DELIVERABLE D.T2.2.6

ICT ACTION PLAN FOR IMPROVING MULTIMODAL TRANSPORT IN ADRION REGIONS

Version 1.3

February 2020

LUKA KOPER

Port of Koper

Disclaimer

This document is a deliverable of the ADRIPASS project, co-founded by the Adriatic-Ionian Programme INTERREG V-B Transnational 2014-2020 First call for Proposals. It can in no way be taken to reflect the views of the European Union. In any case, if any party is interested in extracting some pages from this Publication the source must be mentioned: ***Adriatic-Ionian Programme INTERREG V-B transnational 2014-2020/ Programme Priority 3/ ADRIPASS project (166), Integrating multimodal connections in the Adriatic-Ionian region/ Deliverable T2.2.6 – ICT action plan for improving multimodal transport in ADRION regions****.*

The document has been prepared by Luka Koper, d.d. with contribution of the ADRIPASS project partners. Data and information have been collected through direct analysis and desktop research. Any error or omission of this version of the document, which is due to incomplete data, an error or omission in data provided to the authors or obtained from any other parties, is not the responsibility of the authors

Responsibility for the information and views expressed in the document lies entirely with the authors and the ADRION Programme is not liable for any use that may be made of the information contained therein. The ADRION Programme, the project partners, their officers, employees, agents and contractors shall not be liable for any direct or indirect or consequential loss or damage caused by or arising from any information or inaccuracy or omission herein and shall be not liable for any use of the information contained in this document.

Table of Contents

Glossary of abbreviations

ADRION	Adriatic-Ionian programme area
AIS	Automatic Identification System
ALB/ AL	Albania
AR	Augmented Reality
BCP	Border Crossing Point
BG	Bulgaria
BI	Business Intelligence
BIH/ BA	Bosnia and Herzegovina
BPA	Bar Port Authority
CCTV	Closed-Circuit Television
CEF	Connecting Europe Facility
CEI	Central European Initiative
CEN	European Committee for Standardization
CNC	Core Network Corridor
CONNECTA	Technical Assistance to Connectivity in the Western Balkans
CRM	Connectivity Reform Measures
CPMM	Corridor Performance Measurement and Monitoring
DG MOVE	Directorate-General for Mobility and Transport
DPA	Durrës Port Authority
EC	European Commission
EDMS	Electronic Document Management System
EL/ GR	Greece
ERTMS	European Rail Traffic Management System
ETCS	European Train Control System
EU	European Union
FTCBH	Foreign Trade Chamber of Bosnia and Herzegovina
GPS	Global Positioning System
GSM-R	Global System for Mobile Communications - Rail
iOS	iPhone Operating System
IPA	Instrument for Pre-accession Assistance
IT/ ICT	Information and Communication Technologies
ITL	Institute for Transport and Logistics (ADRIPASS partner)
ITS	Intelligent Transport Systems
IWW	Inland Waterways
KOS/ XK *	Kosovo* (hereinafter referred to as Kosovo)

* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence

KPI	Key Performance Indicator
LK	Port of Koper
LP	(ADRIPASS) Lead Partner - CEI
MCA	Multi-Criteria Analysis
MED	Mediterranean (corridor)
MK/ NMK	North Macedonia
MNE/ ME	Montenegro
MoTC/ MoI/ MoCTI/ MoTI/ MoIT/ MoTMA/ MoEI	Ministry related to Transport and Infrastructure
MS	Member States of the European Union
NTCIP	National Transport Communication for ITS Protocol
NCTS	New Computerised Transit System (Customs related)
OEM	Orient East Mediterranean (corridor)
OLIG	Igoumenitsa Port Authority
PCS	Port Community System
PDA	Personal Digital Assistant
PP	(ADRIPASS) Project Partner
PPA	Ploče Port Authority
POI	Points Of Interest
RIS	River Information Services
RRT	Road-Rail Terminal
RUTH	Regional Unit of Thesprotia
SEE	South East Europe
SEETO	South East Europe Transport Observatory
SRB/ SR	Serbia
TA	Technical Assistance
TAF - TAP	Telematics Applications for Freight/Passenger services
TCS	Transport Community Secretariat
TEN-T	Trans-European Transport Network
TR	Turkey
TSI	Technical Specifications for Interoperability
UIC	Union Internationale des Chemins de Fer
VMS	Variable Message Sign
VTMIS	Vessels Traffic Management and Information System
WB6	Western Balkans 6 Regional Participants
WB (G)	World Bank (Group)

WP	Work Package
WPL	(ADRIPASS) Work Package Leader

1. ICT tools to improve the multimodal transport in the ADRION Regions

1.1. Description

Maritime freight flows represent the most important segment of international trade in the world. At this regard, ports represent an essential link between the connection of industrial, transport and commercial hubs. Ports are strategic points, as they play an important role in relations between countries, as well as interconnections of different cultures and logistical hubs between land and maritime transport. In recent years, ports in the Adriatic-Ionian region have greatly intensified connections with the Far East, as they represent an important window in the center of Europe for both export and import of all kinds of goods. What is more, China is currently opening up to the world with its "One Belt, One Road" initiative, and is looking for foreign markets that will boost the economy in addition to domestic consumption.

European countries are resolving relations with economic powers from other continents through a variety of common cooperation platforms, backed also by strong bilateral cooperation. The OECD predicts balanced growth by 2025, with just under 1.5 percent of annual GDP growth per capita, and a slow increase in growth to just over 1.5 percent annually in 2030. Many of major international advisory and audit networks predict that the global economy will grow by about 130 % between 2016 and 2050 when China and India are expected to take over the global economy. Added to this analysis is HSBC's forecast that China will economically be the fastest in growth by 2030.

With such assumptions, we can concretely take the potential of the Adriatic-Ionian region as being in growth and with a very good starting point in the face of new infrastructural and operational challenges for all countries in the region.

Inevitably, from an economic and geopolitical point of view, the ADRION ports are increasingly representing an alternative to the ports of Northern Europe, for reaching the markets of central and southeast Europe. In line with the increase in the volumes of goods coming by sea, even the technologies for faster and operationally lean handling require an update of existing ICT technologies.

The digitization of the documentation accompanying the goods, the databases to be constantly available to the stakeholders included in the logistics chain, the real-time updates on the status of the goods, the information obtained in advance regarding the goods to be handled, are just some of the interventions that modern Logistics requires to keep ports or logistics centres in step with the times and at the forefront worldwide.

Furthermore, the ADRION region is crossed by several corridors that are part of the TEN-T network of the European Union and, even more so, they must be considered of primary importance, when it comes to the development of the transport network, both at the level of infrastructure, both at the technological / digital level.

For what regards the ADRIPASS project, it is going to take advantage from the analysis, elaborations, studies and pilot actions provided through the last 2-years' execution of the Action, with contributions related to activities T1.2.3, T1.2.4, T2.1.3 and all the pilot actions included under the work package T2. They will serve as starting point for the definition of strategies at national and regional level, as well as for future development plans in the Adriatic-Ionian region. One of these results is respected by this document which elaborates the information obtained in the abovementioned deliverables.

The contribution to the success of project's activities provided by the project partners was huge and all the efforts were spent to analyze the current situation at regional level and for the definition of lacks, needs and proper solutions to be developed in line with the current infrastructural, geographical and political situation in the countries concerned by the Action. The researches and adopted solutions at local level allowed the development of tools that will serve for the consideration and definition of proper solutions at larger scale, at regional level, to demonstrate how operative improvements can speed up the operation also on the whole logistic chain.

Infrastructural lacks or shortages due to geomorphological constraints cannot be resolved through solutions developed for single/ specific/ local areas and with small financial contributions. That's why the different types of contributions were provided by all the partners in different forms (studies, questionnaires, pilots etc.), to follow the global aim of the project, which was the reduction of lacks at operational level, through the development of ICT tools that will speed up local procedures and will contribute to the better link between the ports and the hinterland as well as the improvement of the multimodal transport and the intermodal connections between countries in the Adriatic-Ionian region.

2. Definition of needed interventions in single areas

The ADRION region extends its geographical area from the Northern Adriatic sea to the Ionian Greek region, where the biggest volumes of containers are being handled, being the Piraeus port a crucial destination for all the containers entering and leaving the Mediterranean in relation to the Silk Route to the Far East. The ports represent the most important link of the logistic chains being developed through the EU corridors. Actually, the Mediterranean, the Scandinavian-Mediterranean, the Baltic-Adriatic, the Rhine-Danube and the Orient East/MED corridor are those corridors of the TEN-T's core network, crossing the ADRION region.

