

# D.5.1.1 Report on data collection

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# 1 Introduction

The scope of the report “D.5.1.1 Report on data collection” is to collect and assess the qualitative and quantitative information collected during the conduction of the different Moses pilots. The main aim of this report is to collect all the required information that allow assessing if conditions for transforming it into a permanent service are met, or revisions are necessary.

The **paragraph 1** describes in details the different pilots developed and implemented during the Moses project. For each case is described the contexts and the reasons for the pilot development. This framework analysis is fundamental in order to assess from a quantitative point of view the starting point and the key KPI to monitor for a quantitative analysis.

The **paragraph 2** the quantitative data collected during the Moses project are presented. The different case study were analysed at different level of details based on the nature of the pilot developed. In fact for some case studies more related to the development of a feasibility study collect quantitative data are more difficult.

Finally the **paragraph 3** briefly summarize the main results of the WP5 Moses assessment activities and it presented the main lessons learnt.

No data are available for the Molise Region.

## 1. Description of the Moses pilots implementation

### 1.1 The Friuli Venezia Giulia Region pilot

MOSES project has given to Autonomous Region of Friuli-Venezia-Giulia the opportunity to launch, in cooperation with Region of Istria and Primorje-Gorski Kotar County, a new cross-border maritime link, making attractive the use of a mode of transport fast and comfortable as the hydrofoil service. This pilot is part of a wider offer of cross-border public transport services and part of intermodality development in all its forms (bike&bus, bike&train, bike&boat etc.). These intermodal solutions are the results of consolidated relations with the bordering regions, proving a very high attention to transport demand necessities and needs, more and more oriented to sustainable mobility choices alternative to the usage of cars.

### 1.1.1 The Trieste Port and the Passengers Terminal

The port of Trieste is located in the North East of Italy (in Friuli-Venezia-Giulia Region) in the proximity to Slovenian border. It is a reference point for cargo traffic in an area ranging from Austria to Hungary, Slovenia to Switzerland and Bavaria. It is also at the intersection of some of the European corridors that cross Italy as the Mediterranean and the Adriatic-Baltic Corridor. The port is connected by regular direct lines to China, Far East, Singapore, and Malaysia.

Among the Adriatic ports, the port of Trieste is the one offering the fastest connections to Piraeus (Greece) with journey times significantly shorter than those from Venice and Ravenna, and Turkey.

The International passenger terminal of port of Trieste consists of three terminals with five berths and a 7,200 m<sup>2</sup> large terminal building. It can accommodate ships of up to 400m in length with a maximum draft of 12m.

The terminals “*Stazione Marittima*” (Maritime Station), Quay 57 and Quay 42 are used for cruisers and ferry traffic. The *Stazione Marittima* also includes various congress halls and utilities. The port of Trieste acts as ferry port as well as a cruise port. The port provides adequate facilities and public conveniences for passengers. The Maritime Station passenger terminal has a departures lounge, coffee shop, lavatories, a convenience store and public telephones.

There are several inland connections from the terminal. Local bus station with bus frequency of about 10-15 minutes is positioned within the terminal, while interurban bus services offering connections to several larger nearby cities can be found in the close proximity (less than 1km from the terminal). There is twice per hour a bus connection connecting Trieste with its nearest airport “Ronchi dei Legionari” which is located 37 km away from the city centre.

Main rail station is located at the distance of 1 km and offers 16 daily departures towards major regional cities, included the airport located in Ronchi dei Legionari, throughout the intermodal terminal inaugurated in March 2018. Highway connection is found at about 5 km distance from the Maritime Station passenger terminal, but the Quay 57, a ferry terminal, is directly connected to the highways.

The passenger terminal used in the Moses pilot project was the **Molo (Pier) IV**, which is equipped on the ground floor overlooking the sea, with two large halls of about 1.000 square meters each, and an Auditorium of 120 square meters, which makes it a multifunctional location, suitable for different types of events such as conferences, trade fairs, exhibitions, gala dinners, cultural activities, exhibitions, concerts and entertainment.

The infrastructure is managed by the company **Trieste Terminal Passegeri S.p.A.**, which was incorporated on April, 11th 2007 by Trieste Port Authority. The company was established pursuant to Law no. 84 of January, 28th 1994 which allowed the Port Authority to establish companies to provide services of general interest, as identified by the Decree of the Minister of

Transport and Navigation of November, 14th 1994. Trieste Terminal Passeggeri S.p.A. has a licence, that is effective for a period of twenty-five years starting from January, 1st 2008, to manage the mentioned Cruise Terminal located on Molo (Pier) Bersaglieri, the Passenger Terminal at Molo (Pier) IV and the Ferry Terminal at Ormeggio (Berth) 57 in the New Port. In addition, the company manages the parking lots at Molo (Pier) IV and along Trieste's waterfront.

At the end of 2010, the Port Authority of Trieste sold 60% of Trieste Terminal Passeggeri S.p.A. by a public tender. The shares were purchased by Trieste Adriatic Marine Initiatives S.r.l. (TAMI) composed by four companies (Unicredit, Costa Crociere, Giuliana Bunkeraggi and Assicurazioni Generali).

Furthermore, in the Gulf of Trieste there are the following internal public transport maritime connections: Trieste – Muggia (daily); Trieste – Barcola – Grignano – Sistiana (summer season); Trieste – Grado (summer season). The ships are moored at the Molo (Pier) Bersaglieri at the Maritime Station.





FIGURE 1. THE MOSES PILOT: PASSANGERS WAITING INSIDE THE PASSANGER TERMINAL IN TRIESTE (PIER IV)

### 1.1.2 The Friuli-Venezia-Giulia Region pilot

The Friuli-Venezia-Giulia pilot developed in the Moses project is the new maritime connection represented by the **hydrofoil maritime passenger line** between Trieste, Istria and Primorsko-Goranska Županija. This service was available from **July 1<sup>st</sup> 2018 to September 7<sup>th</sup> 2018**, with two connections per week (on Fridays and on Mondays), for a total number of **18 round trips**, of which 9 along the axis Trieste-Pula Mali Lošinj and 9 along the axis Trieste – Rovinj - Mali Lošinj.

These services transported a total number of **2.381 passengers**. The sailing schedule of both the connections made it possible to the passengers to extend their trips to Susak, using the existing lines of company Jadrolinija from and to Mali Lošinj.

<b>Total Passengers during the Moses pilot testing activities (July-September 2018)</b>		
<b>2018</b>	<b>TOT. embarked passengers</b>	<b>TOT. disembarked passengers</b>
<b>Trieste</b>	5.034	5.079
<b>Piran</b>	1.849	1.736
<b>Poreč</b>	963	856
<b>Rovinj</b>	1.994	2.185
<b>Pula</b>	152	153
<b>Mali Lošinj</b>	535	518
<b>TOTAL</b>	<b>10.527</b>	<b>10.527</b>

FIGURE 2. FRIULI-VENEZIA-GIULIA PILOT. TOTAL NUMBER OF PASSENGERS EMBARKED AND DISEMBARKED DURING THE TESTING PERIOD.

<b>Total Passengers in the Moses line during the Moses pilot testing activities (July-September 2018)</b>		
<b>2018</b>	<b>TOT. embarked passengers</b>	<b>TOT. disembarked passengers</b>
<b>Trieste</b>	1247	1134
<b>Rovinj</b>	447	576
<b>Pula</b>	152	153
<b>Mali Lošinj</b>	535	518
<b>TOTAL</b>	<b>2381</b>	<b>2381</b>

FIGURE 3. TOTAL PASSENGERS IN THE MOSES LINE DURING THE MOSES PILOT TESTING ACTIVITIES (JULY-SEPTEMBER 2018)



FIGURE 4. THE MOSES PILOT. PASSENGERS WAITING TO BE EMBARKED IN MALI LOSINJ PORT.



FIGURE 5. THE MOSES PILOT. PASSENGERS INSIDE THE HYDROFOIL VESSELS

### 1.1.3 Friuli-Venezia-Giulia pilot. Timing and problems

The pilot was running for a period of two months, from July 1<sup>st</sup> until September 7<sup>th</sup> and that limited duration influenced the total mentioned numbers achieved in terms of passengers transported. Some technical problems occurred during the starting phase, which were due mostly to the age of the hydrofoil vessel, but nonetheless no deviations are to be reported. However, during the project implementation it appeared necessary to provide more opportunities to passengers who were travelling using intermodality sea-bicycle, increasing the maximum number of bicycles which could be transported by the hydrofoil vessel, according to safety and security regulations in force. The solution found for some specific trips was the

reduction of the passengers' seats in the lower deck for making more room available for embarking a higher number of bicycles.

Additionally, the challenge to make a stronger promotion of the line for attracting more and more passengers, especially along the coasts of Istria, was partially won, given the limited time available for launching the service and, therefore, for making better communication strategies during the setting up of the service. That is the reason why at the end of the service, during the evaluation/assessment phase, it was evident the need of supporting that kind of cross-border service by:

- Specific agreements amongst the decision makers of the area, starting at the level of Memorandum of Understanding;
- The setting up of stakeholders permanent platforms, arranging meetings with the most relevant stakeholders on public (institutions, regional development agencies port authorities etc.) and on private side (travel agencies), for better understanding the needs and the opportunities given by such cross-border maritime connections, and for better fine-tuning the service itself and its promotion.

