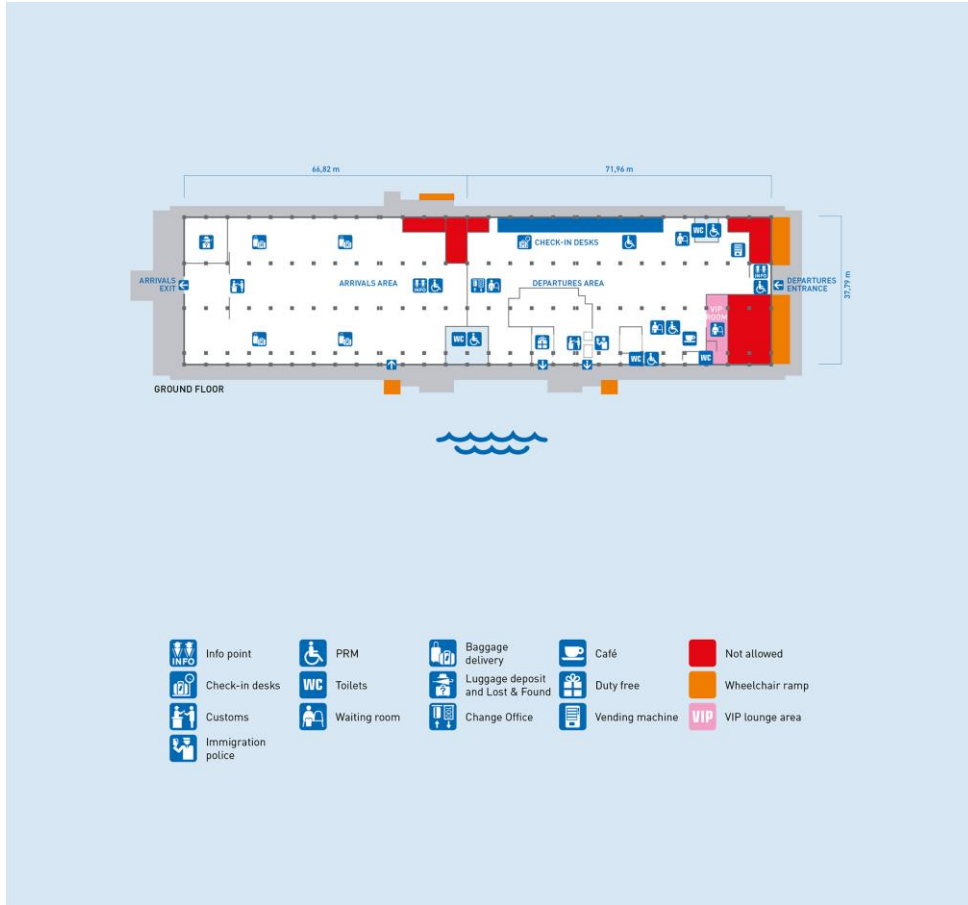


Figure 9 Map of Terminal 117

Terminal 123

The Terminal 123 is a single-store facility of 5.000 square meters opened in 1999 and used to serve ferry traffic until 2013. After the relocation of the ferry traffic to the Fusina Motorways of the Sea Terminal, the facility has just been refurbished into a cruise terminal dedicated to both embarking and disembarking operations. In addition, it is the only terminal located in the Marittima area provided with an internal Mediterranean scrub garden open to the public. The closeness to a short stay area available for drop off and pick up of passengers, as well as the proximity of a car park, located just in front of the terminal, grant an easy access to the facility.

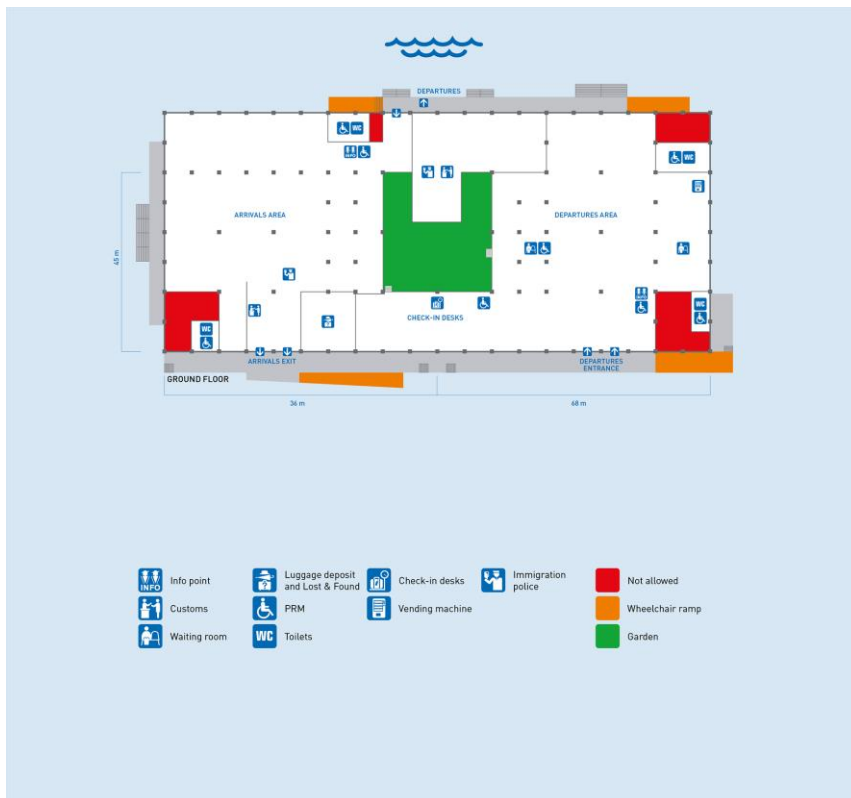


Figure 10 Map of Terminal 123

TERMINAL ISONZO 1-2

Terminal Isonzo is a two-story building, divided in two parts: Isonzo 1 and Isonzo 2, opened respectively in 2009 and 2011. Designed for providing all passengers a smooth experience while embarking and disembarking, it counts among its amenities a 1,432 sq. m panoramic terrace allowing outgoing passengers to enjoy the timeless beauty of the Lagoon City. Easy access to the Terminal Isonzo is granted by the closeness of a short stay area available for drop off and pick up of passengers as well as by a car park, located just a few minutes' walk from the facility.