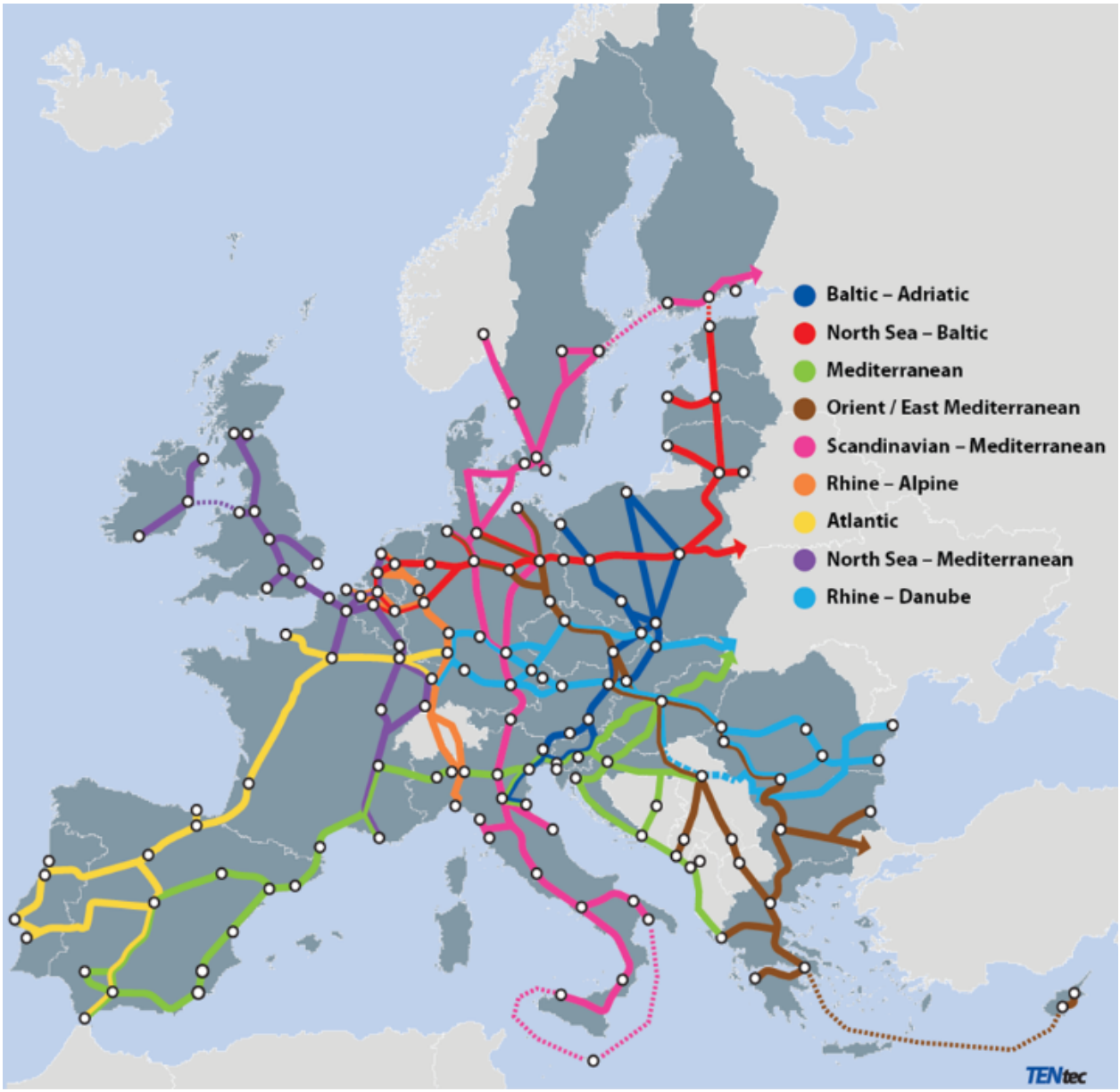


Figure 1: TEN-T core network corridors

Source: European Commission, Directorate-General for Mobility and Transport, TENTec Information System

At a first look it can seem that such a big and ramified core network can be followed by an important infrastructure, which offers full services and support that can be potentially provided by such a corridor. In fact, from the first hand there can be identified various lacks and obstacles to the development of the southern European network and especially the ADRION region, which has to face infrastructural, operational and geographical challenges. The situation can appear different when considering different types of transport – railway transport has to face also geological issues that the road transport can easily bypass through specific multimodal transport concepts and vehicles.

The lacks identified at national level were transferred to regional basis, through the works made for the data collection, analysis and Transnational Action Plan where all the issues and possible solutions were listed. All the data collected, allowed the project partners, and the partners leading the activities, to group the found crucial points per types of transport and propose potential solutions, overruns or mitigation plans.

As mentioned in previous paragraphs, the Core TEN-T Corridors in the ADRION region that were considered are the following:

- **Orient East-Med:** crossing Greece, North Macedonia, Kosovo, Montenegro and Serbia;
- **Mediterranean:** crossing Italy, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro and Serbia, Albania and Greece;
- **Baltic – Adriatic:** crossing Italy and Slovenia;
- **Scandinavian – Mediterranean:** crossing Italy;
- **Rhine – Danube inland waterway network:** crossing Serbia, Bosnia and Herzegovina and Croatia.

Analyses were made for roads, railways and inland waterways as well as for inland terminals and for maritime ports. Even if analyses were considering all these areas, the activities developed through pilots were interesting just the Eastern Adriatic ports, where pilots were tested in the maritime ports in Koper, Ploče, Bar and Igoumenitsa. In addition to this, a Project Design for the implementation of the port's PCS in Durres has been produced as preliminary design for further interventions, after the end of the project.

Detailed description of each Corridor's sections in the ADRION region, with indication of their alignments, road and rail BCPs and other nodal points of interest are provided in the DT1.2.3 where the data collected served for the frameworks within which the considered solutions can potentially be developed.

2.1. Maritime Ports, Inland waterways and Inland terminals

Regarding the ICT level of deployment at maritime ports, inland waterways and inland terminals it was identified that Port Community Systems must be upgraded, at least with the solutions provided by experts supporting the development of systems in the companies. A new PCS is usually very expensive, and it is difficultly replaceable because the codes and the structure of the systems are usually unique and, in most cases, these are owned by the developer and they cannot be shared with other providers for the upgrade or minor modifications. It means that developments are made case by case and these are custom upgrades, which are not necessarily adoptable in other realities.

What came out from the work made in previous deliverables (DT1.2.3, DT1.2.4 and DT2.1.3) is that different lacks were identified separately for different types of transport

and at different nodes in the region. The ports are a focal Border Crossing Point (BCP) for the freights travelling from remote destinations and they have specific procedures and organizational operations to be followed in order to maintain the quality and the sustainability levels distinguishing such a link on the logistic chain.

Taking these preliminary assumptions, what was initially identified is that significant bottlenecks were caused by:

- insufficient, number of employees, officers and custom agents;
- infrastructural lacks (electrification, traffic congestions, communication technologies, parking etc.);
- lack of communication between stakeholders due to lacks in digitalization;
- insufficient or non-existing planning;
- low level of English knowledge;
- insufficient equipment;
- territorial limitations (slopes, ground composition, water depths etc.).

In the specific, while checking micro areas, the Northern Adriatic is “covered” by a multitude of ports, all increasing their businesses and volumes year by year. Most of the business is made through the containerization of the transport, from vessels through road or through railway to the final destinations.

Containers and cars are the types of cargo with the highest level of growth in the mentioned area and at this regard, the following figures show how containers’ and cars’ volumes were taken in consideration for the development of tools dedicated to the digitalization of solutions linked to the final goal which is the better link with the hinterland and the speed up of procedures on the logistic chain. The biggest port’s in the Northern Adriatic have a constant growth of containers in the last decade, which needed also some interventions at operational and technological level.

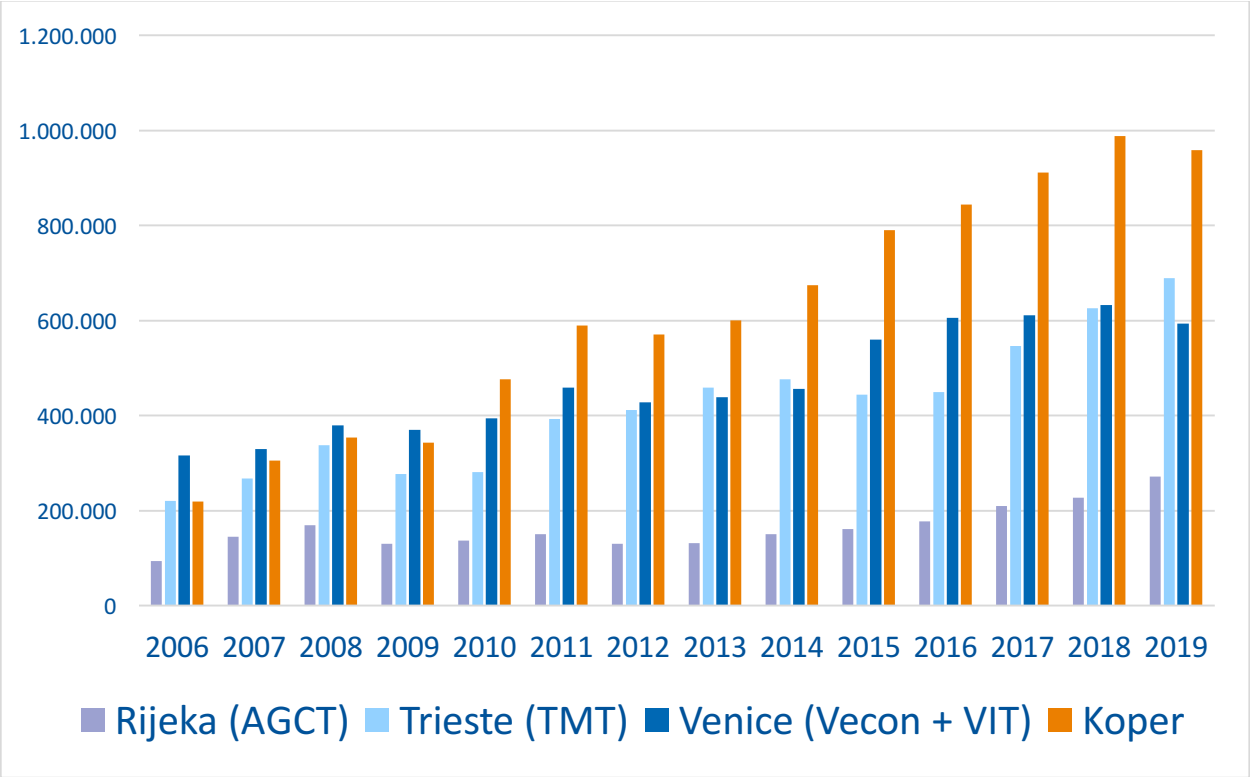


Figure 2: Containers handled in the Northern Adriatic biggest ports, in the last decade
Source: Luka Koper, d.d. own elaboration

What was proposed through the ADRIPASS project for this kind of improvement in the ports was the development of ICT solutions dedicated both to the containerized system and the cars' system. For what regards the container system the implementation at PCS level was the development of ICT tools linked to the EDI interfaces which are crucial year by year for the digitalization of data and automation of procedures in the port. Considering the volumes of cargo leaving the ports, approximately around 59% by railway and 41% by road, it is necessary to develop solutions that can support both the transport types.

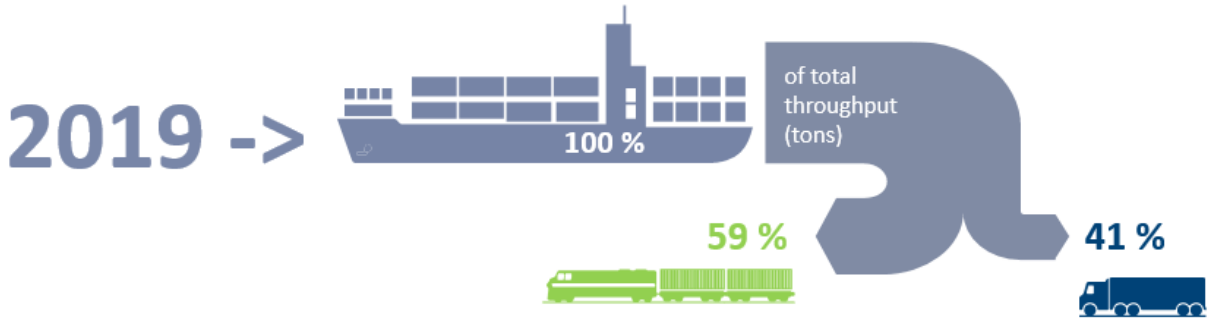


Figure 3: Modal split for goods arriving to the port of Koper
Source: Luka Koper, d.d. own elaboration

For the segment dedicated to cars, the solutions adopted were considered for the port of Koper which represents a good testing area, considering that it's the second terminal in the Mediterranean (after the Barcelona car terminal) for cars handling. The volumes seen in the last decade are showing an increase of numbers, and the upgrade of the system accompanied by a digitalization of the information system and its procedures was necessary in order to allow the cargo to travel without delays and at the same time allowing the port to maintain its high level of service.