On the other side, the success factors are the legal framework set up before the launching of the service composed by a regional regulation submitted to and approved by UE Commission in previous years, as well as the call for tender launched at EU level for selecting the operator of the service. The tender for the operator selection was already carried out three years before the approval of MOSES project, enabled the launch of the service for 2018 summer without any delay from the authorisation point of view.

The extension to Mali Lošinj proved to be quite attractive to passengers, despite the price of the ticket (77 euro for an adult return trip) and despite the need to plan a visit of more than just one day. The line Trieste-Rovinj- Mali Lošinj, which run on Fridays, was indeed the most successful

one, thanks also to the possibility to plan a long weekend stay in Mali Lošinj (from Friday to Monday) or a short week stay (from Monday to Friday). On the contrary, the figures registered on Mondays with reference to Pula stop were not at all satisfactory and, for that reason, that stop is bound not to be included anymore in the sailing schedule of the years to come.

Additionally, on the constraints factors side, it must be taken into account that the overall duration of the service is very much linked to the available funds and, therefore, a coverage of the whole summertime season (from June 1st until September 30th) could have been more suitable for improving the usage and the knowledge of the service.

## 1.2 The Ravenna port pilot

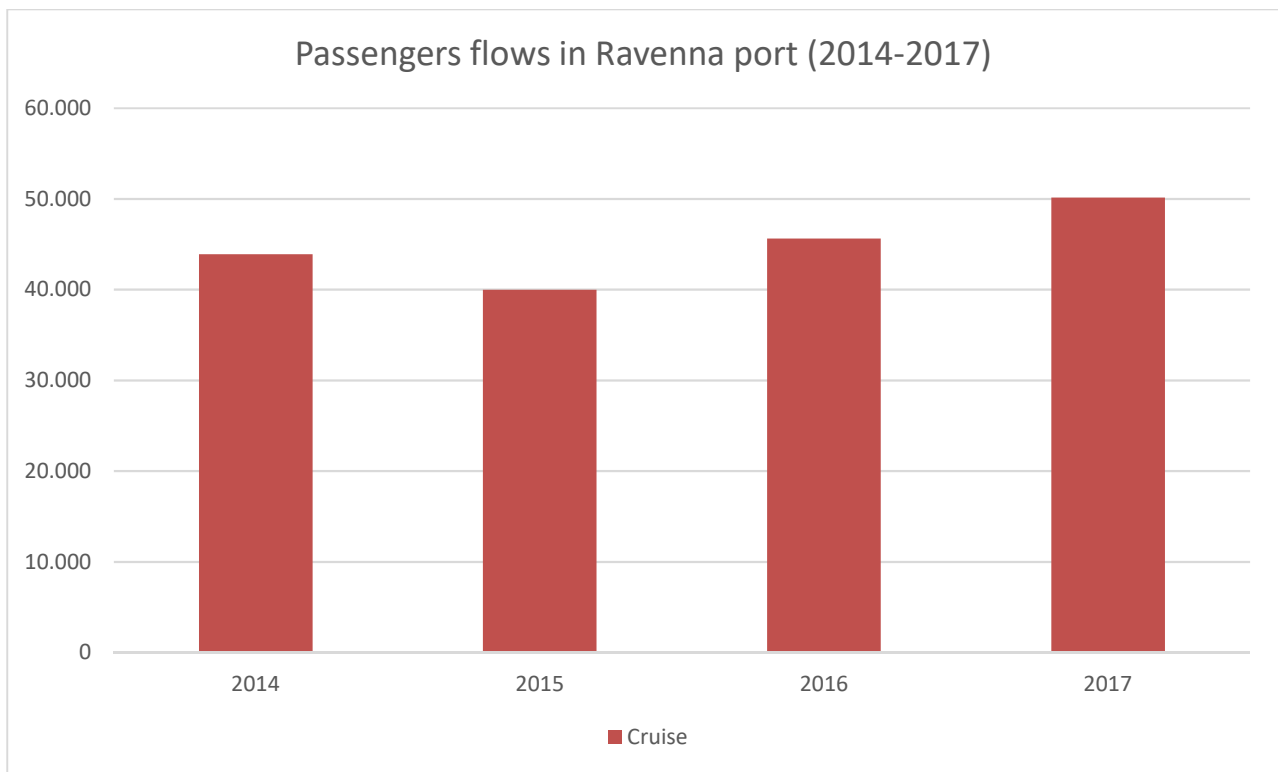
The Moses pilot in Ravenna port intended to capitalise the studies developed within the past EA SEA-WAY project, that have highlighted the need to increase the attractiveness of Ravenna port and its hinterland by fostering an efficient transport system guaranteeing connections between the passenger terminals and the historical city centre.

The scope of the Moses pilot in Ravenna port was to design, implement and test an innovative service of electric bikes sharing aimed to promote sustainable intermodality solutions among the Ravenna port area and the Ravenna historical city centre. The use of electric bikes as last-mile intermodal transport solution was related to a peculiarity of the Ravenna port related to the distance among the cruise terminal in Porto Corsini and the historic city center: more than 11 kilometres. Thanks to this pilot, it is possible to assess the potential of electric light vehicles in providing sustainable transport solutions in short/ medium distances.

As there isn't in literature and in others EU ports experiences like the one tested in Ravenna, the pilot activity was inspired by similar EU experiences (as for example the electric bikes renting services for cruisers activated in Valencia in the framework of the Interreg MED Sumport project) and international experiences, mainly developed in the US. One of the most inspiring case study was the Quikbike Qiosk, a solar-powered, shippable, eBike rental shop-in-a-box built starting from repurposed 20-ft shipping container developed in Nebraska.

### 1.2.1 The Ravenna Port and the Ravenna Cruise Terminal

Ravenna is an important sea gateway to Central Italy, to the Emilia-Romagna Region and the Republic of San Marino. Thanks to its train connections, Ravenna has an easy and quick access to both Florence and Venice. Ravenna is located in the middle of several sea routes to Italy, Slovenia, Croatia, Montenegro, Albania and Greece. For all these reasons the Ravenna port has a big potential in terms of touristic attraction. Despite this big potential in terms of touristic attractions, the passengers flows in Ravenna Cruise Terminal, as evidenced in Figure below, are not so high. Based on the data provided by the Ravenna port authority, the touristic potential of the Ravenna port is 80.000 passengers per year. Nowadays not more than 40.000 passengers per years were monitored in Ravenna port.



**FIGURE 6. PASSENGERS FLOWS IN RAVENNA PORT (2014-2017)**

The Ravenna cruise terminal, managed in concession by Ravenna Terminal Passeggeri, is located 20 minutes drive from the Ravenna historical city centre. The Cruise Terminal is located at the Porto Corsini waterfront, between the yacht marina, the beaches and the pine forest. The Cruise Terminal is able to accommodate ships up to 280 meters.

The public transport connections among the cruise terminal and the historical city centre are not so well developed. Nowadays there is only one public transport bus line connecting the cruise



terminal to the city centre (line 90). Moreover the bus stop it is not close to the Ravenna cruise terminal, reducing the number of public transport potential users.

For all these reasons, there isn't at the moment a sustainable and efficient transport solutions for independent travellers aimed to reach the Ravenna historical city centre. The Moses Ravenna pilot was built starting from these lacks and weaknesses in the promotion of better and more sustainable transport connections among port area and the mainland and historical city centre.

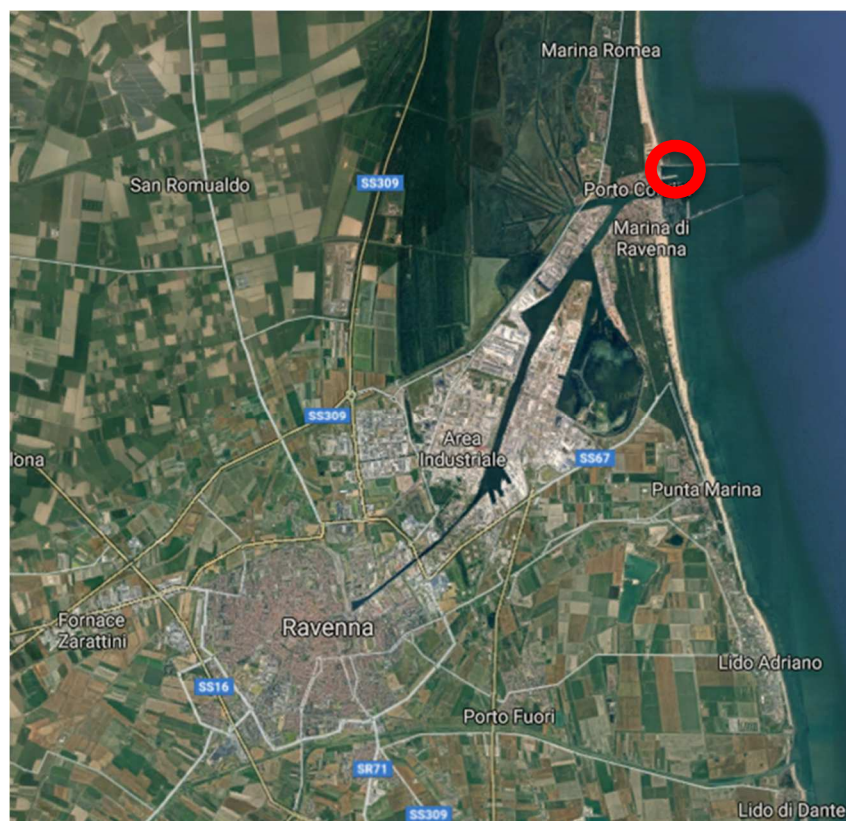


FIGURE 7. THE RAVENNA CRUISE TERMINAL LOCATION IN PORTO CORSINI, RAVENNA.