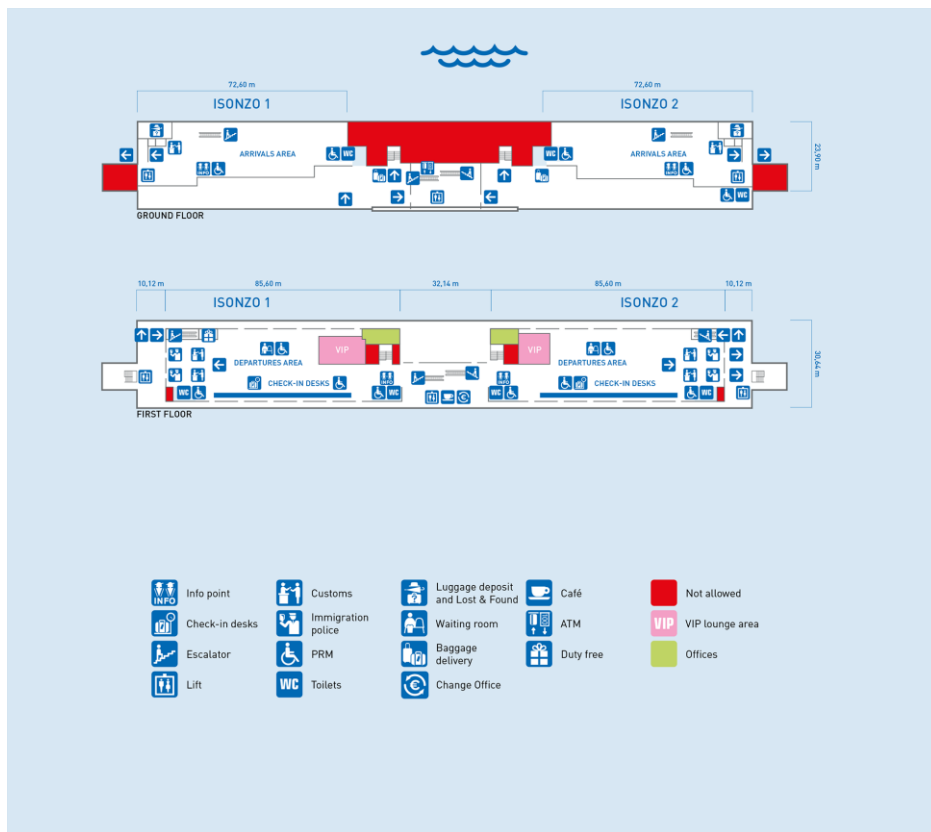


Figure 11 Map of Terminal Isonzo 1 and 2

TERMINAL SAN BASILIO

St. Basilio Terminal, a single storey ground floor facility built at the end of 80s and renovated in the 90s, provides assistance not only to small ships, but also to high speed hydrofoils and catamarans from/to Slovenian and Croatian coasts.

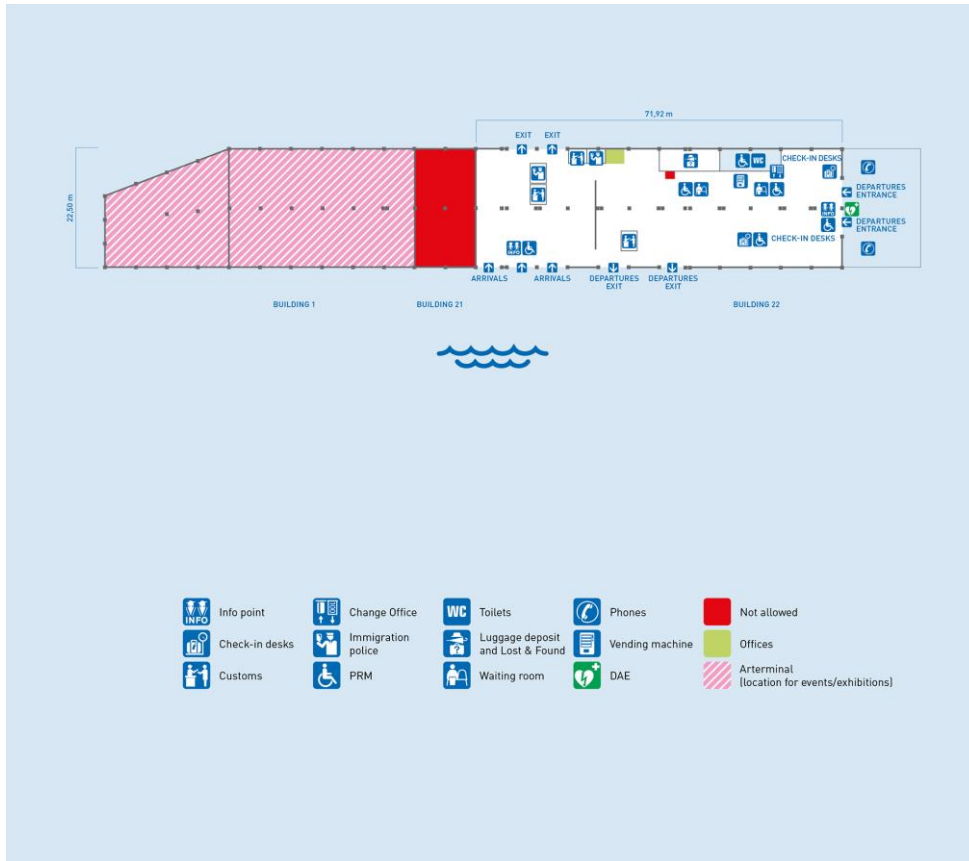


Figure 12 Map of Terminal San Basilio

In the following chapters we will try to value how the travelers use to reach this two primary hubs.

3.1.2. TRANSPORTATIONS POSSIBILITIES

Here we will briefly list the possibilities that the passengers can choose to reach Piazzale Roma or Tronchetto:

- Airplane
- Train
- Bus and vaporetto
- Car
- Taxi and water taxi

3.2. ANALISYS OF THE SEGMENTS

3.2.1. CRUISE PASSENGERS (OR FERRY PASSENGERS WITHOUT CAR) THAT HAVE THEIR DEPARTURE FROM VENICE PORT

Data reported in Table 1 shows that the 77% of all the passengers are people starting their cruise from Venice. Considering the width of this specific segment, it is important to focus the attention on its needs and behavior. To understand them, we will try to re-create their journey from their city of departure to the Cruise Terminal.