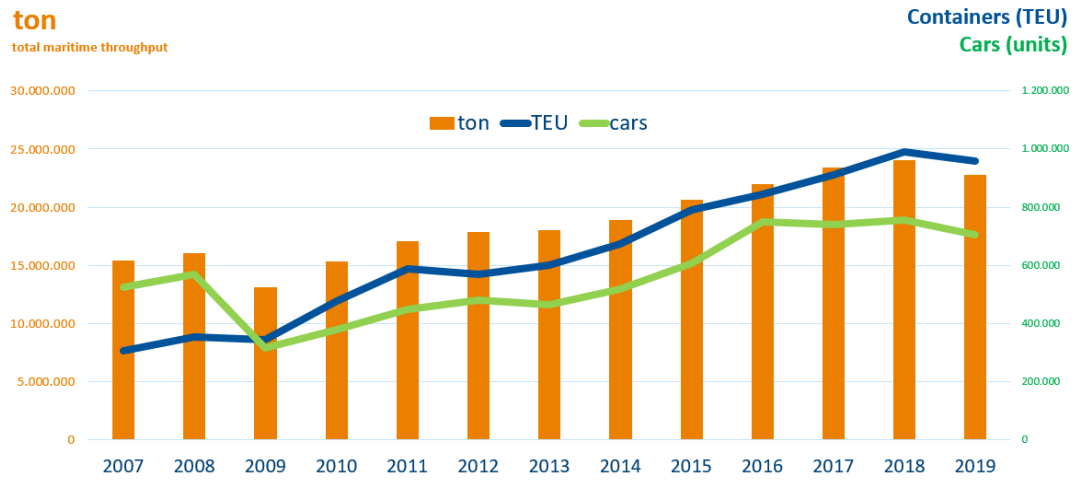


Figure 4: Volumes of cars compared to the growth of containers and throughput in the port of Koper

Source: Luka Koper, d.d. own elaboration

Port of Koper served as a significant testing ground for the pilot activities that were developed with the aim to develop solutions that can represent best practices in case the freight corridors would require such solutions for the entire ADRION region.

What was adopted also in other ports collaborating at pilot level was indicating a general necessity for the entities to develop and upgrade their PCSs, which means important interventions on the entire ports' system for the adoption of solutions that will feed/ address the needs not only of port's operators but also of the other stakeholders involved in the logistic chain.

The solutions proposed and lessons learned through the analysis made for ADRIPASS were involving nodes from the ADRION region as well as through the comparison with nodes outside the region and specifically in Antwerp and Valencia. The data collected included the nodes in the areas of Patras, Piraeus, Ravenna, Venice, Thessaloniki, Trieste, Koper, Bologna, Padova, Trieste, Ploče, Bar, Durres and all the hinterland links with BCPs at country level and at ports that are not listed here above.

While considering the lacks and issues identified at regional and national levels, what came out in the data collected in and the analyses performed in other project activities

and deliverables is that in the Balkan area the lack in infrastructure is significant and that most of the transport is performed by road vehicles, which is also a significant factor for the sustainability of solutions to be adopted. The connection with hinterland is planned to be intensified on railways but the situation is still far to be changed and the road transport is dominating the scene. In this sense, the solutions adopted in ports at pilot level were dedicated to all the types of cargo transported but mainly concentrated on the digitalization of the system for gates, terminals and roads linking the ports.

Ploče and Bar are ports mainly transporting general cargo, fuels and liquid cargo, but also perishable cargo and dry bulk were interested by the solutions adopted at PCS level which promises to significantly reduce the lacks and the issues detected at operational level. The solutions included the collaboration of different types of stakeholders included in the logistic chain like forwarders, rail operators, customs, phytosanitary inspections etc. At the same time, the digitalization of procedures is significantly reducing the waiting times having as a consequence also the reduction of the level of pollution, but what is important is also the introduction of solutions that are going to allow all the members of the logistic system to benefit from the implementations, because the adoption of digital solutions on the new system allows all the links of the logistic chain to see in real time which is the status of the documentation, the position of the cargo and the administrative procedures to be followed.

In Greece, the pilot activities were concentrated on the RO-RO terminal in Igoumenitsa and on the area immediately near the port, where traffic and road info are provided to the users. It must be taken in consideration that, the port of Piraeus is also located in the ADRION region and it represents the most significant increase in volumes of cargo (especially containers), considering that the port authority is owned by the Chinese shipping company COSCO. The Piraeus port is very well linked also with the hinterland through the railways, which allows the development of competitive transport services to neighbouring countries namely Serbia, Hungary, Czech Republic and Slovakia. The successful development of the Greek port is mainly due to the so-called transshipment, which indicates the handling of containers from ship to ship.

A future development of railway infrastructure in the Balkans could represent great opportunities for the Serbian and Bosnian logistics, considering that the actual shipments are travelling from Greece to Hungary and further north countries in Europe.

2.2. BCPs at national borders and road connections

The national border crossing points are mainly affected by barriers related to the administrative procedures, poor knowledge of the main international languages and the national policies that are not aligned from country to country which means that, in some cases, the same documents must be provided for the same thing many times, again and again for each country.

As said at the beginning, considering that most of the infrastructural lacks and geomorphological constraints could not be subject of the researches and interventions proposed through the pilot activities, the ADRIPASS project has focused its attention on the data collection, research and testing of specific ICT tools dedicated to ports' systems and multimodal logistic chains.

The road transport and its border points were not tested through pilots, but the solutions found in ports are in line with the national directives related to the so-called "single window". They have different names from country to country, but the main concept remains the same for each micro region. The problem upstream lies in the necessity to have, at least at national level, the same tool, the same IT solution, the same frameworks, the same interface to follow the cargo's data and all the related information accompanying the freights during their transportation through the different countries. The new solutions are providing also some data in advance, like the Estimated Time of Arrival (ETA) or the Estimated Time of Departure (ETD) which allows all the implied actors to know in advance some crucial data which will serve for the operational planning. It is fundamental for:

- the reduction of waiting time: operators doesn't need to wait for the documents;
- the reduction of costs: being served "just in time" means that costs for fuel, electricity, staff etc. can be reduced and redirected to other activities that can improve the level of the services;
- the optimization of personnel employed in specific jobs, while all the parties involved know the expected operations to be done and the distribution of work between the existing staff is better. And last but not the least;
- the reduction of pollution, which is indirectly linked with all the previously mentioned pluses, considering that the less trucks waiting, less costs of energy consumption and optimization of work's distribution means at the same time a lower level of pollution in its different forms (light pollution, noise pollution, micro particles in the air etc.).

Some of the pilot solutions were found and tested mainly for the operational reasons but at the same time, it was necessary also to align the future necessities of global information to be shared at EU level for all the members of the logistic chain in EU. Many information is provided through the digitalization of data but the common characteristic found at road transport level, as well as at rail transport level is the loss of time due to the formalization of documents accompanying the freight in transit from one country to another. Basically, the most significant documents at this level are those linked to the customs offices, which need to include the information about the cargo transported and also stored at local warehouses (in ports, interports in the hinterland and on vehicles). At this regard, one of the most important solutions reached at EU level is the creation of the Single Window, which offers all the basic data accompanying the cargo during its trip. The EU "single windows" environment for e-Customs initiative was originally part of the Decision No

70/2008/EC. Some embryonal tests were made in 2012 at EU level and entered in production in some countries in the year 2014. The Single Window (SW) is defined as a facility which allows parties involved in trade and transport to lodge standardized information and documents with a single-entry point to fulfill all import, export and transit-related regulatory requirements (cf. UNECE recommendation 33). If information is electronic, then individual data elements should be submitted only once and the information is visible to all the actors at once, while before it was depending on single communications from one party to another (mainly by e-mail or through papers printed at warehouses or forwarders' offices), without sharing the information with other actors.

The EU Single Window environment for customs is focused on customs formalities and involves stakeholders dealing with cross-border movement of goods. The objective of the EU Single Window environment for customs is to enable economic operators to electronically lodge, and only once, all the information required by customs and non-customs legislation for EU cross-border movements of goods. It is linked in ports with the PCSs and EDI interfaces that provide all the data necessary for the correct transport of goods through different countries, not only EU countries.

According to the European Commission (Taxation and Customs Union) the system is operational with nine (9) Member States in production in 2018 (Czech Republic, Ireland, Slovenia, Latvia, Bulgaria, Poland, Cyprus, Estonia and Portugal,). Successful conformance tests have been performed by Lithuania, and other Member States have expressed interest to participate in the successor of the project (called EU Customs SW – CERTEX) in the near future (e.g. France, Belgium, and Luxembourg). One of the countries also entering in the system is going to be Croatia, which is developing the national network of data, allowing the future link with the other EU countries. Pilots made in Ploče are in line with the national directives and the system will allow a global link between Croatian ports and other logistic operators involved in the transport of goods.

Returning to the main argument of this chapter, the roads and BCPs are mainly involving the transport of goods by truck. Different types of cargo and vehicles are passing every day through the ADRION countries and most of these trucks transport general cargo, perishable goods, dry bulk cargo and liquid cargo. A part the port of Trieste which is additionally directly linked with the northern countries through a pipeline system, the countries in the ADRION region are mainly feeding their markets by trucks, especially for the specific liquid cargo dedicated to chemical industries.

In the area of liquid cargo, these are long-term and less volatile transactions, which require certain specifics in storage and work technology. Therefore, these are not major competitive challenges at the regional level, but more about technological sophistication of processes that can at the same time ensure a smooth and safety-friendly unloading of goods.

The bulk cargo domain is offered a greater possibility of transshipment in the Adriatic ports of Koper, Ravenna, Venice, Rijeka, Zadar, Split and Bar, which increases competition for the services offered.

General cargo is also the reason for the increase in road transport in all countries of the ADRION region, mainly because of easier storage and a great variety of cargo. The ports are mainly connected through the hinterland through the roads, with the exception of the cargo which can be transported in containers. In this case, rail is the primary choice since, in principle, all transports longer than 500 km privilege rail transport for the sake of cost-effectiveness of services.