### 1.2.2 Description of the Moses Ravenna pilot

The scope of the Moses pilot in Ravenna was to design, implement and test an innovative service of electric bikes sharing aimed to promote sustainable intermodality solutions among the Ravenna port area and the Ravenna city centre. The activation of the service during the summer 2018 was not easy both from technical, procurement and management point of view.

There were different reasons for choosing an electric bike in providing a sharing service in areas with high variable touristic demand:

- More than 40/50 km of autonomy;
- Easy to charge batteries;
- Easy to use;
- No license needed in the Italian context for the users;
- Low cost solutions compared to others sustainable transport solutions.

In brief, these are the main numbers related to the Moses Ravenna pilot:

- **18 electric bikes** (different models for woman and man);
- **1 electric tricycle** for people with disabilities;
- **19 GPS** system managed by an online platform;
- **20 helmets** and **security lock systems**;
- **1 container 40"** transformed into a prototype "**Mobile Hub**".

The Moses pilot was managed from the operative point of view by the manager of the Ravenna Cruise Terminal, **Ravenna Terminal Passeggeri (RTP)**, the concessionaire of this public owned terminal. RTP is part of Global Ports Holding, one of the most important independent operator of cruise terminals in the world, with a consolidated presence in the Mediterranean, in the Atlantic and in the Asia-Pacific regions.

The Mobile Hub was planned as a flexible and low cost hub for the electric bikes storage and maintenance. There are different reasons supporting the development of this kind of mobile hub:

- Mobile to meet seasonal characteristics of the cruise services in Ravenna;
- Mobile to provide services in different points;
- Mobile to allow the transferability to others Adriatic ports.



FIGURE 8. THE MOSES “MOBILE DEPOT” AND THE FOUR DIFFERENT KINDS OF ELECTRIC BIKES USED DURING THE RAVENNA PILOT.



FIGURE 9. PHOTO FROM ONE RENTING DAY IN RAVENNA CRUISE TERMINAL.

There is a wide literature showing the importance of high quality bikes in order to guarantee an higher success rate of the bike sharing renting systems. In fact bikes perceived as not reliable in providing the required service reduce the appeal of these services. This is more important for an electric bike sharing service, where users decided if use or not the service also in base to the reliability of the electric bikes in covering long distances as the one we were trying to cover in

Ravenna Moses pilot (more than 35 km for a return trip from the Ravenna Cruise Terminal to the historical city centre).

Considering all these aspects, a tender procedure was opened in order to select an operators able to provide high quality electric bikes and related assistance services (bikes' maintenance, insurance full coverage, technical assistance for the managers of the service, assistance to cruisers during the bikes use). Moreover strict bikes technical requirements were fixed in the tender procedure in relation to the quality and the of the electric batteries and the batteries requirements in order to guarantee high technology and reliability standards.

The selected supplier of the electric bikes and of the related services was an Italian electric bikes producer called **FIVE Trade s.r.l** (Fabbrica Italiana Veicoli Elettrici). FIVE provided electric bikes "Wayel Electric Bikes" trade mark, with high technical and reliability standards.

In relation to the electric bikes used for the Moses testing phase in Ravenna, different kinds of bike (see Figures below) were used in order to cover all the different kind of requirements and considering the average age of users in Ravenna port area is quite high. For these reasons man and female city bikes models were selected in order to be able to better fit our target group requirements.



FIGURE 10. WAYEL SUV MODEL



FIGURE 11. WAYEL FUTURA (FEMALE MODEL).



FIGURE 12. WAYEL FUTURA (MALE MODEL).



FIGURE 13. ELECTRIC TRICYCLE FOR PEOPLE WITH DISABILITIES

The Table 1 shows the different technical characteristics of the different Moses electric bikes.

	<b>Wayel Suv</b>	<b>Wayel Futura</b>	<b>Tricycle</b>
<b>Engine Power</b>	250 W (19nm of torque)	250 W (32 nm of torque)	250 W (30 nm of torque)
<b>Battery</b>	Lithium ion cells Samsung 24v 8.8 ah (8.8 ah nominal capacity)	Lithium ion cells 36v 10 ah (10 ah nominal capacity)	Lithium ion cells 36v 8.8 ah
<b>Autonomy</b>	30 - 45km	50 km	50 km
<b>Weight total (kg)</b>	23.3 kg	23.3 kg	33.3 kg
<b>Wheels</b>	Rear 26" – 1.75" – Anterior 24" – 1.75"	Rear – Anterior 28" – 1.75"	Rear – Anterior 26" – 1.75"
<b>Market price (2018)</b>	1.200 €	1.300 €	1.800 €
<b>Number of bikes in the Moses Pilot</b>	8	5 (man model), 5 (female model)	1

TABLE 1. TECHNICAL INFORMATION ON THE 3 DIFFERENT ELECTRIC BIKES MODEL USED DURING THE TEST ACTIVITIES IN RAVENNA.

### 1.2.3 The Moses pilot in Ravenna. Timing and problems

The pilot was conducted during the **Summer-Autumn 2018**. The pilot was fully activated on mid July 2018 due to the long times required for the electric bikes procurement activities and the transformation of a 40" container in a "mobile hub" supporting the sharing service in the Ravenna cruise terminal and the maintenance activities.



The main problem tackled by the Moses pilot activities in Ravenna was the sand reducing the Ravenna port accessibility during the testing period. Due to this problem, the number of ships arriving in the Ravenna port decreased compared to the foreseen 2018 arrivals (see the Annex 2, berthing schedule 2018). In particular, the 8 biggest cruise ships foreseen for the 2018 summer period didn't berth in Ravenna, together with several smaller ones. For this reason a large part of the target groups of the Moses pilot action didn't attract in Ravenna during the summer 2018.

Another relevant problem not related to the project but with a relevant impact on Moses results was related to the growing number of touristic private bus tours organized by the cruise companies. Due to these organized touristic tours, sold before the arrival of the ships in the port, several tourists had no choice on their transport solutions in Ravenna port. The large part of the tourists arriving in Ravenna used this private touristic buses to reach the Ravenna city centre.

For all these reasons, it is possible to provide the full electric bikes sharing services during **6** different berthing days in the Ravenna port. These cruise ships were:

- Amara Quest on 30/09/2018. Ship capacity: 680 passengers;
- Monet, Elegant Cruises on 19/10/2018. Ship capacity: 90 passengers;
- Monet, Elegant Cruises on 26/10/2018. Ship capacity: 90 passengers;
- Marina, Oceania on 27/10/2018. Ship capacity: 1.250 passengers;
- Pacific Princess on 28/10/2018. Ship capacity: 640 passengers;
- Pacific Princess on 21/11/2018. Ship capacity: 640 passengers.

In total **3.390** cruise passengers were informed about the Moses electric bike sharing service activated thanks to the dissemination materials displaced in the Ravenna cruise port.

During the Moses pilot testing period in Ravenna, **28 rentals** were fully analysed. These were collected during the following days:

- **26 users** on 30/09/2018, ship *Azmara Quest*, stop duration in Ravenna port: 8:00-16:00;
- **2 users** on 27/10/2018, ship *Marina Oceania*, stop duration in Ravenna port: 8:00-18:00.

The low numbers of users was also related to the bad weather conditions during some rental days and to all the external reasons previously presented in this paragraph. In relation to the bad weather conditions, for example the cruise ship attended in Ravenna on the 28/10/2018 arrived in the proximity of the Ravenna cruise terminal but due to the strong winds blowing from the sea, it was not able to attract in Ravenna. The Pacific Princess, arrived in Ravenna on 21/11/2018, but due to the raining day, no one use the electric bikes. Finally all the tourists of the two cruises ships called Monet had organized touristic tour and no one use the electric bikes.

### 1.3 The Istria Region pilot

The Istria Region Moses pilot objective is to contribute to the quality improvement of passenger services in the Programme area by taking effective measures at the port terminals and to create the necessary preconditions for the construction of the new passenger terminal in the Port of Pula.