Here are some of the different journeys for this type of passengers:

- Home -> Venice Airport -> Taxi or water taxi -> Piazzale Roma or Tronchetto -> People Mover/Taxi/Water Taxi
- Home -> Venice Airport -> Bus -> Piazzale Roma -> People Mover/Taxi/Water Taxi
- Home -> Treviso Airport -> Taxi -> Piazzale Roma or Tronchetto -> People Mover/Taxi/Water Taxi
- Home -> Treviso Airport -> Bus -> Piazzale Roma -> People Mover/Taxi/Water Taxi
- Home -> Mestre F.S. -> Bus -> Piazzale Roma or Tronchetto -> People Mover/Taxi/Water Taxi
- Home -> Mestre F.S. -> Taxi -> Piazzale Roma or Tronchetto -> People Mover/Taxi/Water Taxi
- Home -> Venezia F.S. -> Vaporetto -> Piazzale Roma or Tronchetto -> People Mover/Taxi/Water Taxi
- Home -> Venezia F.S. -> By walk -> Piazzale Roma -> People Mover/Taxi/Water Taxi
- Home -> Car -> Car Parking service -> Shuttle -> Piazzale Roma or Tronchetto -> People Mover/Taxi/Water Taxi

Passenger's needs:

- Trip planning before departure
- In real-time updating of the time schedule for every transport they need during the journey
- Information regarding where they have to go to switch from one transport to an other
- After the arrival in Piazzale Roma or Tronchetto, if they have enough time before departure, suggestions about what they can do meanwhile (events, shopping, cultural visits)

3.2.2. FERRY PASSENGERS BOARDING THEIR OWN VEHICLE

- Home -> Car -> Docks

Passenger's needs:

- Trip planning before departure
- In real-time updating of traffic situation to arrive at Venice Port
- In real-time updating of any delay of the ferry
- Information regarding where and when they have to go for the check-in procedure
- Information regarding where and when they have to go to board the car
- If they have enough time before departure, suggestions about what they can do meanwhile (events, shopping, cultural visits) and where they can leave the car

3.2.3. CRUISE PASSENGERS THAT ARE IN TRANSIT IN THE VENICE PORT

Data reported in Table 1 shows that the 12% of all the passengers are people in transit, already in a Cruise. Obviously this type of passengers have needs different from the ones already described since , in the case they want to go out of the boat, they have not to reach the docks, but just to move to the primary hubs of Piazzale Roma and Tronchetto.

Passenger's needs:

- Weather forecast
- How to reach Piazzale Roma or Tronchetto (and to come back)

- suggestions about what they can do (events, shopping, cultural visits), related to the time that they can spend before departure, with possibilities of booking some services in advance.
- Alert regarding any changes of their trip (delay of departure, change of docks)

D 3.3.1 – USE CASE SCENARIOS SELECTION AND PRELIMINARY REQUIREMENTS DEFINITION

Activity 3.3 – Technical and functional requirements

March, 2021 – Version final

Partner: PP8 – Grad Split

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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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Partners involved	PP8 - City of Split PP6 – Prosoft d.o.o. PP7 - Jadrolinija
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TABLE OF CONTENTS

Version control.....	2
Acronyms / Abbreviations	4
Reference documentation	4
1. Introduction	5
1.1 Purpose of the DOCUMENT.....	5
1.2 WORKING PRINCIPLE.....	6
2. Background information	7
3. SEGMENTATION AND SUB-SEGMENTATION.....	8
3.1 GENERAL INFORMATION.....	8
3.2 IDENTIFICATION OF THE KEY GROUPS OF FINAL USERS (PASSENGERS)	10
3.3 IDENTIFICATION OF THE NEEDS OF FINAL USERS (PASSENGERS).....	12
4. USE CASE SCENARIOS IDENTIFICATION AND SELECTION OF THE REFERENCE USE CASE SCENARIOS 19	
5. PRELIMINARY REQUIREMENTS DEFINITION FOR THE IDENTIFIED USE CASE SCENARIOS	22

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ACRONYM	DEFINITION
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1. INTRODUCTION

1.1 PURPOSE OF THE DOCUMENT

This document is relevant to activity 3.3 Technical and functional requirements of E-CHAIN project - Enhanced Connectivity and Harmonisation of data for the Adriatic Intermodal Network.

The purpose of this document is to identify use case scenarios, explain the selection of reference use scenarios for connected mobility services provide initial user, and service provider needs, functional and non-functional requirements for features of a wide platform for transport and connected mobility services.

The information provided in this report, together with information supplied in "Technical and non-technical requirements" (D 3.3.2), serve for drawing design of all pilot sites implementation and specifications prepared for all equipment and systems involved.

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

- by the Task Manager (TM) and Project Team (PT) to provide detailed information E-CHAIN platform functional and technical requirements;
- by the Activity 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

Conceptual scenarios will be devised to better understand the HW/SW partitioning and distribution model in relation to the needs of specific use cases and application scenarios. The characteristics of the existing services within Consortium and standards will be taken into account. Technology and "users" from pilot sites will be represented. Technical and no-technical requirements will be gathered. It will establish and apply a methodology for defining use cases scenarios around possible reference services to be developed and replicated at the 3 project's pilot sites.

The pilot site of Split will be our focus.

This document is based on the information and datas gathered through the interview of Act. 3.2. and directly in the web sites of the main stakeholders involved in the mobility in the Port of Split.

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. SEGMENTATION AND SUB-SEGMENTATION

3.1 GENERAL INFORMATION

To identify the most respective scenarios for the Port of Split, first, we have to make a segmentation of the final users' (passengers) needs regarding the means of available transport approaching the Port area. To understand the travellers' needs and prepare the solutions that will contribute to their mobility in the sustainable meaning and improve their experience, we have to first understand the specific significations of the concrete location, in our case, the Port area of the City of Split.

This is the panorama picture of the Port of Split:

Figure 1: Panorama picture of the Port of Split



The first conclusion is that the Port of Split is practically in the city centre, surrounded by all other transport infrastructure, except the airport, which is very well connected to the Port area with the shuttle bus service (who is also one of the stakeholders in this project). It is very simple and quick to come from the central bus and/or train station to the Port, just crossing the road without extra infrastructure needed.

Checking the number of passengers and vehicles departed from, passed through and arrived in the Port of Split during 2019 (before the COVID pandemic), we find the following data:

Table 1: The number of passengers and vehicles data for the Port of Split in 2019

	Domestic	International	Total
Vehicle Traffic	786,399	43,195	829,594
Passenger Traffic	5,064,551	543,238	5,607,789

Source: Split port authority.

In the total local (domestic) Port traffic, the share of local ferry traffic is about 59 per cent, local high-speed lines traffic about 15 per cent, while about 16 per cent is the traffic of domestic tourist vessels.

Additionally, there were 282 ships on cruises in 2019:

Table 2: The Cruise traffic data for the Port of Split in 2019

	Number of Calls	Number of Passengers
Cruise Traffic	282	359,955

Source: Split port authority.

