**Perspectives** and recommendations for the competitiveness of Mediterranean ports

Outcomes of the FUTUREMED strategic project of the EU MED Programme (2007-2013)



Projet cofinancé par le Fonds Européen de Développement Régional (FEDER) Project cofinanced by the European Region Development Fund (ERDF)





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# Foreword

The present publication collects some of the results of a three year cooperation project co-funded by the European Commission under the MED Programme (2007-2013) named FUTUREMED, acronym of "Freight and passengers sUpporting infomobiliTy systems for a sUstainable impRovEment of the competitiveness of port-hinterland systems of the MED area".

FUTUREMED focused on improving the competitiveness of port systems in the MED area by enhancing accessibility through technology and procedural innovations, and guaranteeing sustainable transport.

Sixteen partners from six European Countries - Italy, France, Spain, Greece, Slovenia and Cyprus - cooperated to define strategies to remove the current barriers concerning accessibility of ports (seaside and landside). In addition they focused on the integration of ports with the hinterland, on the development of logistics activities and intermodal transport connected with ports, on the development of infomobility aiming at fostering attractiveness and making port systems more efficient and specialised. The project addressed three strategic sectors: freight, passenger and touristic traffics. It pursued sustainable middle- and long-term development strategies by means of concerted territorial actions and pilot projects.

The Lazio Regional Directorate for Urban Planning, Mobility and Waste Management operated as the lead partner of the FUTUREMED project. The overall experience has been positive as the network of partners received, both internally and externally, the cooperation of relevant stakeholders from the private and public sectors, and achieved results in the regional territory.

One of the main results is the FUTUREMED Observatory, formally an EEIG organized to carry on the results of the project in the future to benefit the EU MED area.

FUTUREMED established a solid foundation for innovative actions to improve the competitiveness of MED ports and consequently the economy and livability of the related territories. With this publication, the authors explain strategies that MED ports should consider to define and improve their role in the MED arena.

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You can find more information on the FUTUREMED project at the project's website <u>www.futuremedproject.eu</u>

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# Introduction

The present publication is built on a shared vision of all the authors:

To make the Mediterranean a territory able to match international competition, by further developing its role as an efficient and environmentally sustainable gateway for Europe.

Realising such a vision requires primarily a sound understanding of the competitive advantages and shortcomings of the Mediterranean ports in their current state. Furthermore, it should take into account all the evolutions taking place at a global and European level that are expected to formulate the future challenges of the Mediterranean ports. Such evolutions can come from a variety of areas, including client requirements, industry responses, formulated policies, societal needs, and so forth.

This understanding though, cannot be confined to the actual port area, but should be extended to cover the whole 'Mediterranean port-centric supply chain'. Porthinterland integration is a critical issue for all Mediterranean port systems playing a 'gateway' role towards their hinterland. To enhance it, focus should be placed on identifying competitive intermodal corridors linking ports to the hinterland, streamlining processes along them and ensuring that the already available infrastructure is used to its full capacity.

Technological innovation remains a major facilitator of both port efficiencies and port-hinterland integration. Although considerable steps have been taken, information barriers still exist between the systems of ports and the systems of the other public and private actors.

Moreover, one must not forget that ports have a three-dimensional role to perform in terms of operations: that of a facilitator of freight flows, maritime passenger flows and cruise passenger flows. All three have their specific characteristics and requirements and have to be managed in an integrated way by one entity with very specific resources. Thus, coordination in terms of human, physical and informational assets is a crucial issue.

All of the above issues are being discussed in the following chapters of this publication, by blending the experiences of the authors with the results of the FutureMed project.

The first section sets the current and perspective scene on the role and importance of port - hinterland integration for MED ports. Starting from what is expected in the upcoming future, the main strategies for MED ports to acquire competitive-ness are illustrated.

The second section presents the main challenges for the MED ports from different points of view: customers, competition between ports, value creation, technological innovation, and governance.

The importance of maritime-rail intermodality in the context of corridors is discussed in the third section, while at the same time reporting current experiences of private stakeholders in the field.

The fourth section discusses in - depth the role of Public Private Partnership in the context of port-hinterland integration, also discussed as a mainstream theme in the first section. Examples are reported as for the MED ports.

One of the main strategies understood in FutureMed is the role that Port Community Systems play in increasing the competitiveness of a port. Section five will be discussing the concept, applications, innovations and key drivers.

In the same technological line, section six shows the importance of infomobility to integrate the port with the hinterland, by increasing the accessibility of the port through the improvement of its attractiveness for its users, and especially for passengers.

Section seven deals with the concept of visibility and how this facilitates the implementation of specific policies aimed at developing ports and improving their business. Visibility is realized by new technologies and especially by web-portals. Examples of implementations are provided for supply chain and cruise visibility.