#### 1.3.1 The Istria Region pilot area

Pula is the largest city in Istria County, Croatia and the eighth largest city in the country, situated at the southern tip of the Istria peninsula, with a population of 57,460 in 2011. The natural beauty of Pula's surrounding countryside and turquoise water of the Adriatic have made the city an internationally popular summer vacation destination.

Pula Bus Terminal is one of the main transport hub for Istria Region and it is located on the edge of the town. From there, an excellent service to a wide range of local, domestic and international locations is available throughout the year. Several bus companies operate from this terminal. There is also a guaranteed direct line from Pula to Trieste/Venice, especially into spring/summer time. Passenger ferries also operate from the port area to nearby islands, and also to Venice and Trieste in Italy from June to September.

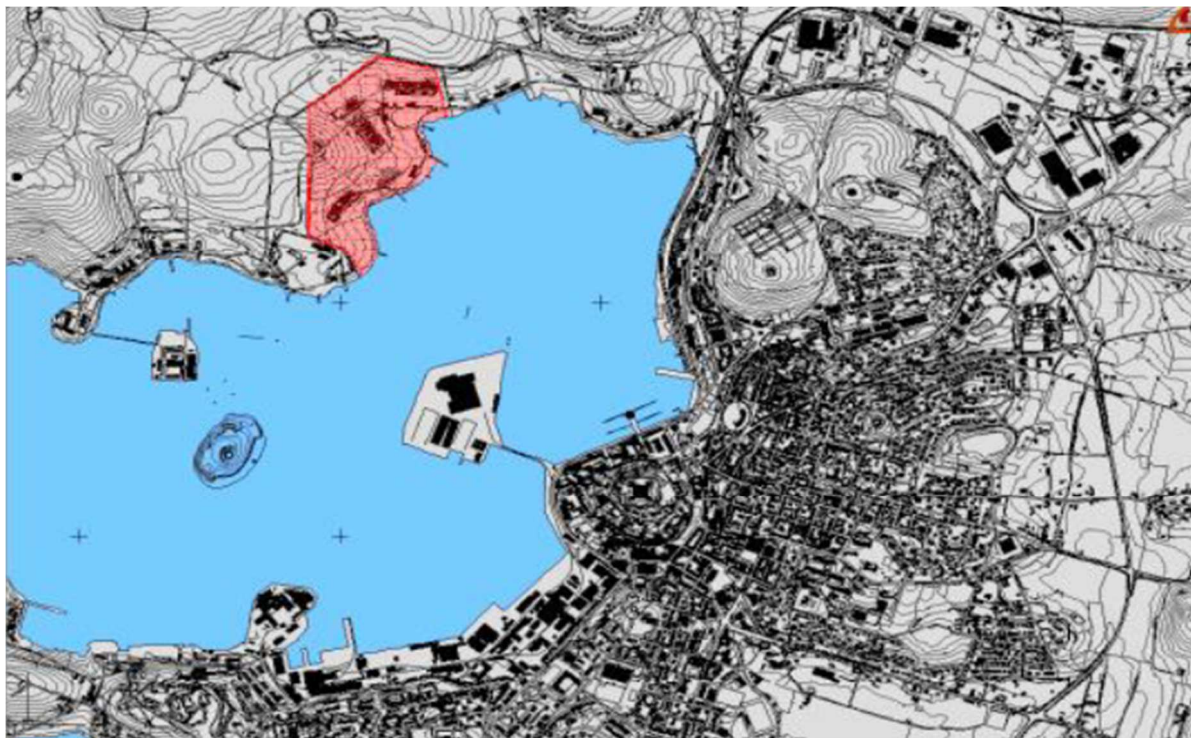


FIGURE 14. MAP OF THE MOSES PROJECT AREA IN PULA

### 1.3.2 Description of the Istria Region pilot and main results

The Istria Region pilot is related to the analysis of the geomorphological composition of the seabed and in-depth examination of the coastal zone in the area of the cape Guc Valelunga within the Port of Pula, using the modern examination technology of the stone substrate and specialized acoustic systems and/or laser bathymetry.

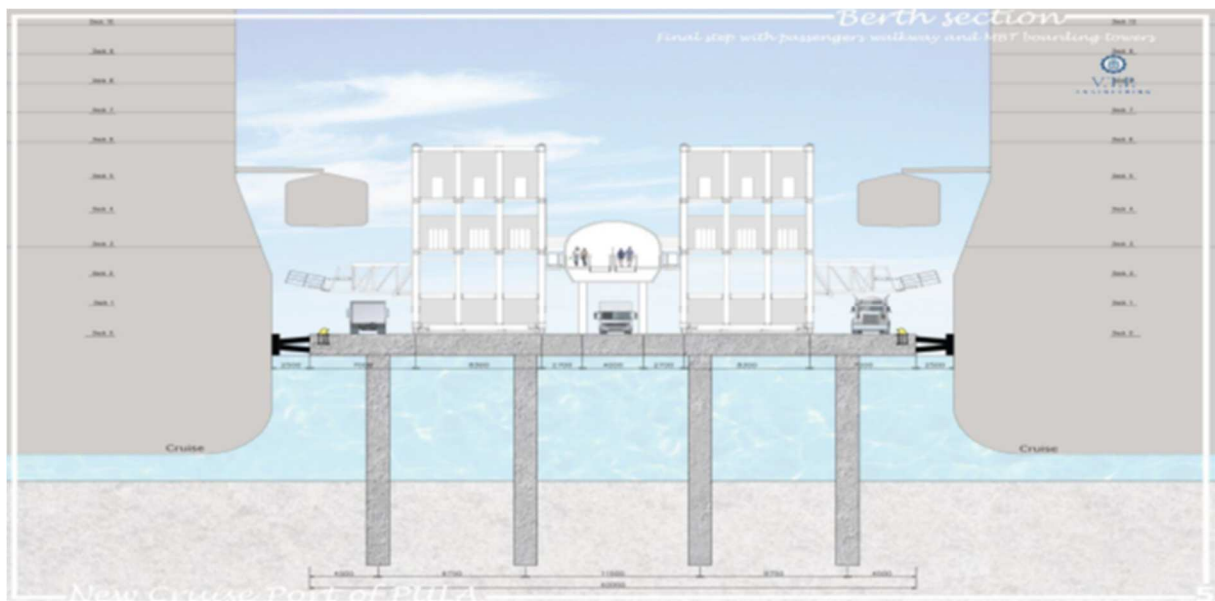


FIGURE 15. BERT SECTION OF PULA CRUISE TERMINAL

The main implemented activities during the Moses project were related to:

- Elaboration of a Feasibility Study;
- Preparation of the Terms of Reference (March 2019).

Implemented main activities:

- Preparation and implementation of the public procurement procedure (April-May 2019);
- Service implementation (June 2019).



FIGURE 16. ISTRIA REGION PILOT. IMAGES OF THE GEOTECHNICAL LABORATORY ANALYSIS



FIGURE 17. ISTRIA REGION PILOT. IMPLEMENTATION PROCESS, GEOTECHNICAL LABORATORY ACTIVITIES.

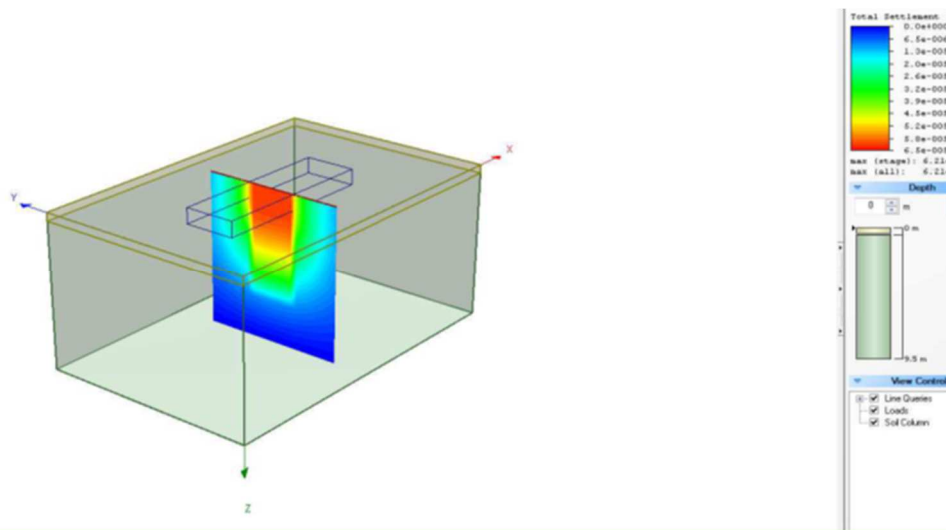


FIGURE 18. STRIA REGION PILOT. THE GEOTECHNICAL LABORATORY MAIN RESULTS



FIGURE 19. ISTRIA REGION PILOT. THE GEOTECHNICAL LABORATORY MAIN RESULTS.