Of the other ship traffic (inflows), these are the data from 2017, when there were 258 ships on international lines traffic, 225 tugboats, work and other ships, and 110 yachts.

The traffic structure through the number of arrivals by type of vessel in the period 2013-2017 shows average daily traffic of 51 ships per day. Real daily turnover changes in the seasonal or off-seasonal period. During the season, the daily number of ship arrivals is approximately 100. Out of season, this value drops to 20 to 30 arrivals per day. The most intensive traffic daily takes place between 08:00 and 20:00 (Port of Split Authority, 2020).

The majority of passenger traffic (93%) refers to local lines to islands that gravitate to the Port of Split. Other passenger traffic refers to local commercial trips, international ferry line Split - Ancona and cruises (local and international).

The national local lines are divided into the following categories:

- 1) Ferry lines (transport of passengers and vehicles by Ro-Ro ferries),
- 2) Ship lines (passenger transport by ships) and
- 3) High-speed lines (passenger transport by catamaran).

Lines of local maritime transport are of national character and, according to the Law of Public Transport, they are divided into:

- 1) Inter-county lines (in the area between counties),

- 2) County lines (in the area within the county) and
- 3) Utility lines (in the area of a particular administrative area of the city).

The international maritime traffic of the Port of Split consists of the international ferry line Split - Ancona, the international high-speed line Split - Civitanova (seasonal) and commercial cruise lines. International ferry line Split - Ancona counted a total of 258 arrivals in 2018, out of which 54 per cent refers to Jadrolinija and the rest to the Italian carrier SNAV (which maintains the lines only during the summer season when the total traffic is five to six times bigger than in the off-season).

The importance of the Port of Split is, above all, to transport the local population and to connect the medieval islands to the mainland, and to 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 shares, of which over 40 % is generated during the summer.

This introduction is essential to understand better the wideness of the different needs and expectations of different travellers who have different goals and different baseline situations that define different products and services' requirements to improve their travel experience.

This chapter represents a basis that will help us to define use case scenarios for the City of Split as a pilot location in the E-CHAIN project. Use case scenarios should be the cases that define most passengers travelling through Split, the Port area. First, we need to answer the following questions:

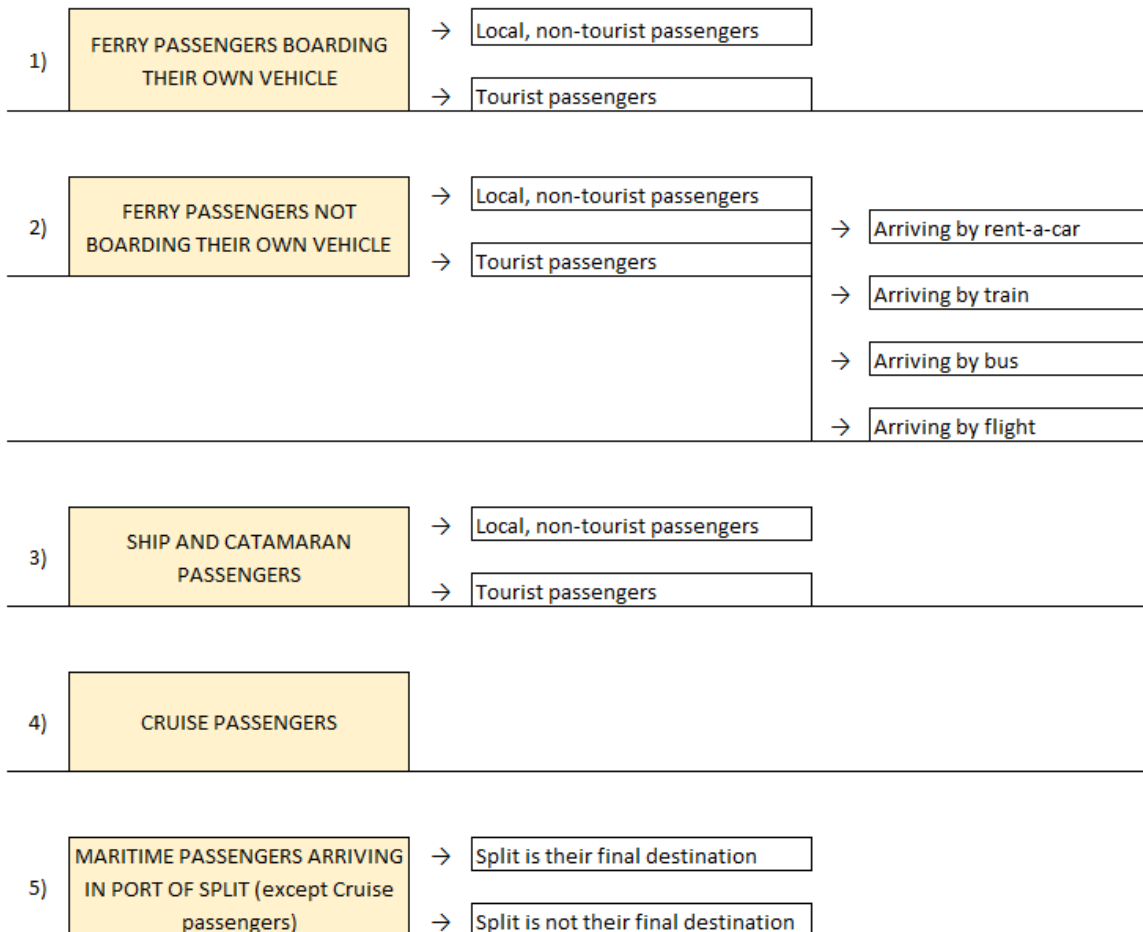
- Who are the representative groups of passengers?
- What are their needs?
- When those needs occur?

3.2 IDENTIFICATION OF THE KEY GROUPS OF FINAL USERS (PASSENGERS)

Based on the above introduction and general information, we can define different segments of passengers travelling through the Port of Split. The basic segments are the following:

- 1) Ferry passengers boarding their own vehicle
- 2) Ferry passengers not boarding their own vehicle
- 3) Ship and catamaran passengers
- 4) Cruise passengers
- 5) Maritime passengers arriving in the Port of Split

The detailed segmentation is presented in the following diagram:



The next step is the identification of the most common needs and expectations for each group of passengers.

3.3 IDENTIFICATION OF THE NEEDS OF FINAL USERS (PASSENGERS)

We can identify different needs for each specific group of passengers. It is also essential to know about when a specific need or expectation arises: before travelling, during travelling, while the travelling is ending or after its end.