All these types of goods were of interest for the ICT upgrades provided through project pilots. As written many times in previous paragraphs, the solutions adopted in the ADRIPASS ports were all dedicated to their PCSs which in general means upgrading of ports' systems for all the types of cargo and transports due to the modification of the main ports' systems. More details about improvements of ICT tools in ports will be provided in next chapters.

2.2.1. Lacks in infrastructure and equipment

Except the Italian railway system with its connections between (inter)ports and hinterland, the lack in rail infrastructure is evident in the Balkan countries, where the road transport is preferred and is by far the most used.

At the regional level, it is therefore worth highlighting the great challenge that we have in the field of multimodality or railway transport, because in all countries we are witnessing higher costs for rail transport, network's physical and operational characteristics that don't allow transports as made in Northern Europe (lower speeds, lower weights, lower lengths of trains, lower level of infrastructures (lack of electrification, different train gauges, different axle load of wagons, slopes etc.), poor level of equipment and lack of modern tracks.

It's also clear that some countries already have subsidy schemes in place for rail transport, while in other countries there are specific rail taxes, and at the same time this particular transport system faces low competition when we consider railway operators. All these factors have a direct influence on the prices and on the level of the service, which in practice means that without competition, no needs for implementations are foreseen, except in cases when the infrastructures are obsolete or regulatory at EU level aligns the level of services. It includes also the implementation of the technological part of the infrastructures.

The lacks in infrastructure and geographical/geological barriers cannot be a matter of discussion for this document, but it is made clear that in ADRIPASS, also while preparing the Deliverable T1.2.4, that *"…facilitation measures for the promotion of intermodal transport in the ADRION Region are primarily related to telematic applications and ICT*

solutions aimed at solving operational and administrative, i.e. non-physical barriers at BCPs and logistics nodes, thus reducing waiting times or procedural times associated with border crossing operations, as well as administrative processes at ports and logistics terminals, and/or improve safety and security of logistics transport operations".

In the framework of the ADRIPASS project, which aims to develop ICT solutions for the upgrade of actual administration and optimization of operational efforts, the pilot activities in the selected ports were mainly concentrated on the development tools able to improve the links and flows with the hinterland, supporting multimodality. It was basically a matter of local software and upgrade of systems, which are all linked to the local logistic network because they're used by the other logistic operators and stakeholders that work with ports (customs, inspection officers, forwarders, transport companies, railway operators, shipping companies etc.).

2.2.2. Intervention on ICT

The detection of relevant barriers lacks and deficiencies at ICT level was completed through the D1.2.4 which highlighted how the main issues are identified in communication systems and tools for the optimization of operations or digitalization of information to be shared at local level, as well as at regional level. The crushing information about lacks and areas of intervention have been collected/grouped in larger categories and catalogued as follows:

- Deficiency of existing ICT technologies for the digitalization of processes and system operability;
- Inadequate competences/knowledge which needs to be very specific, if the staff uses specific and advanced technology to provide a specific service;
- Lack or deficiency of the of the existing telematic applications for traffic management;
- Lack or poor conditions of the basic utilities (telephone, internet, communication systems like ERTMS/ETCS (European Rail Traffic Management System/European Train Control System), electrification of some rails, etc.);
- Lack of adequate equipment affecting the efficiency and effectiveness of processes at BCPs and transport nodes. This includes machinery, such as cranes weighbridges, x-ray scanners, etc.;
- Deficiency in the last-mile and hinterland transport interconnecting system (both inside and outside the node areas).

The identified lacks and deficiencies mentioned above are well known and outcomes are in line with thousands of data from most of the relevant studies and national plans, which are following the main objective foreseen for the integration and improvement of intermodal transport in the ADRION region, as set by Regulation (EU) 1315/2013.

Table 1: Lacks and barriers identified at regional level

Definition	Maritime Ports	Road BCPs	Rail BCPs	IWW Ports	Logistic Facility	Total
Deficiency of existing ICT technologies/solutions for the digitalisation of processes and system interoperability	4	14	13	-	1	32
Inadequate staff number and competences, lengthy and paper-based procedures, long waiting times of intermodal and border crossing procedures	8	48	28	5	3	92
Lack or deficiency of the existing telematic applications for traffic management	1	-	1	-	-	2
Lack or poor conditions of the basic utilities, such as water, lit, telephone and internet	-	18	16	-	-	34
Lack of adequate equipment affecting the efficiency and effectiveness of processes at BCPs and transport nodes. This includes machinery, such as cranes weighbridges, x-ray scanners, etc…	-	37	7	1	3	48
Deficiency in the last-mile and hinterland transport interconnecting system (both inside and outside the node area)	20	-	-	-	7	27
Need of major infrastructure works and/or minor investments to remove physical and technical barriers, affecting operations and capacity of the infrastructure	12	21	10	2	-	45

Definition	Maritime Ports	Road BCPs	Rail BCPs	IWW Ports	Logistic Facility	Total
Lack of alternative clean fuels supply facilities	-	-	-	-	-	-
Total	**45**	**138**	**75**	**8**	**14**	**280**

Source: D.T1.2.4 based on information from D.T.1.2.3

What can be commonly accepted is that there's a general lack of technology and technological processes. All over the world the automatization is something that is becoming real and daily. All the equipment and innovations adopted in major logistic nodes are bringing solutions for processes, data storage and sharing, communication systems and local software dimensions. The same development is expected at ADRION level where the tools and improvements developed through the pilot activities are expected to be useful also for other realities in the same area, where the linked logistic actors will have the possibility to join the data-bases and functionalities proposed by the partners developing the solutions.

It will allow the partnership to produce an Action Plan which will include the steps to be followed (also after the end of the project) in order to contribute to a larger level of improvement of multimodality in the ADRION area, mainly for what regards the data exchange for the freight transport and for the documentation accompanying the freights through different countries.

2.3. Evaluation framework – Current port operations and specialization

As mentioned in previous paragraphs, the pilot activities adopted in the ADRIPASS project are focusing the actions on port's processes and on their link with the hinterland to improve multimodality and to encourage the development of ports in parallel with the inland ports and logistic centres, which represents the future picture.

In fact, what is going to be developed from the logistic point of view are the logistic areas planned behind the maritime ports, where the main service must be the handling of cargo, not the long-term storage and warehousing of goods. In few words, the future picture foreseen can be explained as a logistic chain where ports handle containers, liquid cargo, dry cargo, livestock, cars etc. but these are moved within few days toward the sea or toward the inland ports and warehouses, leaving the limited spaces in ports free, for the current handling and operations.

The ports directly and indirectly included in the ADRIPASS project, are covering all the types of goods and transports foreseen for the maritime logistics. The focus has been put on the development of the EDIFACT (Electronic Data Interchange for Administration, Commerce and Transport) interfaces which allow not only the port's to communicate with other stakeholders, but they're going to put in touch all the actors on the logistic chain,

through one system, by offering the possibility to offer the data exchange in real time. The United Nations EDIFACT is a cornerstone international standard for the electronic exchange of data that is widely used in international supply chains, transport and logistics. It offers a standardized language for data exchange, providing a set of syntax rules to structure data, standard messages which allow multi-country and multi-industry exchange and an interactive Electronic Data Interchange protocol[1].

For the ports collaborating in ADRION, current port operations and types of cargo handled are described below:

- The port of Koper (WPT2 leader and responsible for Activity **T2.2.1**) is a multipurpose port. It operates through 12 different terminals, which are all linked through the PCS provided and maintained by external experts. The analysis made in last decade shows how the cargo groups leading port's development are cars and containers. The strong link with neighbouring countries allows the port to have quick responses and deliveries for all the types of goods but the accent is put on cars and containers, which are constantly increasing their volumes in the port. The development of ICT solutions through project pilots in the Port of Koper focused on those types of cargo representing the main indicators for the growths of throughputs and trends in the Northern Adriatic region. In fact, cars and containers are representing the flywheel of the huge investments planned in infrastructures in the port. These investments must be accompanied by proper systems and equipment on which ADRIPASS activities focused their attention.
- The port of Ploče (responsible for Activity **T2.2.2**) is a port specialized in handling liquid and bulk cargo, as well as general cargo. In the last decade the Port Authority started an ambitious investment plan, aiming for a substantial increase in the volume of port operations. The port of Ploče is the second largest port in Croatia and it is mostly serving Bosnia and Herzegovina. Being considered by its National Authority one of six seaports of national interest, the Port of Ploče is part of a larger national investment process which includes modern connecting the Croatian area with Zagreb, Budapest and Vienna; as well as Bosnia and Herzegovina. All the port's quays are linked by tracks connected to a single-track railway to Mostar, Sarajevo, Osijek and further north towards Budapest. Such investments in infrastructure leaded to a modernization of systems for the automation of processes and digitalization of data/documentation exchanged. The work done by the port of Ploče in ADRIPASS was focused on the ICT tools necessary for the development of port's PCS and the information data linked to all the terminals operating in port's area.
- The port of Bar (responsible for Activity **T2.2.3**) is a port working through different terminals: RO - RO Terminal, Timber Terminal, Container Terminal, General Cargo Terminal, Bulk Terminal, Grain Terminal, Liquid Cargo Terminal and Passenger

[1] http://www.unece.org/fileadmin/DAM/trade/edifact/untdid/d422_s.htm

Terminal. The volumes handled are not comparable with the other ports in the Mediterranean mainly because there's a big lack in road and rail connections with the hinterland. The port is mainly feeding the Serbian market and the volumes planned and foreseen are mainly depending from the development of infrastructures out of port's area, mainly those that can link port's terminals with the hinterland. That's why in the short-term period it's cheering the news about the announced building of Belgrade–Bar motorway and proposed reconstruction of Belgrade–Bar railway, which would thus mark a breakthrough in attracting the Serbian, and thus the Central European market. In this respect, the integrations and upgrades of port's PCS was needed and co-financed through the ADRIPASS project. It included integrations of existing systems and upgrade of interfaces used in the port with new functionalities and operational solutions.