The Geotechnical Study conducted in the Moses project showed as the examined seabed in the Port of Pula is composed of three layers (sand, clay, limestone). All the analysed soil layers have geotechnical stability and they are suitable for the construction of the new Pula passenger terminal.



FIGURE 20. MASTERPLAN FOR THE DEVELOPMENT OF THE PULA NEW PASSENGERS TERMINAL.



## 1.4 Primorsko-Goranska Region pilot

Primorje and Gorski Kotar County in the Moses project was responsible for two different pilot activities related to the port of Susak: the reconstruction of the quay in Susak and the production of the technical documentation for the reconstruction of the coastal wall in port of Susak.

### 1.4.1 Reconstructed quay in port of Susak

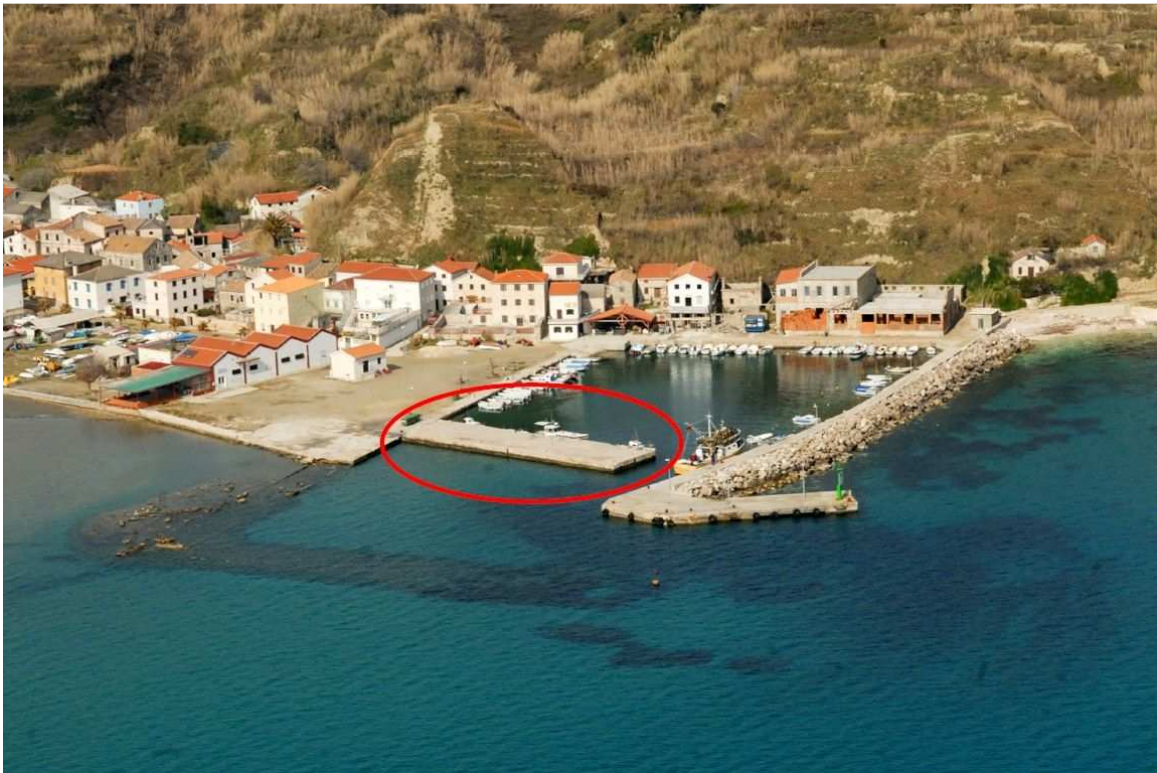


FIGURE 21. THE POSITION OF QUAY IN THE PORT OF SUSAK

Before the start of the MOSES project, the Primorje and Gorski Kotar County used a submarine for the elaboration of the overwater images needed to document the existing conditions of the quay. On the base of these data a technical plan for the rehabilitation of the quay in port of Susak was defined. This plan was made in 2016 and it was documented there was a bad state of the quay that began to bend and it was dangerous for its further damage and decay.

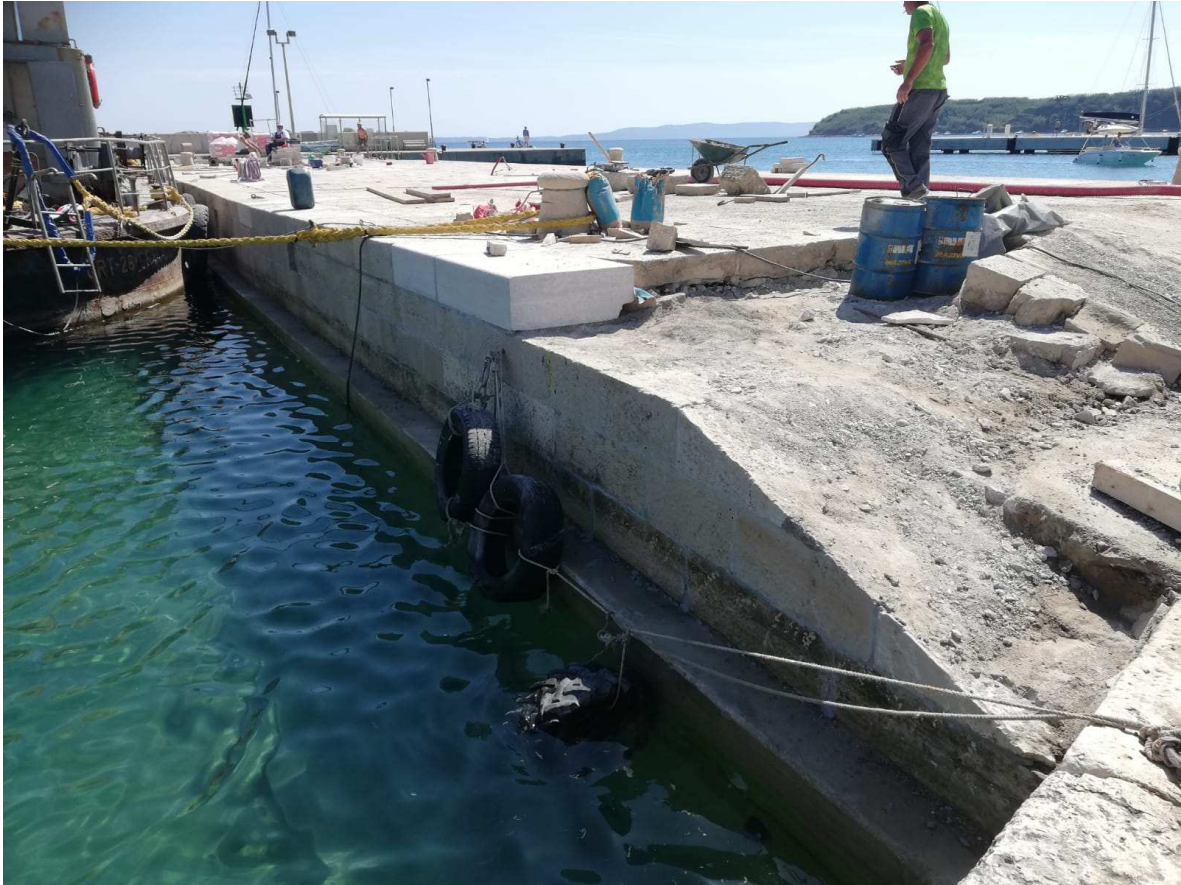
The plan also evaluate that the required works for the maintenance of the quay was **213.173 €** excluding VAT. This amount was partly covered (85%) through the Moses project EU funds. Based on these first results, the County asked to Port Authority of Mali Lošinj to conduct further activities related to underwater conditions of the quay. These activities showed deformations in the underwater part of the quay, so the bill of quantities as well as scope of works for renovation of quay in port of Susak have changed significantly comparing to the technical report of the submarine and upper marine construction and execution project with bill of quantity which were produced in 2016. As a result, the price for reconstruction of quay has increased.

On July 24 2018, County Port Authority Mali Losinj delivered a new report on the recorded conditions of the port of Susak quay reviewing the intervention economic quantification. The conducted analysis showed as the quay was deteriorated particularly in the surface inclination and abyss of the moles, deformations in the underwater stone part and foundations, the separation of stone blocks along the entire millstone, and the deterioration of the structure's full structure, and the urgent reconstruction of the mentioned facility. The new cost estimation of the require d interventions amount to **320.317 €** without VAT (without supervision of works). Following this obligation, Primorje and Gorski Kotar County carried out the public procurement procedure was carried out and works and supervision bids were obtained in the amount of **412.213 €**. Works in amount 395.730 € with VAT. Supervision amount to 16.483 € with VAT

The difference between the budget defined in MOSES project and the price of the best tenderer was financed from the budget of Primorje and Gorski Kotar County. Works on restoration starts in first part of December 2018 and finished on 19th of June 2019.



FIGURE 22. TEMPORARY BOARD IN PORT OF SUSAK.