In the following tables, we are analysing specific needs for each identified key group of passengers. We have merged some groups since their needs are very similar in most of the phases of travel.

1) FERRY PASSENGERS BOARDING THEIR OWN VEHICLE

- **Local, non-tourist passengers**
- **Tourist passengers**

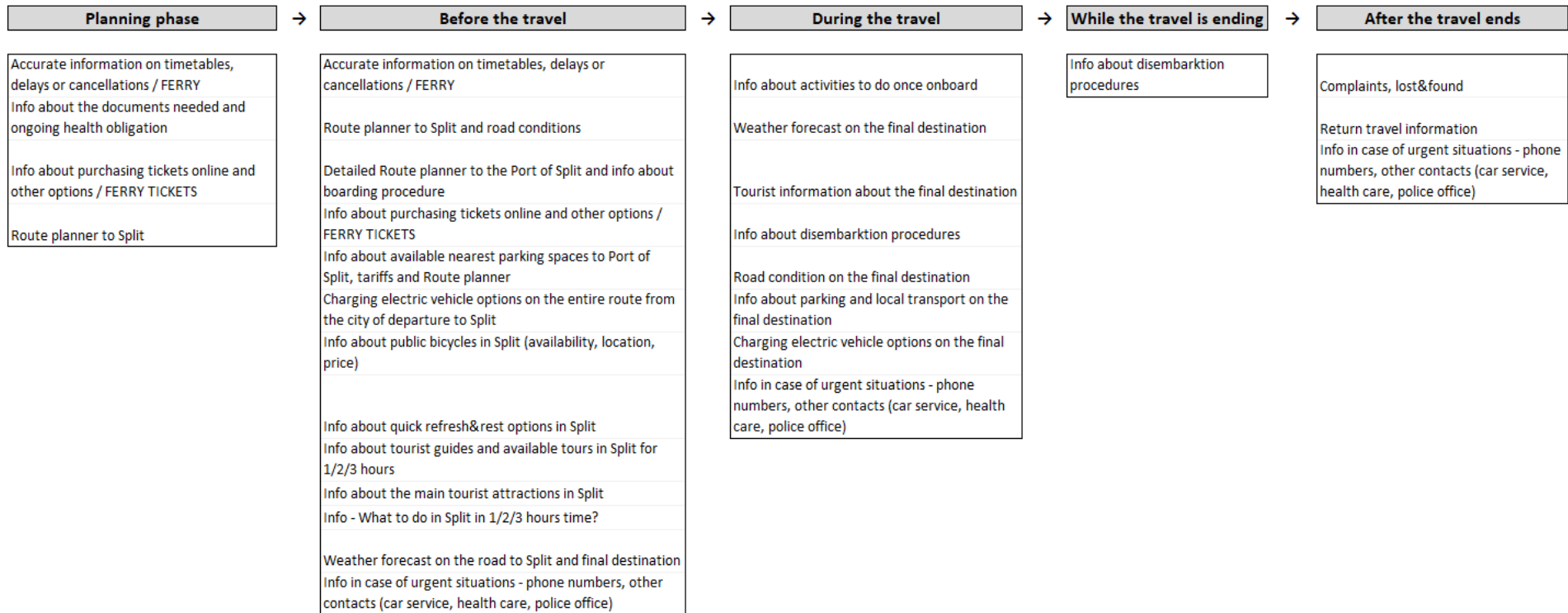
The difference between the two sub-groups is that the local passengers need less tourist information in most of the cases. However, this is not a rule, which is the reason why they are analysed together.

A local passenger can be, for example, defined as an every-day or at least a very regular passenger travelling from Split to one of the near islands to his work-place. Also, a local passenger can be, for example, someone travelling from Split to one of the islands because of family reasons. Or, a high-school student travelling every day from Šolta and Brač island to Split to school. These local travellers don't need much information, neither they have needs for integrated services and/or tourist services. For this group of passengers, the most valuable information is possible delays or cancellations (due to bad weather) and a quick and simple ticketing system.

On the other hand, a local passenger can be, for example, defined as a passenger coming from continental Croatia to his family on one of the islands a few times a year. These local travels also don't need much information, but, on the other hand, they can have some of the needs that are specific for tourist travellers; not all of them, but some of them for sure.

On the other side, tourist passengers need a broader scope of information and services in all their travel phases. As a **"travel"** in this case, we address the journey that begins in the Port of Split (ferry, ship, catamaran). Such travel, when tourist, begins with the phase of planning (can be months before implementing the travel), followed by the phase before travel (final planning at the destination of a department (e.g. home) and the route to the Port of Split, coming to the Port). These are the phases when most of the information are needed.

Situation 1: Ferry passengers boarding their own vehicle



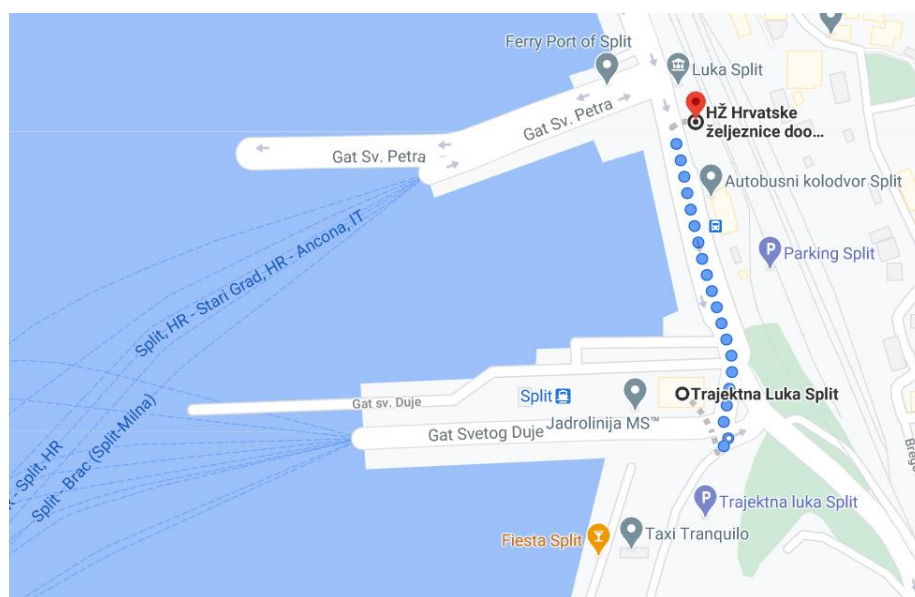
2) FERRY PASSENGERS NOT BOARDING THEIR OWN VEHICLE

- Local, non-tourist passengers
- Tourist passengers
- Arriving by rent-a-car
- Arriving by train
- Arriving by bus
- Arriving by flight