- The port of Igoumenitsa (responsible for Activity **T2.2.4**) was indirectly involved in project's activities through the pilots brought by the Regional Unit of Thesprotia (RUTH). The port of Igoumenitsa is specialized in passenger and RO-RO transport which from one hand reduces the possibilities to extend the solutions and direct collaboration with other ports in the ADRIPASS project, but at the same time allows the project to extend the knowhow of its found solutions also to this specific branch of the transport chain, which provides useful data for later proposals and integrations with best practices from other ports, after the end of the project. The main lacks and difficulties identified in the Thesprotia region were the traffic congestions around the port and the lack of information for the drivers entering/leaving the port for the RO-RO terminal with main destinations in Italy and other Greek ports. The solutions proposed by RUTH were two: one dedicated to the development of platform for PCS flows analysis and a second solution proposing an AR virtual navigation mobile app, mainly dedicated to users like drivers of trucks, which will benefit from the tool in terms of reduction of waiting time and of costs.
- The port of Durres (responsible for Activity **T2.2.5**) is participating in the ADRIPASS pilot development through a project design for a possible introduction of a PCS in the port. It is a port mainly dedicated to the passenger transport, but it includes also the handling of containers and other types of cargo. Actually, the Durres port doesn't have a PCS and considering the global trends foreseen also through the other pilot activities in the project, it's most probably a solution that cannot be ignored if the purpose is to grow and align port's services with those in other areas. Currently, private and state actors within the port community communicate in traditional ways, thus losing the opportunity to be informed in real time about the port activity (which we see that represents the strong point of the new solutions found in other pilots), creating delays or obstacles to the realization of procedures, being centralized within relevant institutions (companies, agencies) and by lost

cooperation with each other. These and other reasons also bring down efficiency (quality and time) in delivering services.

2.4. Stakeholders involvement

During the meetings organized by project partners in their areas, the solutions adopted for pilot activities were also agreed with the ports' communities and their collaborators, because the provided tools serve as an improvement of the existing system used by all the actors of the logistic chain and without their approval, all the possible solutions wouldn't be useful. That's why the meetings were not only organized before and during the development of the tools but were periodically organized also to check the progress of the implementation, to focus on the results obtained and to verify the difference between the expected and obtained benefits.

What was highlighted during the meetings with stakeholders was mostly listed in previous paragraphs and includes also obstacles and lacks that cannot be solved and treated at project level. First of all, because the ADRIPASS project concentrates its activities on ICT tools, and second because the infrastructural and equipment improvements need a longer period than project's duration and an extremely bigger budget at actors' disposal, in order to properly face the mentioned challenges. Sometimes it's also a matter of policies and policy makers, so the main concept which was behind the project idea was like *"let we do something that can be palpable and feasible - in our possibilities, which can be developed and useful for the integration of local logistic nodes with the hinterland"*.

What was accumulated through meetings, questionnaires and interviews was involving all the types of logistic operators and considered the whole logistic chain, including not only works in the port but also its connections with the hinterland, for which it included road transports, railway transports and BCPs. The summarized details of the outcomes and possible solutions are provided in the table below, which is presented in the **T1.2.4**.

Table 2: Proposed measures and solutions in WPT1 Action Plan

Definition	Maritime Ports	Road BCPs	Rail BCPs	IWW Ports	Logistic Facility	Total
Improvement/upgrade of the existing ICT infrastructure to foster transport digitalisation, the interoperability of communication and data sharing systems	50	14	2	-	5	71
Hiring of additional/specialised personnel and provision of training courses to increase the quality of the working staff; implementation of ICT	2	2	3	-	-	7

Definition	Maritime Ports	Road BCPs	Rail BCPs	IWW Ports	Logistic Facility	Total
solutions to solve Operational and Administrative problems						
Deployment or upgrade of telematic applications for traffic management to the EU standards	1	-	2	-	-	3
Provision of basic utilities (internet, drinkable water, toilettes, etc…)	-	-	-	1	-	1
Purchase and installation of equipment for the improvement of the process efficiency and effectiveness at BCPs and transport nodes	5	2	-	2	2	11
Infrastructure improvement or expansion of the road and rail last-mile connections within and outside the node areas	18	-	-	-	5	23
New construction or modernisation of existing infrastructure aiming to remove physical and technical barriers or to increase the actual capacity	30	9	2	7	3	51
Realisation of alternative clean fuels supply facilities	2	-	-	-	-	2
Total	**108**	**27**	**9**	**10**	**15**	**169**

Source: D.T1.2.4 based on D.T.1.2.3

It is evident how the lacks in infrastructure, equipment and geomorphological conditions were not taken in consideration while implementing the ICT tools, but possible solutions and improvements have to be included in the summarized table against the detected obstacles, in order to propose the whole picture of the situation and at the same time highlight how the ICT tools with their upgrades cannot be an overall solution, if also other interventions are missing at national and transnational level.

The measures adopted in this sense are listed in the table below, which resulted also from the researches and data collection made for the T1.2.3:

Table 3: Measures/ Solutions adopted in the WPT1 Action Plan for improvement of multimodal transport

Definition	Maritime Ports	Road BCPs	Rail BCPs	IWW Ports	Logistic Facility	Total
Improvement/upgrade of the existing ICT infrastructure to foster transport digitalisation, the interoperability of communication and data sharing systems	49	20	1	-	17	87
Hiring of additional/specialised personnel and provision of training courses to increase the quality of the working staff; implementation of ICT solutions to solve Operational and Administrative problems	-	8	1	-	3	12
Deployment or upgrade of telematic applications for traffic management to the EU standards	-	-	-	-	-	-
Provision of basic utilities (internet, drinkable water, toilettes, etc…)	-	9	7	-	-	16
Purchase and installation of equipment for the improvement of the process efficiency and effectiveness at BCPs and transport nodes	1	49	11	-	2	63
Infrastructure improvement or expansion of the road and rail last-mile connections within and outside the node areas	-	-	-	-	-	-
New construction or modernisation of existing infrastructure aiming to remove physical and technical barriers or to increase the actual capacity	-	-	-	-	-	-
Realisation of alternative clean fuels supply facilities	-	-	-	-	-	-

Total	50	86	20	0	22	178

Source: D.T1.2.4

2.5. ICT tools deployment

In this paragraph are indicated all the concrete improvements and deployments obtained through the use of the ICT tools foreseen and developed through the ADRIPASS project. In this paragraph, depending on the local context and proposed ICT tools, the specific actions and solutions are actually implemented and tested in the specific use cases.

What has been reported during project activities' implementation and at the end of the development of ICT tools, is represented in the following paragraphs in which the solutions, procedures and steps are described for each pilot:

Port of Koper: the Port of Koper has initially prepared an analysis of existing IT equipment in the port and worked on the development of ICT tools for the upgrade of operative systems and for the streamlining of the administrative procedures at gates and at the terminals, mainly to serve the container and the car terminal, which are increasing the volumes more than other terminals.

In the specific, the intention was to develop part of the EDIFACT CENTRE 2, for which implementation was completed in October 2019. Containerization around the world increased the percentage of goods transported in containers. The impact of this was also felt by Luka Koper, which in the last 5 years increased the number of transshipped TEUs by 65%. Increased number of basic operations requires a growing standardization of business processes and an unambiguous delimitation of the responsibilities of individual stakeholders. The logistics chain itself is based on a fast and accurate data exchange, which enables the company to manage operational processes more efficiently, which consequently means faster transit of goods through the port area.

Going into details, the development has focused on the VBS service for the automatization of the vehicle booking processes at gates. After this first intervention, the focus was on car terminal and on container terminal where has been developed / upgraded respectively the ACAR hybrid system for the registration of cars transported by truck through gates in the port. The second intervention was vaster and included the upgrade of the whole port's system. There were implemented some functionalities included in the EDIFACT CENTER 2 developed for the port and these upgrades touched the following systems:

- **TINO** - Marketing and Operations - which includes an entry point for communication with customers and SDIS modules - warehousing, NPID - ordering and planning of work and invoicing. It is the key operating system of Luka Koper d.d., linked with the EDIFACT International standard;
- **DEPO** - an entry point module for the container terminal that enables direct communication of shipowners with TOS - Terminal operating system - at the

Container Terminal using the EDIFACT international standard. The system is connected both to the TINO system and to the TOS system Tideworks,

- **TOS Tideworks**, a specialized container terminal management system that is connected both to the TINO system and to the EDIFACT Center system.

Improvements detected from the beginning of the action were: more detailed technical specification for the upgrade of the PCS and its integration with ACAR and VBS, when the systems became operative. The ACAR system entered in production and works.

Next steps foreseen are the integration of the ACAR system with the opening of new gate in Sermin and Bertoki at the end of 2020.

We can find of course a link between the described activity and the needs at regional level, because with these upgrades, the PCS will allow quicker detection of vehicles and goods transported, with digitalization of procedures, which will reduce administrative timeframes per vehicle both at the gates and at terminals (car terminal and container terminal). It will also meet some of the demands of the stakeholders working with Luka Koper on a daily basis and of course also some national entities like Customs Administration and other inspection entities, considering that the operations are being performed in the port as a free zone. Upgrades include also the part of the system dedicated to customs, the part of the system dedicated to the weighing of vehicles, etc.

In addition, at a higher level and after the end of the project, the solutions will be comparable for further implementations at regional level for other users, and of course, will have the possibility to be integrated with other equipment like cameras and detectors at the main gate or at the terminal gates, which will allow better control on goods transport as well as at security level, for a double check before the goods enter/leave the port's area.

Port Authority of Ploče: The Port has developed for its pilot actions within the ADRIPASS project an upgrade of the PCS system within port area for streamlining freight flows by improving communication with port supply chain stakeholders.

In Ploče it was detected a need for message exchange in order to have quality information so that processes in logistic chain run smoothly. The final objective was to improve competitiveness of the port through smooth and quick movement of the cargo and the view was to upgrade the PCS technology with aim to develop central control management system based on single window concept, being able to share and capture data to better analyse its flows in the Port's area.

In parallel, intention was also to integrate with other system so that data can be collected automatically from them. There were aligned all the data integrating different systems for: ship arrival and departure, coverage by National Maritime system, Liquid bulk cargo system, General and dry bulk cargo system, Containers handling, Railway operators' system, Customs and Gate in/out procedures.

The prerequisites for such an implementation were: the Sync with development of National PCS & Integration with National CIMIS (Croatian Integrated Maritime IS), Integration with TOS which in turn included the upgrade of CORE + Truck announcement, the ship announcement, integration with National Maritime System, Customs, Liquid Cargo terminal, General + Dry Bulk cargo terminal, the Railway operators and Operational Business Intelligence (BI) including the operations with vehicles entering/leaving the port (to be adopted at gates).

From the beginning of the action the improvements detected concerned administrative procedures and operational internal project management plans.

Port of Bar: the working team in the port of Bar has prepared a detailed analysis of the current status and operations in PCS, analysis of previous demand by stakeholders (forwarders, agents, customs etc.), analysis about the connection between customs documents and port's PCS, LUBARIS (Port of Bar IT system) & PCS, analysis of possible upgrades in accordance with the available budget. It leaded to a standardization of protocols for exchange, as well as the exchange of information among members of port community and centralized all available information. The stakeholders were introduced to PCS development related to optimization of the connection between the Port and the Customs Administration, with special attention to improvement of the system for data processing.