**FIGURE 23. WORKS TAKING PLACE ON QUAY IN PORT OF SUSAK DURING THE MOSES PROJECT**



FIGURE 24. WORKS ON QUAY IN PORT OF SUSAK DURING THE MOSES PROJECT

Upon completion of the works, the finished work situation was delivered on the amount of 367.021 € including VAT. Supervision was done in amount of 16.483 € including VAT. At the works and supervision was carried in amount of 383.504 € including VAT.



FIGURE 25. QUAY AT END OF WORK



FIGURE 26. QUAY AT END OF WORK



FIGURE 27. QUAY AT END OF WORKS.



FIGURE 28. QUAY AT END OF WORKS.

At the end of project a permanent Moses board was installed as shown on in photo below.



FIGURE 29. PERMANENT MOSES BORD IN PORT OF SUSAK

#### 1.4.2 Production of technical documentation for the reconstruction of the coastal wall in port of Susak



Public procurement for documentation for reconstruction of the coastal wall in port of Susak, started at the beginning of April 2019 and was selected creator for the mentioned activities in the amount of 9,333 € with VAT.

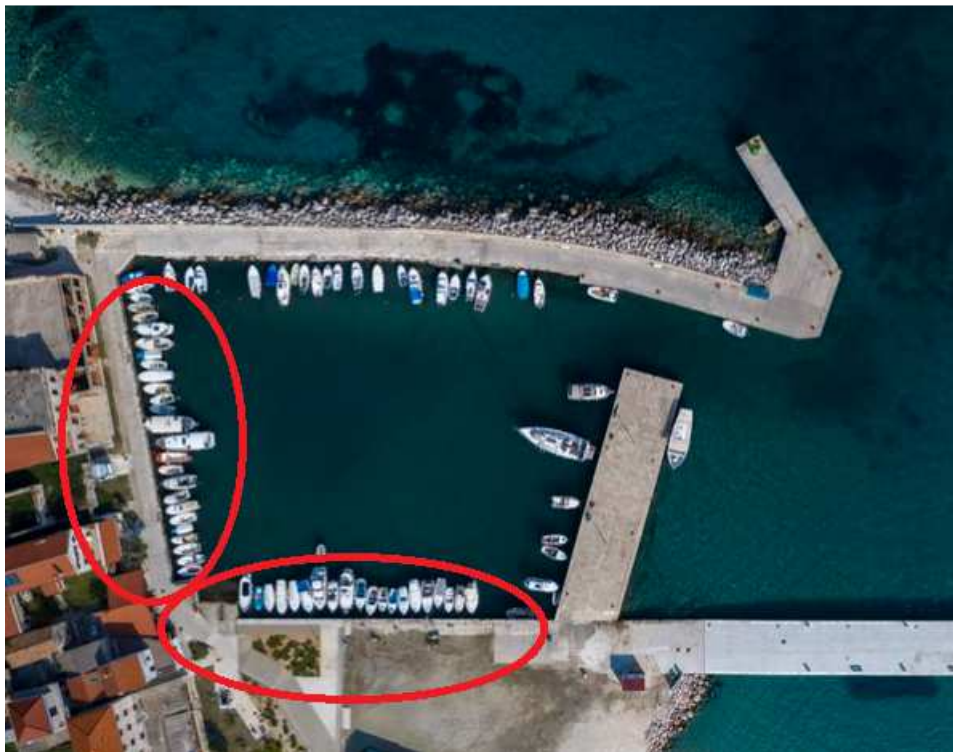


FIGURE 30. LOCATION OF COSTAL WALLS IN PORT OF SUSAK

Technical documentation is based on the fact that the Mali Losinj County Port Authority can use its own financial resources to carry out the works of the coastal wall at Susak port and at the time of securing the financial resources to initiate procurement for them.

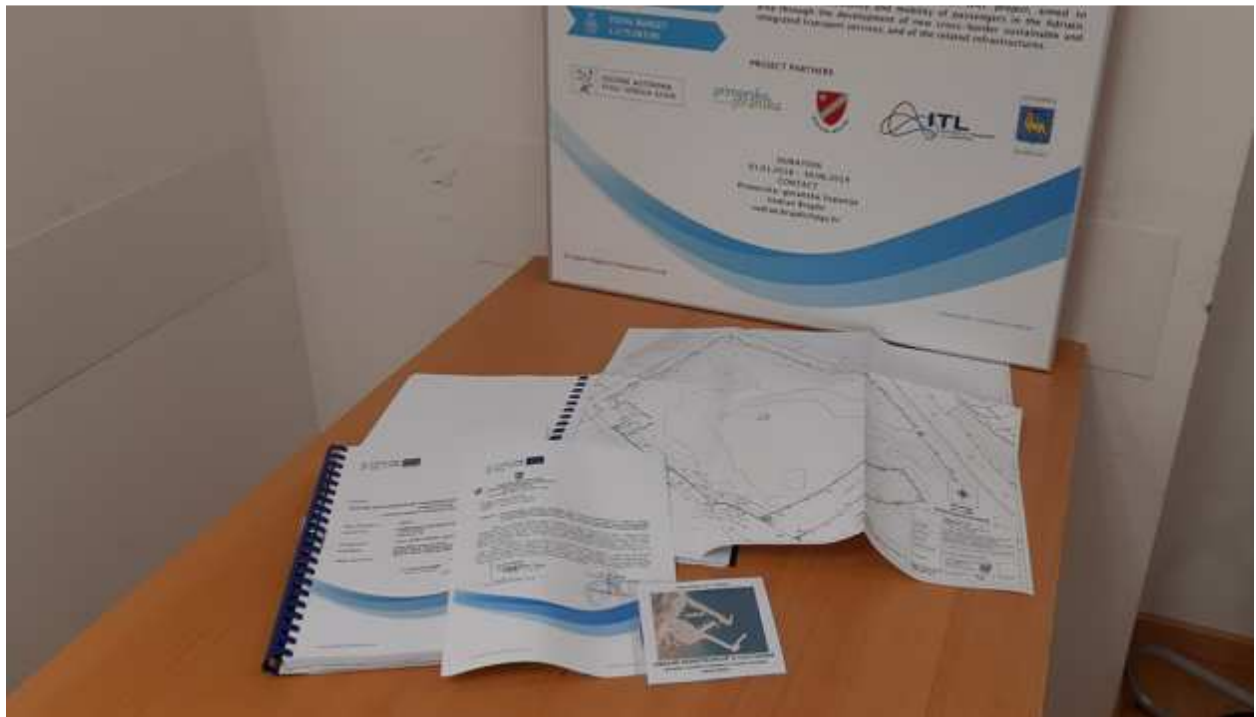


FIGURE 31. DELIVERED TECHNIAL DOCUMENTATION

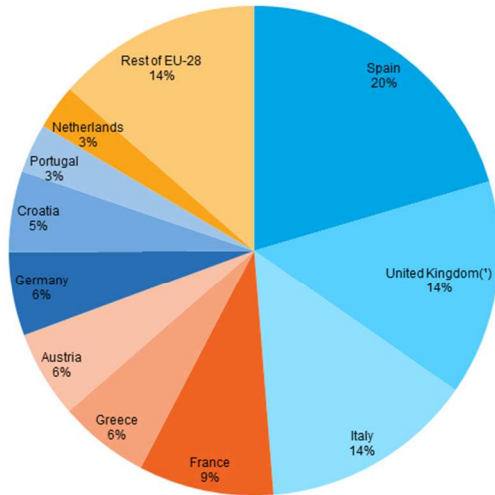
## 2 Quantitative data on Moses pilots

The following paragraph analyse the main quantitative data collected during the Moses pilots. Others quantitative data related to the Moses pilot are analysed in the second WP5 Moses report called “D.5.2-Report on surveys”. The main quantitative focus of this paragraph is on Ravenna pilot and GPS detection of the cycle paths generated by the cruise tourist using the electric bike sharing system tested in the Ravenna cruise terminal.

### 2.1 Analysis of touristic flows among Italy and Croatia

Tourist arrivals and accommodation establishments in Croatia have been steadily rising each year since 2000, reaching a record of 18.6 million tourists (including residents and non-residents) arrived at accommodation in Croatia in 2018. In particular, in line with trends across Europe, tourism in Croatia has experienced a boost in the last ten years. International tourists account for the vast majority of arrivals in accommodation in Croatia, and the country has maintained its popularity as a vacation destination for European and global visitors alike. With its array of coastal towns and resorts on the Adriatic Sea, it is a key destination for cruise tourism, especially the port of Dubrovnik.

Share of nights spent at EU-28 tourist accommodation by tourists travelling outside their own country of residence, 2017 (% of all nights spent in EU-28 tourist accommodation establishments)



Note: EU-28 estimate made for the purpose of this publication, based on available data.  
 (\*) Number of nights spent estimated using monthly data.  
 Source: Eurostat (online data code: tour\_occ\_ninat)



FIGURE 32. SHARE OF NIGHTS SPENT AT EU-28 TOURIST ACCOMMODATION BY TOURISTS

The traffic flows between Italy and Croatia are mainly represented by road traffic and the international maritime public transport services which Friuli-Venezia-Giulia Region is making available represent the only cross-border passenger public transport service running, even if during summertime only. The number of passengers reached a record in 2016, but in general they are stable on average around **10.000** as showed by the table below.