Also, in this situation, in the following analysis, we have merged some groups that have similar needs for information and services:

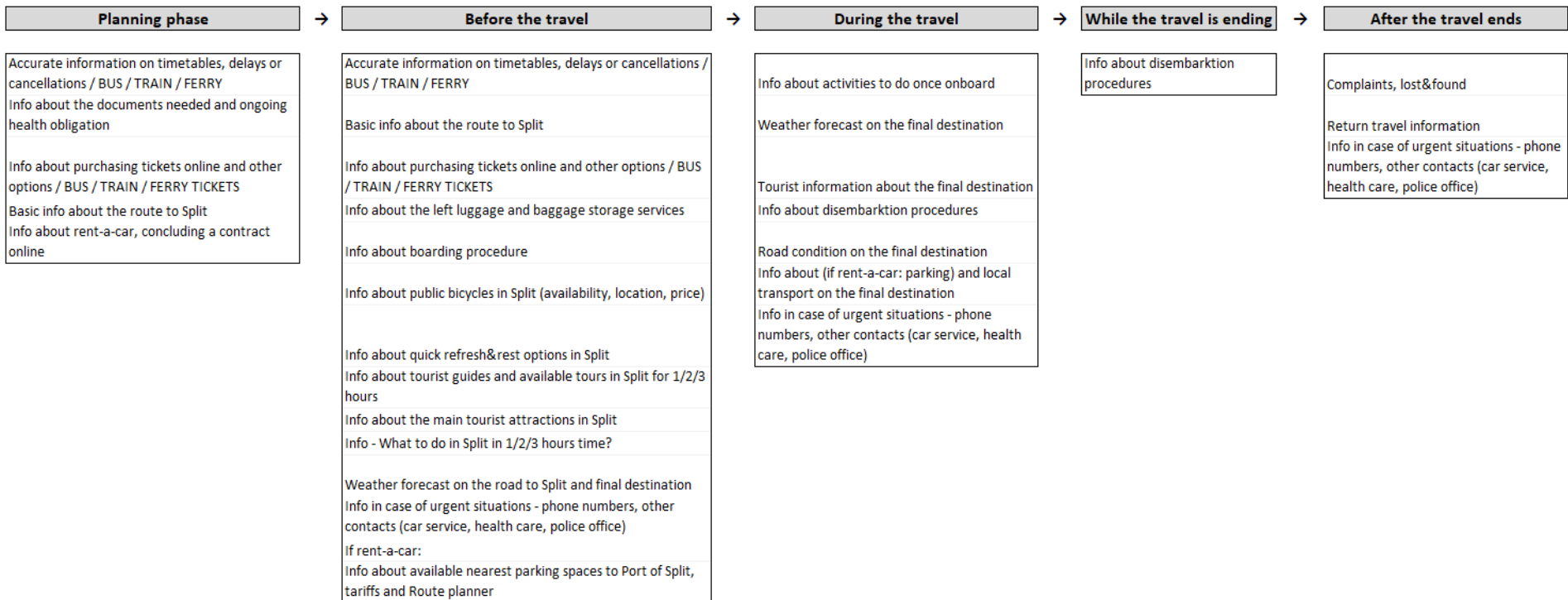
- Local, non-tourist passengers and tourist passengers are being merged (similar as above).
- Passengers arriving by train and passengers arriving by bus are being merged together since the central train station and central bus station are practically in the same location. They are both within walking distance of the Port (3 minutes, 250 metres).

Figure 2: Path (walking distance) from the central train station and central bus station to the Port