The specific pilot activities contributed to the development of the following upgrades of the PCS:

- "*Control centre*" was upgraded (statistics, dashboards, etc.): this part of the PCS is dedicated to the statistics (report, dashboards, etc.) for the users of the PCS. This is in line with one of the objectives of the pilot project (to improve the planning capacities of transport stakeholders and policy makers). The statistics is related to the ships and cargo data;
- "*Customs module*": it was upgraded considering that one of the main stakeholders of the port are the Customs and this upgrade is in line with previous requests by Customs officers in terms of better use of the PCS by the stakeholders for which implementation was made in accordance with current legislation;
- "*Truck module*": it was upgraded taking in account that the truck transport is very important in the port in addition to the need to fulfil security demands (in particular ISPS code). In this upgrade, PCS collects data for the truck transport (truck parking and main gate) in the port and integrates it with other parts of the PCS;
- *"Mobile solution/ application"*: is an upgrade that allows users of the PCS to enter/ see/ analyse some of the available data on mobile phones/ tablets. As new

technologies are available, new mobile solution improves usage of PCS by transport stakeholders and policy makers in Montenegro;

- "User interface upgrade" (better GUI, user friendly): considering that the PCS was developed in 2014 and up to now end users' requests were collected for the future upgrades, this solution is dedicated to the users' requests and will support them in their usage of the PCS.

In addition, working team had several meetings with the operational department and with the main stakeholder - Customs Administration. All these meetings were necessary to improve and precise definitions of the upgrades and to meet stakeholders demand. The pilot has passed through activities related to the "User interface upgrade (better GUI, user friendly)". The "print screens" of the actions are indicated here below:

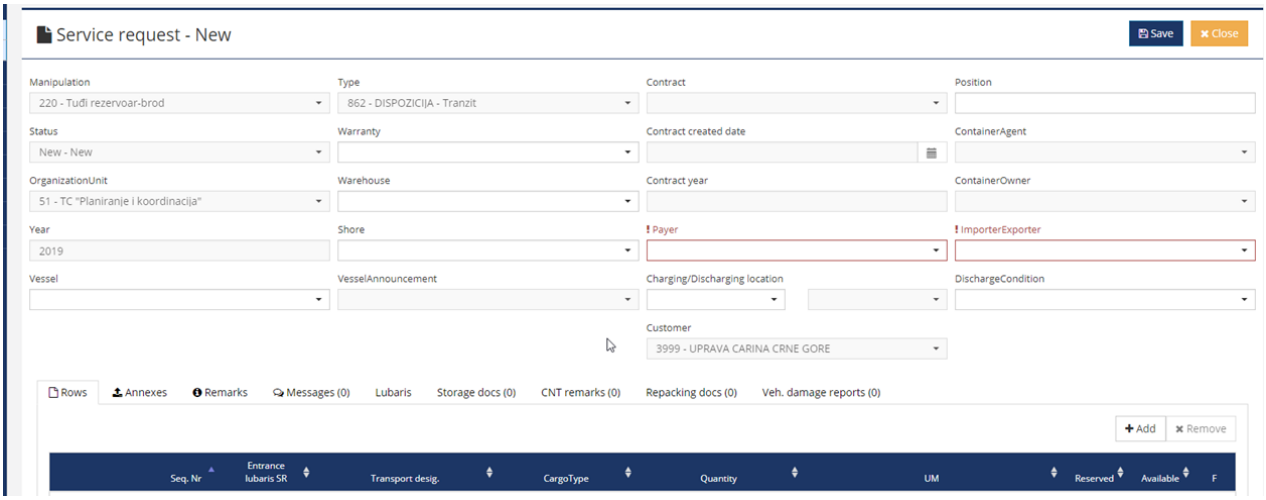


Figure 5: view of new Bar's system interface

Source: Bar port

Improvements detected from the beginning of the action are the improvement of main functionalities, better workflow, more intuitive user-interface and database structure for the Truck module. As said, the main innovations are linked with:

- Mobile solution/application
- "Control center" (statistics, dashboards, etc.) upgrade
- "Truck module" upgrade (2. part)

With these upgrades, PCS meets some of the demands of the national authorities (in particular Customs Administration of Montenegro) regarding operations in the port as a free zone. In addition, potential integration with cameras at the main gate (additional benefit of PCS upgrade) will allow better fulfilment of the International Ship and Port Facility Security Code (ISPS) regulations in Port of Bar (Port of Bar will invest in new equipment – new ramps, PLC cameras, to meet PCS software requirements).

What is relevant for ADRIPASS project's purposes is that the results of all meetings and correspondence with the Ministry of transport and maritime affairs of Montenegro resulted in the PCS development being included in the Development Strategy of Maritime Economy for 2020-2030 period. In order to facilitate maritime transport and to reduce administrative costs, it is necessary to simplify, and update formalities related to announcements and calls of ships, cargo declarations, i.e. allowing free traffic in Montenegrin ports by implementing Maritime Single Window (MNSW), by which Montenegro would align the concerned procedures with the relevant EU Directive 2010/65/EU, which is the recommendation made by the European Commission.

In the future, PCS may represent a basis for development of Single Window, depending on the results of a study related to the implementation of "MNSW". It should be noted that Montenegro, by using pre-accession assistance of the EU, in the second phase of IPA II, has already defined the resources for implementation of "MNSW" project which includes primarily drafting a study, and then implementation of the system.

The port of Bar will be a lead partner for the project EFINTIS - Enhancing eFficiency of the INTermodal transport flows by Improved ICT Systems (The Interreg IPA CBC Italy-Albania-Montenegro Programme). The Port of Durres (AL), Institute of Transport (AL), Southern Adriatic Sea Port Authority (ITA) and AAST (ITA) will be a PP. In this project the port of Bar will continue with PCS upgrades and Port of Durres will establish PCS in Durres in accordance with ADRIPASS study results.

Regional Unit of Thesprotia (RUTH) in the port of Igoumenitsa (OLIG): The pilot action consists of 2 sub-actions. The major sub-action is the design, development and operation of a Platform for PCS flows analysis and forecast, while an additional sub-action refers to the development of Augmented Reality (AR) virtual navigation mobile application for vehicle drivers.

1. Platform for PCS flows analysis

OLIG already operates a PCS, providing useful information for passengers, vehicles, freights and ships. Therefore, the pilot application that is being implemented through ADRIPASS project is a web-based platform operated by RUTH, for PCS flows analysis, which by getting input from the current system, processes appropriate information through data analysis, performance management and Business Intelligence (BI) tools in order to provide RUTH and OLIG various type of useful information about the transport load presented through charts and dashboards in a comprehensive and user friendly way.

Furthermore, road data traffic on Egnatia Motorway within the Regional Unit area are included in the platform. The system provides information of sea transport flows from 2006, while road transport data are available for the past 5 years.

Both data information is presented on a monthly basis. Moreover, the system is accessible from other transport stakeholders and public authorities as well, with limited however

user permissions, providing them with a customized level of information adjusted and based on their needs.

The platform uses various tools such as digital boards, offering adequate information about current and previous performance of the transport flow. Such tool may host and visually include high volume data in order users be able to compare actual performance in terms of goals, standards and previous performance.

In addition, business intelligence (BI) tools provide the users (RUTH/ OLIG) extend data giving the opportunity for more efficient decision making on transportation issues, which in turn will improve their operational effectiveness. In addition, the business intelligence tool facilitates scenario planning on forecasts of transport flows.

This analysis of PCS data concerning the above flows is an important activity both for OLIG and RUTH. Obviously, for the Port, gathering and presenting in a comprehensive way all data concerning flows of passengers, vehicles, freights and ships will act as a business intelligence tool for the improvement of its administrative and operational purposes.

Nevertheless, the importance is significant for RUTH as well, on the grounds that the organisation will improve the planning capacities in the field of transportation taking into account the strategic position of Igoumenitsa in the West Balkans. It will also help RUTH to provide data to several transport stakeholders facilitating the design and implementation of medium/long term transportation strategies for the area, in collaboration with other transport organizations.

The platform for PCS flows analysis is available on the website:

https://adripass.indigital.gr/

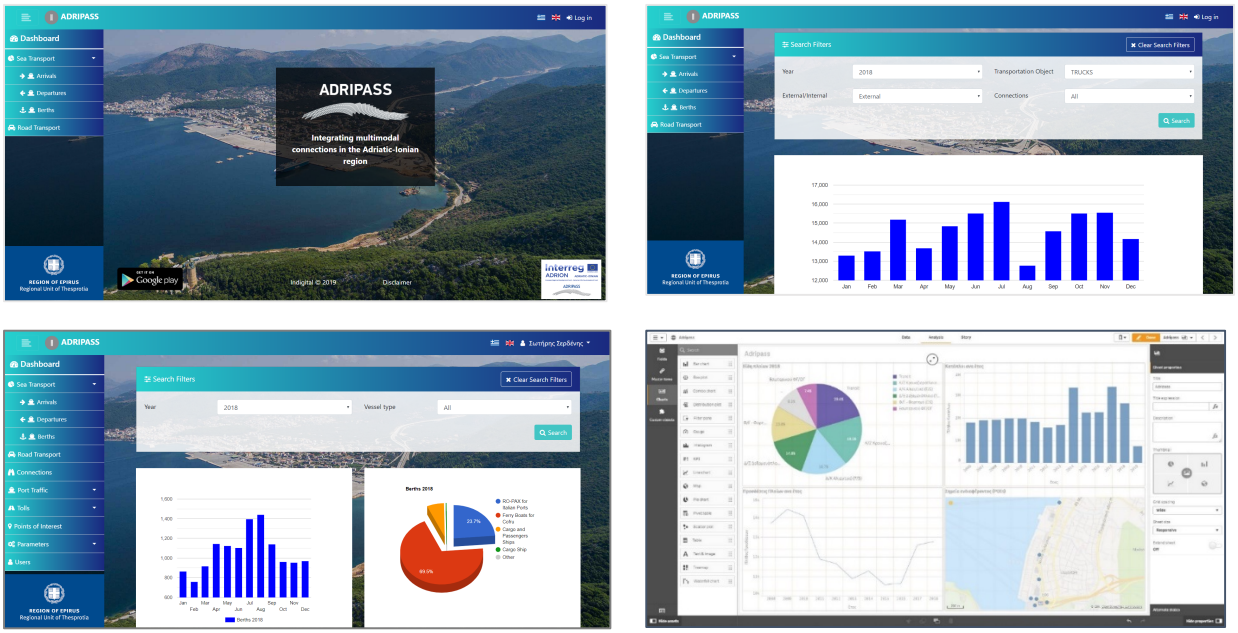


Figure 6: RUTH platform for PCS flows analysis

Source: https://adripass.indigital.gr/

2. AR virtual navigation mobile app

The second sub-action is addressed mainly to vehicle drivers (trucks, TIR trucks, buses, cars) which by using Augmented Reality (AR) tools is designed to serve as a virtual tour mobile application (available on Android and iOS) in order to provide drivers with useful information about the route that has to be followed from the arrival to the Port from Egnatia Motorway up to the boarding and backwards. The mobile app presents useful information about the location of critical points within the port area i.e. terminals, control check points, tickets/ security cards, as well as the relevant documentation needed at each critical point. Through the mobile app the vehicle driver approaching the Port of Igoumenitsa has the opportunity to receive navigation information by means of AR tools.