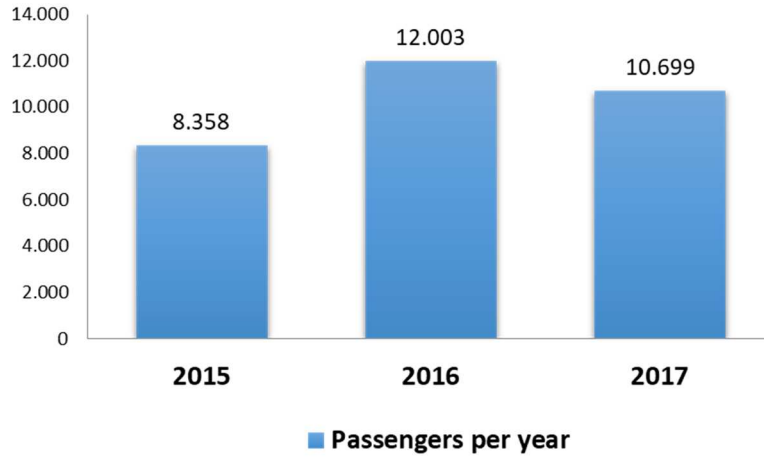


FIGURE 33. PASSANGERS PER YEAR AMONG ITALY AND CROATIA

Whilst the number of bicycles transported is increasing, showing a growing attitude towards intermodality bike&boat by the tourists mainly.

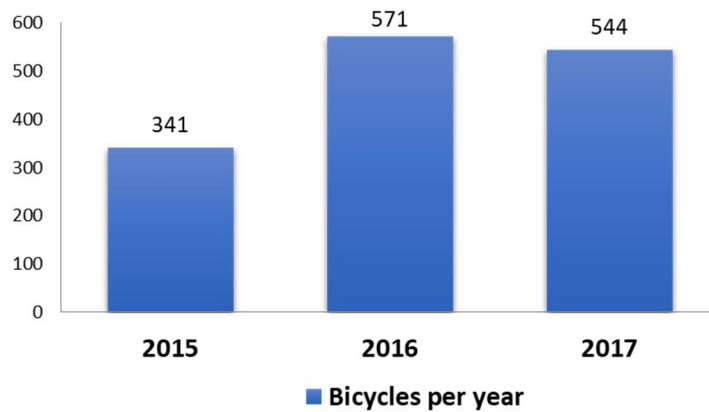


FIGURE 34. BICYCLES PER YEAR AMONG ITALY AND CROATIA

Being a pilot line, the connection set up during summer 2019 linking Trieste to Mali Lošinj has reached the objectives, which are bound to be higher in summer 2019 since the line was included also in the sailing schedule of the new contract signed by FVG Region with the operator Liberty Lines SPA for three years (period 2019 – 2021), taking into account that the length of the season was enlarged for 2019 until the end of September and will be even larger in 2020 and in 2021, when it will include also the months of May and June.

## 2.2 Analysis of GPS data collected in the Ravenna pilot

In the framework of the Moses project, each Moses used electric bike was monitored using a GPS device. Despite some technical problems, it was possible to collect high quality and representative data. The main technical problems faced in managing these GPS systems were mainly related to:

- GPS detection errors due to external factors as the number of visible satellites and precision of the monitored points;
- Unpredictable interruptions in the journeys' monitoring due to batteries lack, covered places where the GPS signals was too weak, etc.



FIGURE 35. PHOTO OF THE GPS USED IN THE RAVENNA MOSES PILOT



FIGURE 36. PHOTO OF THE GPS SYSTEM INSTALLED ON THE ELECTRIC BIKE IN RAVENNA CRUISE TERMINAL

For all these reasons, a geometric simplification of the monitored cycle itineraries were conducted in order to have relevant and clear final data. Where the GPS data were missing, the qualitative data collected with the surveys were used to complete the GPS data.

Considering all these ex-post geometric simplifications, 5 different cycle itineraries typologies were identified as summarized in the table below.

	<b>Cycle itinerary typology</b>	<b>Length (km)</b>	<b>Intermodality</b>	<b>N° users</b>	<b>Points of interest</b>
1	<i>Double Pier path in Porto Corsini and Marina Ravenna</i>	7.1	Ferry	2	Pine forests Marina di Ravenna Beaches
2	<i>Single Pier path in Porto Corsini</i>	3.4	No intermodality	5	Pine forests
3	<i>Marina di Ravenna path</i>	4.8	Ferry	13	Marina di Ravenna Beaches
4	<i>Ravenna city centre path (one way, return by bus)</i>	15.1	Ferry Bus	2	Ravenna city centre Pine forests Marina di Ravenna
5	<i>Ravenna city centre path (return trip)</i>	31.8	Ferry	6	Ravenna city centre Pine forests Marina di Ravenna

FIGURE 37. SYNTHESIS OF MONITORED CYCLE PATHS

The 5 different cycle itineraries differ each other on the basis of the lengths and the required intermodality levels. In relation to the travel intermodality, it is interesting to note as almost all the electric bikes users used the ferry public transport service connecting Porto Corsini to Marina di Ravenna.

As evidenced in the table below, during the Moses pilot test activities in Ravenna, **314,6 km** were monitored, allowing to obtain data relevant from a statistic point of view.



	Cycle itinerary typology	Length (km)	N° users	Total km travelled
1	Double pier in Porto Corsini and Marina Ravenna	7.1	2	14.2
2	Single pier in Porto Corsini	3.4	5	17
3	Marina di Ravenna	4.8	13	62.4
4	Ravenna city centre (one way)	15.1	2	30.2
5	Ravenna city centre (return trip)	31.8	6	190.8
	<b>Total</b>	<b>62.2</b>	<b>28</b>	<b>314.6</b>

FIGURE 38. TOTAL KM TRAVELLED BY MOSES ELECTRIC BIKES DURING THE MOSES PILOT IN RAVENNA (SUMMER 2018).

Thanks to the GPS tracking technology, it was possible to map in details the bicycle itineraries generated by each user.

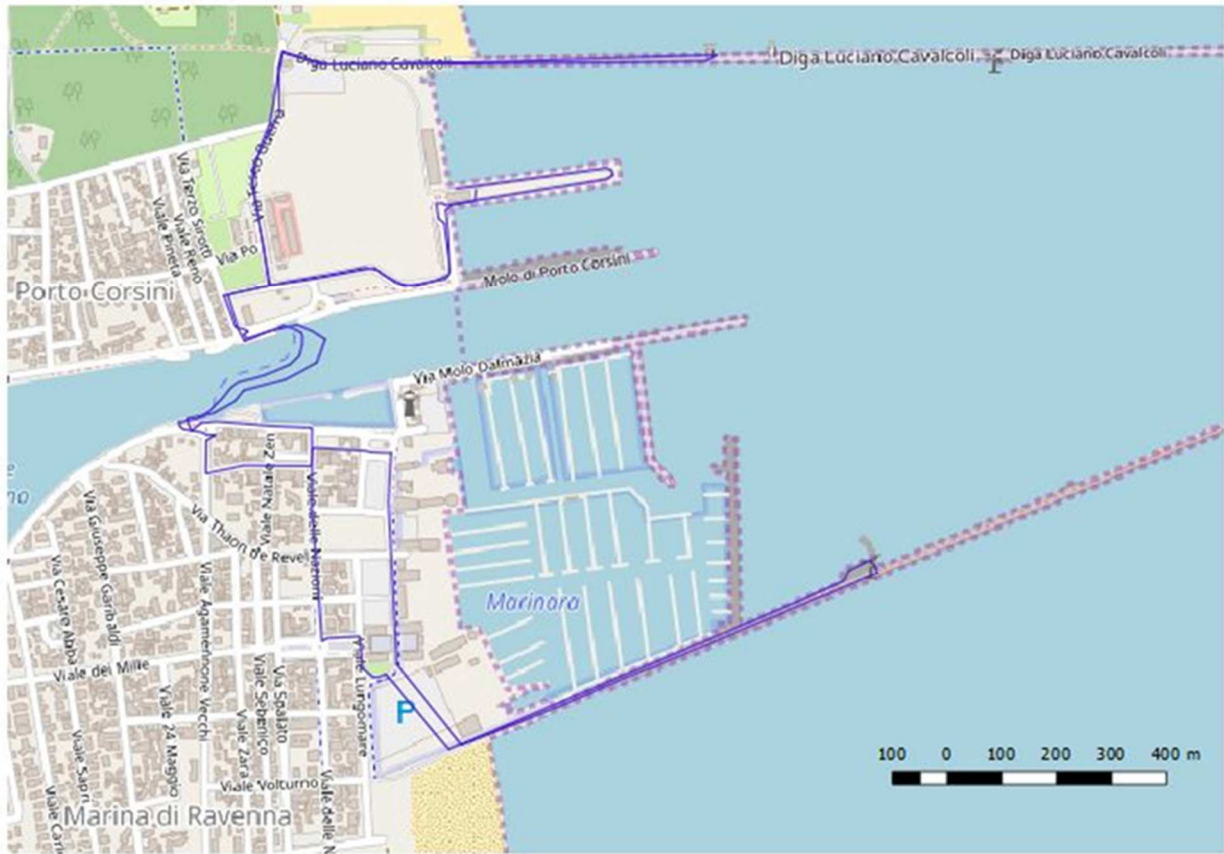


FIGURE 39. PATH 1. DOUBLE PIER PATH IN PORTO CORSINI AND MARINA RAVENNA (SOURCE: ITL FOUNDATION ELABORATION)

The Path 1 “Double pier in Porto Corsini and Marina Ravenna” main aim was to reach the touristic beaches and the restaurants located in Marina di Ravenna, one of the most important and attractive touristic areas in the Ravenna municipality. The electric bikes were also used to reach the two piers, both attractive from a landscape point of view. Path 1 total length amount is 7.1 km.