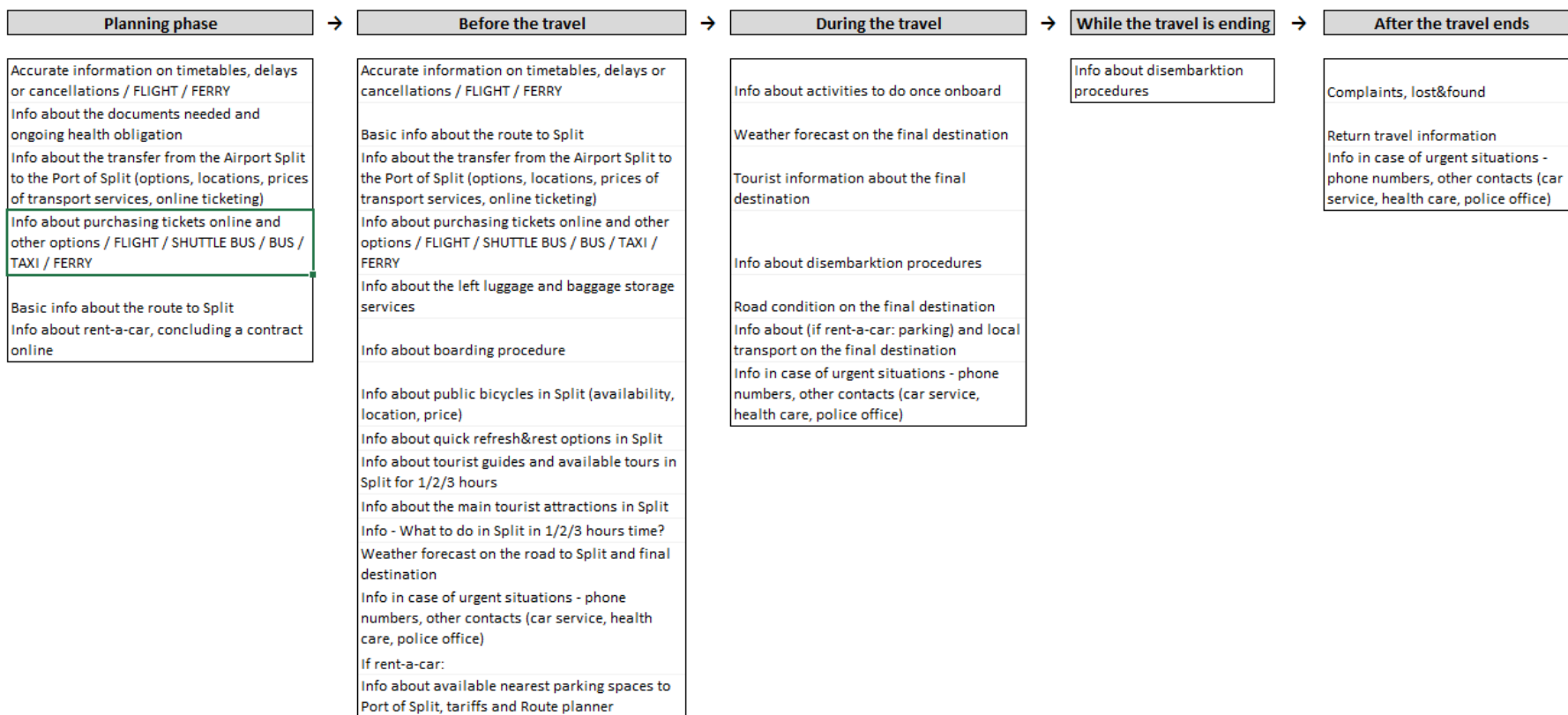


- Passengers arriving by rent-a-car need a combination of information and services; they are the most of the time in the group "Ferry passengers not boarding their own vehicle" and only at the time of arriving at the airport / central bus station / central train station, after renting a car, they become passengers in the group "Ferry passengers boarding their own vehicle". They are, therefore, analysed in groups "arriving by train / bus" / "arriving by flight".

Situation 2.1: Ferry passengers not boarding their own vehicle / arriving by train / bus



Situation 2.2: Ferry passengers not boarding their own vehicle / arriving by airplane



3) SHIP AND CATAMARAN PASSENGERS

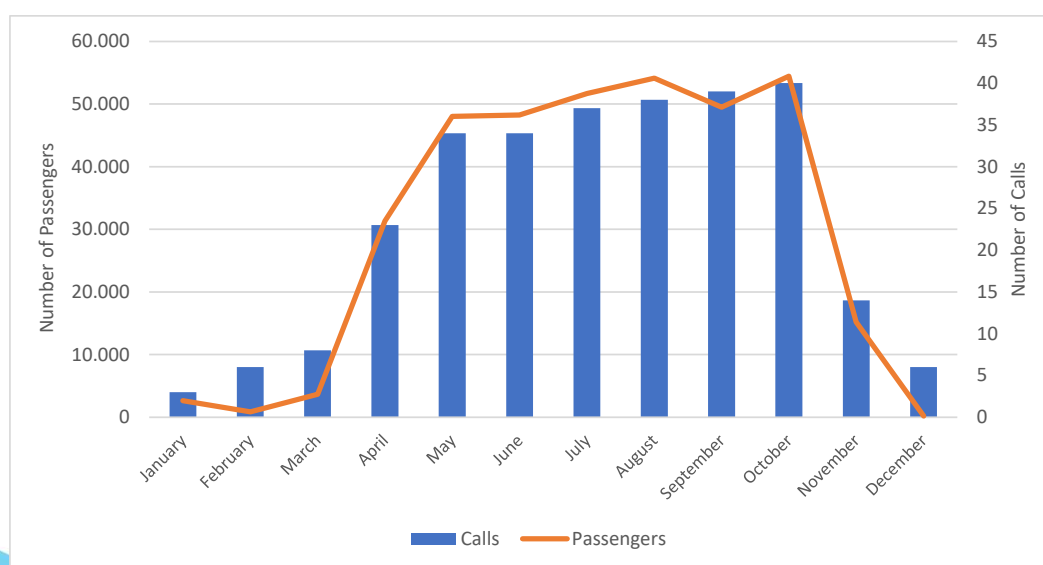
- **Local, non-tourist passengers**
- **Tourist passengers**

Regarding the needs for information and services, the passengers in this group are very similar (or the same) to passengers in "Ferry passengers not boarding their own vehicle" group. Therefore, this group is not analysed separately.

4) CRUISE PASSENGERS

Cruise passengers coming to Split are passengers with particular needs since Split is a transit destination where the cruise guests stay for a day or less. In 2019, the Port of Split had in total 282 Calls with 359,955 Passengers in total. The main cruise-season for the Port of Split is from May to October, which is presented in the following figure. October is a peak season for a cruising-tourism in Split.

Figure 3: Cruise passengers in the Port of Split in 2019 – number of calls and number of passengers, by months



Source: Split port authority.

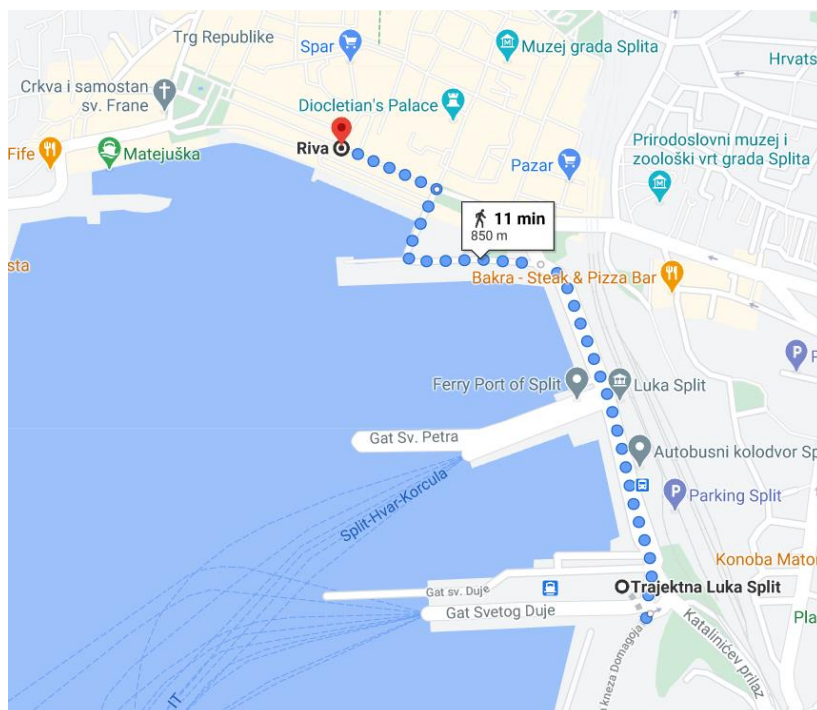
Because of their short stays and a considerable percentage of organised visits to Split, these passengers need very specific information and services, such as:

- Information about "must-see" locations in the old city centre in case of having 2/3/5 hours of time;
- Information about the top 5 locations in Split;
- Information about the taxi location;
- Information about local gourmet specific places which are a "must-visit";
- Information about the typical local souvenir shops, cafes, restaurants;
- Information about the local tourist guides and their offer (1/2/3 hours trips around Split);
- Information about the nearest beach and service to get there and back (taxi).

The Tourist Board of Split, one of the key stakeholders in this project, needs to be very active in formatting the cruise passengers' services. The fact is that, in most cases, what they need are tourist information and services. It is on the Tourist Board of Split to follow the cruise guests' needs and trends and prepare appropriate and exciting content.