In addition, the mobile app provides key statistical data of the PCS flows platform (sea and road transport flows) in the Regional Unit of Thesprotia area.

The AR mobile app is available on:

Google Play: https://play.google.com/store/apps/details?id=com.indigital.adripass

App Store: https://apps.apple.com/app/id1477491530

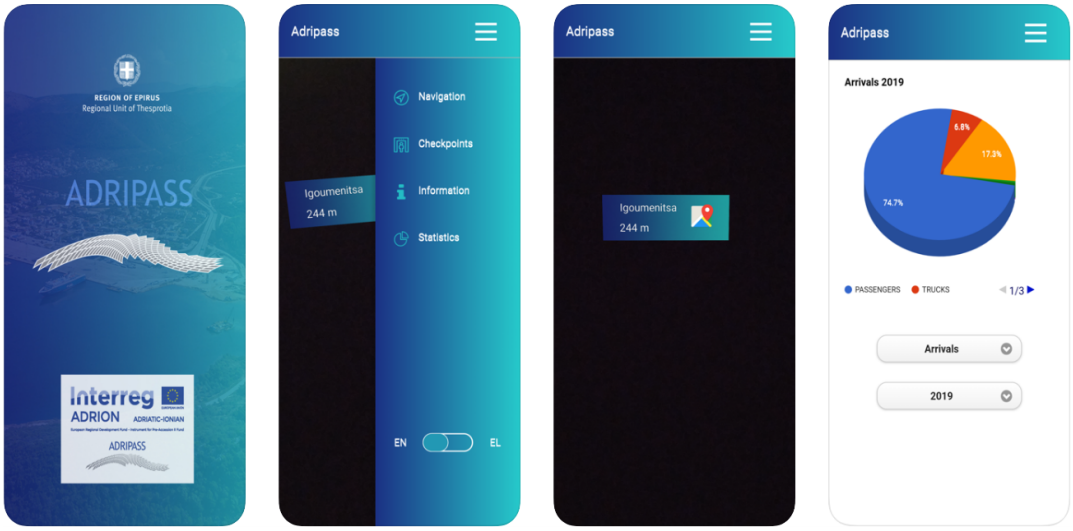


Figure 7: RUTH AR navigation app

Source: https://play.google.com/store/apps/details?id=com.indigital.adripass & https://apps.apple.com/app/id1477491530

Durres Port Authority (APD): In the studies planned for Durres, in which no specific pilot action is foreseen, the actual implementation is expected to be carried out in next years, when the developer of the PCS will be found through a tender procedure which will allow the definition of detailed characteristics of the port's system that the authority is going to choose. As mentioned before, APD does not have a PCS system. Under the T2 work package of the ADRIPASS project, APD has carried out a study that will serve as a basis for the implementation of a PCS system in the future. The main purpose of the study is to analyze the needs within the port community, obstacles and bureaucracies in the exchange of information and to offer (propose) solutions through PCS systems. As already mentioned, private and state actors within the port community communicate in traditional ways, thus losing the opportunity to be informed in real time about the port activity, creating delays or obstacles to the realization of procedures, being centralized within relevant institutions (companies, agencies) and by lost cooperation with each other. These and other reasons also bring down efficiency (quality and time) in delivering services. The workgroup has worked on drafting the specifications that should contain the study for the creation of a neutral and open PCS for the entire port community, the main purpose of which will be the safe and intelligible exchange of information in order to improve the competitive position of the port in front of other ports.

2.6. Risks and issues management - Leasons learnt

2.6.1. Potential exceptions and problems

The potential solutions initially detected and lately found for specific situations at local level, have also specific risks linked with the obstacles and lacks detected in previous

paragraphs. What has been found at local level is that the solutions are originally very ad-hoc made. The risks and issues identified are summarized in the following table.

Risk description	Probability	Impact	Mitigation plan and appropriate corrective measures
Upgrade of the system may cause operative delays due to the fact that every news must be absorbed by the users and properly elaborated for the correct use of the tools	Medium	Low	Planned works will be followed by the same staff which will absorb the knowledge and will share it with others after the adaptation period
Dilatation of times related to the introduction of new functionalities and acceptance from all the parties involved	Medium	Low	Operative activities are always followed by action plans foreseeing the congestion at IT level so paperless solutions can be substituted by papers in case the system needs more time for the correct working
Adoption of new Regulative not in line with the development ongoing through the ADRIPASS project	Low	Medium	In case the developments on-going will require new adaptations to potential national systems, the further upgrades will be necessary, and it will be done in accordance to the national legislation and the EU regulative
Users' not friendly tools	Low	Low	All the users were informed about the innovations but some of them could be not in favor of changes. It is going to be covered by solutions adopted on the ground (for example with the adoption of manuals or dedicated staff at gates for the registration of vehicles or drivers)

Risk description	Probability	Impact	Mitigation plan and appropriate corrective measures
Technology needed to use the tools is not provided by all users	Low	Low	Some users can be found without the necessary instruments for the correct use of tools. Apps for smartphones are available and can be introduced to the new users on the ground. In alternative to this solution, responsible stakeholders can be advised about possible issues and they can be contacted to solve issues related to the proper equipment to be used by guests

Basically, there are no other particular risks to be faced by users of the new tools. Actual developments were made in line with existing regulative and the adoption of the technologies has been communicated in advance to the operators so that each one was prepared on the new systems. What has been learnt through the development process is that each user could have his/her exigencies so that it can represent a problem while the final version of the tools is going in production.

2.7. Development of ICT tools at regional level

One of the ADRIPASS final goals is to promote the development of ICT tools at ADRION level in order to improve transport links between ports and hinterland logistic centres, as well as multimodality in the region. Results should be transferred from locally developed scenarios, for specific ports, to national levels first and ADRION level in the last phase.

The process to be followed for the enlargement of the tools developed initially at local level also at regional level, foresees the adoption of similar or compatible solutions that would be linked between them allowing the interchange of data for all the actors involved in the logistic process.

2.7.1. Change process flow

The processes flow diagram of the steps to be followed is estimated at regional level through the solutions introduced from the pilot results.

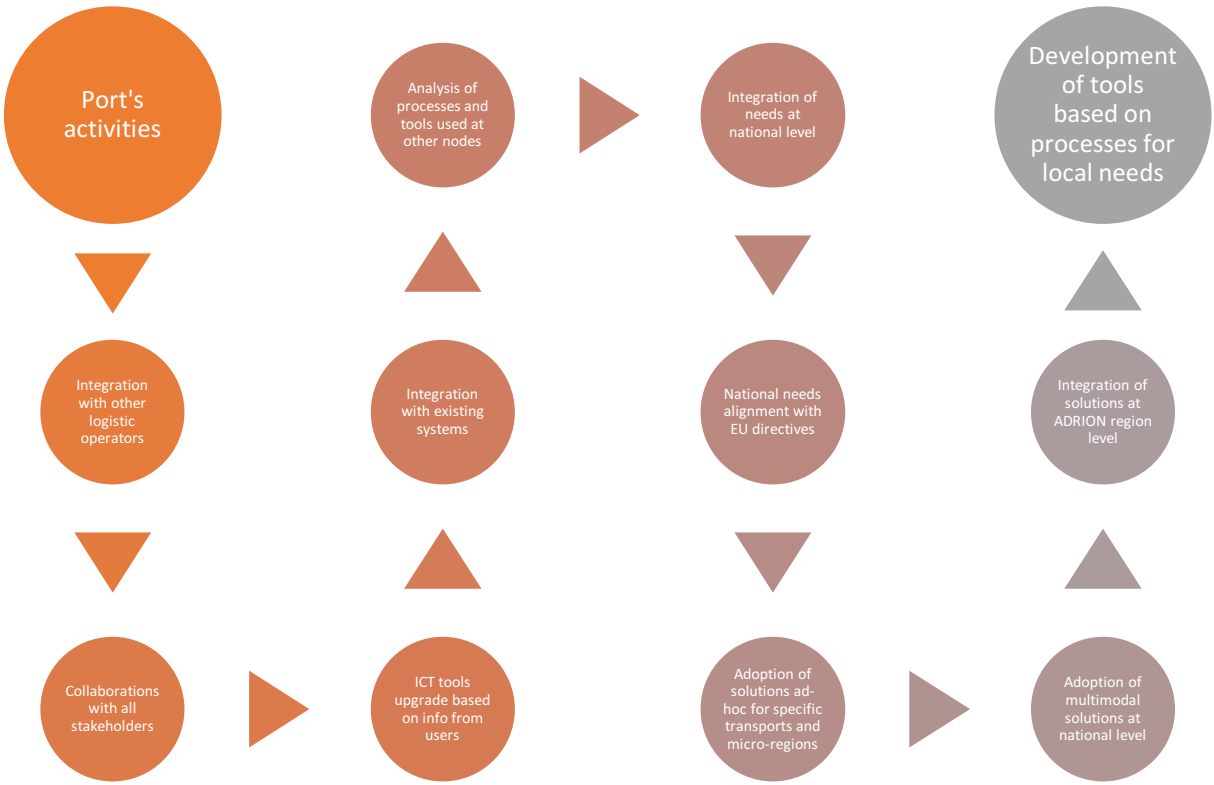


Figure 8: processes flow diagram for the introduction of pilots' solutions

Source: Luka Koper, d.d. own elaboration

Going into detail, as mentioned in previous paragraphs, the ADRIPASS project supported pilot activities, which were followed in the maritime ports in Koper, Ploče, Bar and Igoumenitsa. The solutions found at local level were provided for the ICT systems, facing the constraints that are affecting the areas, focusing the activities at specific terminals where the growth in terms of volumes is more pronounced.

Even if in Koper the focus was on cars and containers, in Igoumenitsa more on trucks and RO-RO terminal and in Bar or Ploče the focus was on the PCS platforms, the common denominator was the necessity to digitalize the data flows and share the info just-in-time, leaving the information available to all the actors of the logistic chain, also for later usage.