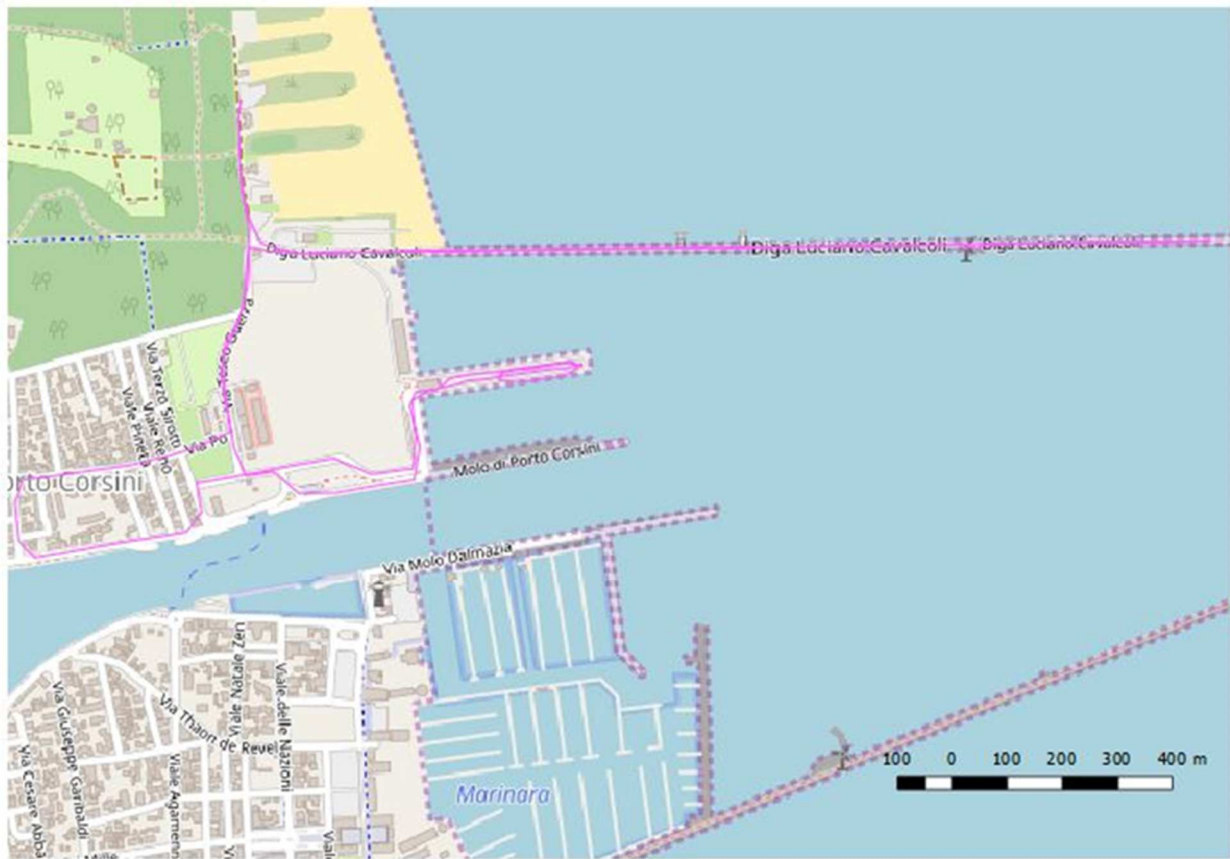


FIGURE 40. PATH2. SINGLE PIER PATH IN PORTO CORSINI (SOURCE: ITL FOUNDATION ELABORATION).

The Path 2 “Single pier in Porto Corsini” was the only collected path where the ferry service was not used. In this case the electric bikes were used for very short distances in order to reach the pine forest in northern part of Porto Corsini municipality and to reach the northern pier, an attraction mainly for local people. Path 2 total length amount is 3.4 km.



FIGURE 41. PATH 3. MARINA DI RAVENNA PATH (SOURCE: ITL FOUNDATION ELABORATION).

The Path 3 “Marina di Ravenna” main aim, as for Path 1, was to reach the touristic beaches and restaurants located in Marina di Ravenna, one of the most important and attractive touristic areas in the Ravenna municipality. Path 3 total length amount is 4.8 km.



FIGURE 42. PATH 4. RAVENNA CITY CENTRE PATH (ONE WAY) (SOURCE: ITL FOUNDATION ELABORATION).

The Path 4 “Ravenna city centre one way” is the most interesting for the purpose of the Moses project. One of the most important objective of the Moses pilot in Ravenna was to demonstrate as the electric bikes could be a reliable and efficient transport solutions to promote the sustainable intermodality among the cruise terminal and the Ravenna historical city centre. In this case, the users reached the city centre of Ravenna using the electric bikes and crossing the “Candiano Channel” with the public transport ferry service. Once in the city centre, one of the users had some technical problems (tire deflated) so they decided to return to the Cruise Terminal using the public transport bus. Based on their qualitative notes collected with the

survey, they appreciated the different transport services used and they said the integration among all these different transport solutions was perfect.

Another very interesting aspects showed by this case is related to the use of the existing cycle paths connecting the Ravenna cruise terminal to the historical city centre. The users, following the indications provided by the personnel at port, followed existing cycle paths to reach the city centre. Based on the qualitative data collected with the survey, they declared they would have never been able to reach the city centre without these cycle paths. Path 4 total length amount is 15.1 km.



FIGURE 43. PATH 5. RAVENNA CITY CENTRE PATH (RETURN TRIP) (SOURCE: ITL FOUNDATION ELABORATION).

The Path 5 “Ravenna city centre return trip” is similar to Path 4, but in this case there weren’t technical problems with the electric bikes so the users were able to return to the cruise terminal without using any kind of public transport service. For both trips, the users used the existing cycle path network connecting the historical city centre to the Ravenna cruise terminal. Path 5 total length amount is 31.8 km.

### 2.2.1 Ravenna pilot. Methodological notes

The single pathway were been cleaned up by the main deviations due to GPS technical problems during some detections moments.



FIGURE 44. ORIGINAL GPS TRACK CONTAINING SOME DETECTION ERRORS



FIGURE 45. REVIEWED GPS TRACK AFTER THE GEOMETRIC SIMPLIFICATION

## 2. Conclusions and lessons learnt

With reference to Friuli-Venezia-Giulia pilot, the passengers quantitative data collected prove that if new cross-border maritime services and links are made available, the use of modes of transport alternative to cars are chosen by citizens and tourists. Those figures could have been higher if the finalization of the contract with the operator would have been closed earlier and



not too close to the start of the line. Therefore, the available timing for promoting new services and increasing the knowledge of new opportunities among citizens and tourist can really make the difference in having successful new sustainable cross-border links.

In relation to the Ravenna Moses pilot, the quantitative data collected demonstrates as the use of light electric vehicles in a sharing mobility services allows to cover in a reliable, efficient and attractive way long trip distances (more than 30 km). Moreover the use of electric vehicles in this kind of sharing mobility services, is an attractive, reliable and sustainable solution for aged tourists arriving in port areas. As demonstrated by these data, electric bikes could be a valuable solution for aged people and with reduced mobility not able to use traditional bikes and/or traditional public transport vehicles, also in covering long distances.

The light electric vehicles, as demonstrated by the data collected during the Moses Ravenna pilot are also a suitable and reliable solution in providing and promoting intermodal and sustainable transport solutions in urban and low density/peripheral urban areas. In fact light electric vehicles allows an easy integration with existing public transport offer (both buses and urban ferries) and potentially also with trains for longer distances.

The data collected showed also the importance of supporting all these electric mobility initiatives with high quality infrastructures, in particular safe and well designed cycle paths. In the Ravenna case study the existence of a cycle path connecting the port area to the historical city centre had a fundamental role. In fact as evidenced by the qualitative data collected with the survey, the users declared they would have never been able to reach the city centre without these cycle paths.