In the context of improved and sustainable mobility for cruise passengers, Split has an excellent perspective since the city centre is actually within walking distance from the Port (10 - 15 minutes, 850 metres) and no additional transport is needed for a large number of passengers during their stay in Split.

Figure 4: Path (walking distance) from the Port to the old city centre



On the other hand, the City of Split and the Tourist Board of Split can encourage the transport companies to improve their vehicle fleet to a more sustainable one and digitalise their ticketing services. Furthermore, the Tourist Board of Split can encourage the developers and tenderers of tourism products to prepare and offer products that involve green, sustainable transport solutions.

5) MARITIME PASSENGERS (except cruise passengers)

- **Split is their final destination**
- **Split is not their final destination**

This is the situation when the passengers come to Split using one of the maritime options of reaching Split by the sea – a ferry, ship, catamaran or private yacht. We have identified two different options; the first one is when Split is the passengers' final destination. The second is when the passenger travels further, and Split is only a transit point of his journey.

Actually, these are the vice-versa situations of the situations from above (situations 1), 2), and 3) and all sub-situations). Therefore, we are not analysing them once again at this point, just referring to the scenarios that are already presented above.

4. USE CASE SCENARIOS IDENTIFICATION AND SELECTION OF THE REFERENCE USE CASE SCENARIOS

Now when we have identified the main groups of passengers and their needs on different specific points of their travel, we are not far from placing the key use case scenarios. The use case scenarios should be scenarios that describe the passengers' typical behaviour and try to find solutions that fit their needs and expectations as good as possible. The idea is to cover an essential part of all potential final users of solutions that will result from the E-CHAIN project. Therefore, it is the most logical to define each group mentioned above as one use case scenario, with no further splittings to sub-groups.

The idea is realisable because it does not make any difference if the passenger arrives from Paris, Stockholm, Rim, Ancona, or from anywhere else in the World. What makes the difference is the level of information the passenger has (and therefore, needs), the level of his technical knowledge, interest and equipment, and the mode of transport he uses to arrive in Split. These are exactly the options that we

have investigated and analysed in the previous chapter. Therefore, we can identify the following use case scenarios:

Use case scenario 1: Ferry passengers boarding their own vehicle

Place of the department → travel by road to the Port of Split → arrival to the Port of Split → embarking on the ferry → travel to the final destination

or

Place of the department → travel by road to Split → arrival to Split → parking → free time in Split → moving with the car from parking to the Port of Split → embarking on the ferry → travel to the final destination

Use case scenario 2: Ferry passengers not boarding their own vehicle

Bus / Train:

Place of department → travel with bus / train to Split → arrival to Split → walking to the Port of Split → embarking to the ferry → travel to the final destination

or

Place of department → travel with bus / train to Split → arrival to Split → free time in Split → walking to the Port of Split → embarking to the ferry → travel to the final destination

Plane:

Place of department → travel with the plane to the Airport Split → transfer to Split (shuttle bus, bus, taxi) → arrival to Split → walking to the Port of Split → embarking to the ferry → travel to the final destination

or

Place of department → travel with the plane to the Airport Split → transfer to Split (shuttle bus, bus, taxi) → arrival to Split → free time in Split → walking to the Port of Split → embarking to the ferry → travel to the final destination

Rent-a-car:

A combined procedure of Use case scenario 1 and Use case scenario 2

Use case scenario 3: Ship and catamaran passengers

The same procedure as Use case scenario 2

Use case scenario 4: Cruise passengers

Disembarking from the cruise ship → organised tour

or

Disembarking from the cruise ship → sightseeing, shopping etc. in own organisation

Use case scenario 5: Maritime passengers (except cruise passengers)

Split is a final destination:

Disembarking from the ferry / catamaran / ship / private yacht → walking to the final destination

or

Disembarking from the ferry / catamaran / ship / private yacht → travel to the final destination with own vehicle or public transport (local bus, taxi)

Split is not a final destination:

Vice-versa procedures from the one shown in Use case scenarios 1, 2 and 3

5. PRELIMINARY REQUIREMENTS DEFINITION FOR THE IDENTIFIED USE CASE SCENARIOS

This last chapter will try to identify the preliminary requirements for features of a wide platform for transport and connected mobility services.

The preliminary requirements in the meaning of the travellers' needs can be seen from the above chapters. In this stage, we are merging all kind of information that could be helpful for the passengers into the following key groups:

General information	Weather forecast Conditions on the road Info in case of urgent situations - phone numbers, other contacts (car service, health care, police office)
General information for the travel	Information about the route to Split Route planners Information about the documents needed and ongoing health obligation
Travel information	Accurate information on timetable, delays or cancellations Information about the shuttle bus from / to the airport Information about the available local transports, timetables, prices and ticketing Information about rent-a-car Information about left luggage and baggage storage services Information about boarding and disembarking procedure Information about parking (location, availability, price) Information about the charging of electric vehicles Information about activities to do once onboard Return travel information
Tourist information (in case of available free time in Split while waiting for travel)	Information about public bicycles (availability, location, price) Information about quick refresh&rest options in Split Information about tourist guides and available tours in Split for 1/2/3 hours Information about the main attractions Information what to do in Split in 1/2/3 hours time
Information about the final destination	Weather forecast Conditions on the road Tourist information about the final destination Information about parking and local transport

Split has a specific situation since the Port is located within walking distance to the old city centre, the central bus station and the central train station. All these points are within a 10-15 minutes walk. The Port area is very crowded, especially during the high tourist season months, from May to October.

With the E-CHAIN project and through the identified use case scenarios, the key points that should be addressed are the following:

- To give the passenger information and service that will allow him to access the ferry as smooth as possible, without stops in the Port area if he didn't plan to because of other reasons.
- In case the passenger plan to stop by in Split, give him detailed information in real-time about available parking near the Port and navigate him to the nearest possible, without unnecessary driving around.
- In the case of delays or cancellations, inform the passenger as soon as possible and offer him alternative possibilities and suggestions about spending available time, including information about parking his vehicle.
- To give real-time information about available e-chargers for electric vehicles and information about special offers for electric cars owners (free parking, available parking in specific parking zones, etc.).
- In case the passenger has available time before embarking on the ferry/ship/catamaran, give him information about available public bicycles.
- The Split Tourist Board can encourage the developers and tenderers of tourism products to prepare and offer products that involve green, sustainable transport solutions.
- The City of Split can encourage local travel companies to make their fleet more sustainable and to digitalise ticketing solutions.