Going back to the necessity of a development of solutions at a larger scale in the ADRION region, the steps to be followed should be those represented in the Figure 8, where the development process starts from the pilots in ports and ends with the integration of single solutions to the ADRION level:

1. Pilot activities in ports for the development of single ICT tools;

2. Integration of the solutions with other local logistic operators;
3. Collaboration with other local stakeholders in order to collect useful information about lacks and deficiencies of the new ICT solution;
4. ICT tools upgrade after feedbacks from users;
5. Integration of ICT tools with the existing systems at local level;
6. Analyses of processes and tools used out of the local area, at other nodes;
7. Integration of ICT needs at national level;
8. National needs alignment with EU directives and tools;
9. Adoption of solutions ad-hoc for specific transports to be tested at micro-region level, through different countries;
10. Adoption of multimodal solutions at national level;
11. Integration of new solutions at ADRION regional level, with testing period;
12. Development of tools' final versions based on the processes linked at local level, but adopted at regional level.

The last three steps of the above diagram are meant to be taken after the end of the ADRIPASS project, in line with the national development plans and with EU Directives in terms of systems to be adopted and documentation to be shared in the logistics, depending on the countries that are crossed by the freight.

2.8. Assessment design

The main goal of the project was to adopt some measures in favor of the multimodal transport and of the link between logistic nodes and their hinterland. The assessment of proposed action plans is expected to be carried out to improve port's connection with the hinterland and development of multimodality. The assessment design should address solutions and consultations regarding the selection of ICT tools to be adopted at ADRION regional level, including: type of stakeholder involvement, selection of indicators, data collection requirements and the elaboration of the financial consequences with eventual socio-economic and environmental impact assessment, which should lead to the preparation of a SWOT analysis.

The solutions provided at project level were tested in limited areas and for specific types of transports. The introduction of new tools for users requires more time to be implemented at regional or national level because all the solutions must be tested through a certain period and they must show the related lacks during a certain period. What can be useful is the planning of possible scenarios and the foreseen issues and mitigation activities in order to reduce the loss of time while facing potential problems.

At national level there are Single Window systems developed in line with EU regulative framework, when this has been transposed in the national framework, which means that at local level it's good to plan implementations in line with the higher Directives in EU, which will allow the users to maintain a constant tool through the years and in line with the developments made also in other countries that are following the EU laws. The problems may appear while the multimodal transports are performed through countries that are yet non-EU countries. The process for the change of their methodology and the adoption of new tools may require more efforts, due to the fact that this negotiation process for the harmonization of the protocols must fit EU's legislation. It can represent a temporary constraint which must be considered for such a development at regional level.

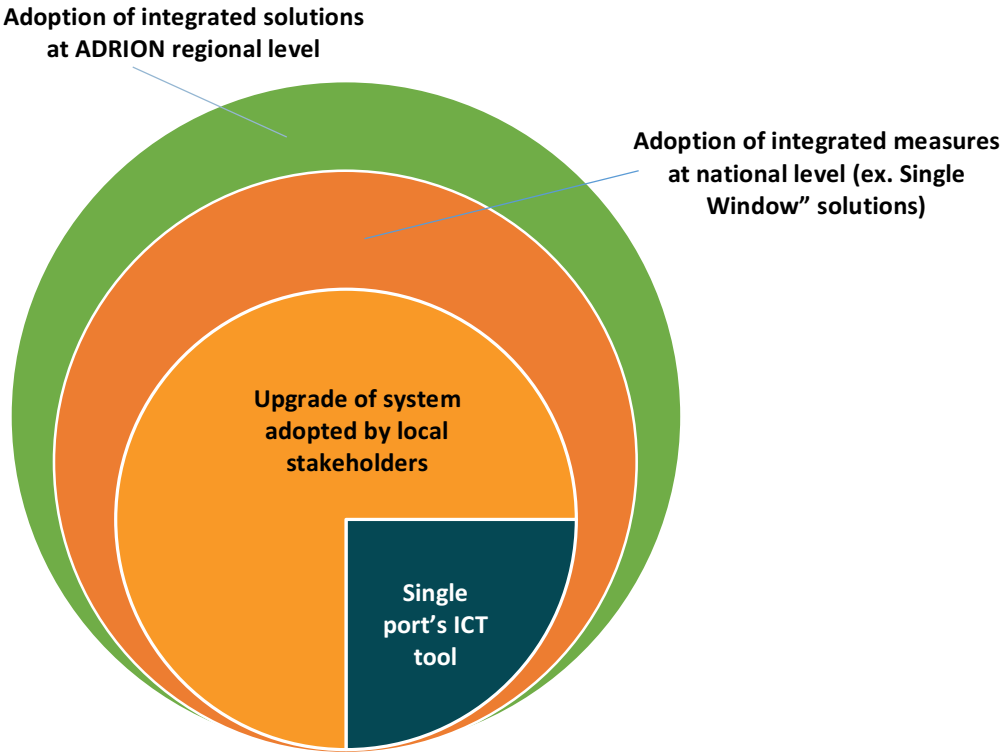


Figure 5: Widespread of tested solutions through the next decade

Source: Luka Koper, d.d. own elaboration

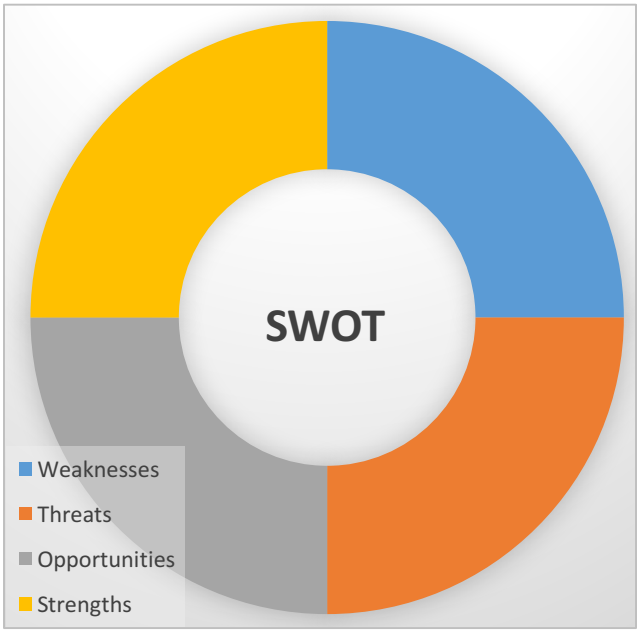
Following the scheme/figure presented above, the details about the opportunity to enlarge the action area of the pilot activities to other realities in the ADRION region, are synthesized in the below SWOT analysis. It serves as a summary of the themes treated in the current document, following the indications, suggestions, results and analysis produced in parallel for T1.2.3, T1.2.4 and T2.1.3.

STRENGTHS

- High rate of digitalization
- Time saving
- Accuracy
- Ad-hoc solutions
- Alignment between countries

OPPORTUNITIES

- Time saves on operational processes
- Improvement of data accuracy
- Immediate overview of the status of the freight
- Constant database for analytics



WEAKNESSES

- Diversification of areas to be improved
- Lower level of cash flow when comparing the situation in Northern Europe and in Western Mediterranean
- Gap in capabilities
- Lack of experience

THREATS

- Economy movements
- Geomorphological obstacles
- Market demand fluctuation
- Competitors in Northern Europe and in Western Mediterranean

Figure 6: SWOT analysis of the situation

Source: Luka Koper, d.d. own elaboration

2.9. Long term potential effects of the ADRIPASS ICT Action plan

The current Action Plan, developed based on the concrete activities implemented in the framework of the ADRIPASS project, aims at identifying clear steps for supporting the long-term impacts of ICT applications in ADRION even beyond the project closure.

Nevertheless, the action plan's concrete implementation and monitoring depends on the uptake of the ADRIPASS results and recommendations not only by the partners (project partners and associated partners) and the project's cooperation network, but also by the EU, the national ministries of transport from the ADRION region and by the **Transport Community Treaty (TCT)**[2].

In particular, considering the key role played by the TCT regarding the governance of the transport policies in the WB6 area, an active involvement of this organization in the process of monitoring and implementing the ADRIPASS action plan would be recommendable. TCT could benefit from the solutions adopted in ADRIPASS to see the replicability of the obtained results in the wider area of WB6 (out of the local areas where the ADRIPASS piloting activities were implemented).

[2] The TCT is an international organization composed of the EU and the Western Balkans 6, and its role is among others to support the implementation of the Western Balkans Six (WB6) Connectivity Agenda aiming to improve links within the Western Balkans as well as between the EU and the region.

Additionally, as regards the potential contribution of the ADRIPASS ICT action plan to the development of the ADRION region, a strong synergy with the EUSAIR Strategy, Pillar 2 “connecting the region” is recommended. The roadmap included in the ADRIPASS action plan could support synergic and strategic measures promoted by the EUSAIR Pillar 2 coordinators.

Moreover, being the ADRIPASS project already linked with other Interreg ADRION projects which treat ICT tools development, experiences exchanged during ports’ visits or data collected can be useful for the implementation of the Plan after the end of the project.

The activities to support the Action Plan’s follow-up could be the following:

- to define targeted ports, inland ports or hubs for which proposed ICT tools can be a crucial solution and which can represent a good testing point for further implementations out of the local level;
- to keep an up to date view of the EU Directives and Regulative which can guide the policy makers through the national evaluation of plans and laws;
- to define monitoring parameters and indicators, for micro-areas to be enlarged after the end of the project;
- to involve stakeholders for the collection of data from different sources and for constant upgrade of possible solutions to be adopted at local level, in order to speed up processes and operational activities, in line with the exigencies of the period (in nowadays world, types of goods and volumes can change from one year to the next). Technologies are being developed and new ones are being discovered every day, so the processes and the supporting tools should be monitored and upgraded in line with the expected flows;
- to support the subscription of agreements, Memorandums of Understanding or international protocols among the ADRION countries, as well as at EU level, for the promotion of multimodality and reduction of lacks and constraints on the TEN-T transport routes linking the ADRION region with the rest of the continent;
- to obtain periodical data and in case it’s necessary, to elaborate analyses and reports for future periodical assessments and disseminations.

The result of such a monitoring activity could be the development of a network of logistic operators working on platforms, using tools and adopting measures which will be common in the ADRION region and will allow the alignment of procedures, data exchange and documentation provided, in order to speed up operational procedures, to reduce transit times, to upgrade systems, to allow data exchange at intermodal level and to allow the logicians to dispose of the information necessary for the successful transport and delivery of goods.