The last section focuses on the cruise sector, which is a very important business area for MED ports, illustrating how information and communication technologies can support its development in a specific region.

We hope that you will find this insightful and useful. But most importantly, we hope that this effort can facilitate a wider consensus on what needs to be done in the coming years to ensure that our ports have a strong contribution to a sustainable growth in the Mediterranean area.

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By Andrea Campagna

# The role of port-hinterland integration, success factors and strategies

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# 1.1 Logistics perspectives in Europe up to 2020

The northern range ports, from Le Havre to Hamburg, are the preferred way in and out of Europe for freight, coming both from Far East and US. The activity in the Mediterranean ports is small in comparison. However the current trends as for world trading patterns and upcoming developing countries is likely to impact also on European logistics practices and infrastructures, including ports.

It is expected an increase of trade between China, India and Europe, due to the growth of such countries and an increasing market share. This will be affecting the Europe's southern ports, since additional traffic will be characterized by supply chains requiring lower costs and higher environmental performances. The Suez Canal will be a preferred choice, confirmed by the fact that it is being enlarged to accommodate double the current traffic.

If we consider also the increasing economic and manufacturing growth in Eastern Europe and their integration into global supply chains, the issue of accessibility to these regions will be fundamental and consequently the need for performing infrastructures and ports.

As for consuming spending, Poland, Czech Republic and Romania are expected to report increases above that of much larger Western European economies. Consequently, the need for these regions to receive direct goods will be increasing, along with more scalable and cost efficient supply chains and the related logistics market.

Overall, the largest growth in manufacturing activity in Europe will be in Germany and Poland, whose economies will remain entwined. Manufacturing growth in the Czech Republic and Romania will be ahead of forecast increases in Austria, France, Spain and Sweden, further signifying the shift of manufacturing east.

Sitting as it does on the "silk road" between Europe and Asia, Turkey is set to play a key role in facilitating trade between the two continents and helping that trade to be cost effective and environmentally friendly. In the first instance the development of large "hub" ports, with deep-water facilities, at Izmir and Mersin, will enable the largest container ships (10,000+ TEU) to dock and their goods transshipped via smaller vessels to key entry points such as the North Adriatic ports of Koper and Trieste, for example, or even the Black Sea ports.

The development of larger ports in the North Adriatic and on the Black Sea, and the improvement of their links with the rest of Europe, will be key in making the argument against ships sailing past Gibraltar towards the main northern ports.

#### The role of port-hinterland integration, success factors and strategies

Additionally, Turkey's rail links to the Middle East, Iran and Pakistan will allow goods to pass into Europe through both the Istanbul rail connection and the Black Sea ports. The rail routes also intersect key European rail and road corridors in Budapest, Ljubljana, Salzburg and Vienna, allowing access to markets in Central and Eastern Europe.

Significant investment is continuing in Turkey's internal rail network, with the 2023 development plan including an additional 14,336 km of extra track, of which 10,000 km allows for high speed rail. This will support the growth of overland links between Europe and the Middle East.

The large increases in the scale of consumption and production in Eastern Europe that we expect to see in the next decade and beyond, will begin to exert increasing pressure on supply chains. Logistics activity around the major ports, such as Hamburg, will gradually become less optimal compared to options such as shipping straight to Gdañsk or using transhipment hubs in the Eastern Mediterranean to feed the ports in the North Adriatic.

Capacity expansion plans of these 'emerging' ports alongside a concurrent improvement in road and rail links will further advance their deployment as growing logistics centres, provided that planned investments are seen through.

The proposed future expansion of the North Adriatic (NAPA) ports will increase container capacity to some six million TEU by 2020, helping to drive goods through this location into Europe. Improving rail links will help to drive freight between the NAPA ports and Europe.

However, there are constraints to rail capacity, so the continual development of future rail corridors will be key. Equally, developing road links from this location, especially those linking the area to Poland, will be vital. Improved transport links running from the north Adriatic to Upper Silesia, central Poland and Gdañsk will also prove key in bringing the Baltic States into play.

As depicted in Figure 1, in 2020 a development in the East is expected of the European logistics network, consequent to the growths in eastern countries and to the development in the transport network. New distribution hubs will exist in 2020, requiring direct links to the major trade flows coming from Asia. Med ports can play a role in this scenario, specifically Turkish ports, but also Greek and NAPA ports. The condition for them is to improve transport connections to guarantee better and more reliable transit times in comparison with the northern range ports.

For the reasons above, it is worth to investigate the other issues affecting the role of MED ports and the strategic importance of the development of the hinterland.

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Figure 1.1 - European logistics network in 2020. Source: Colliers International 2012.

# 1.2 Supply chains and ports

Global supply chains are directly affecting the role of ports. These chains link strongly dispersed production and sourcing sites to more geographically concentrated consumption regions. What matters most from the point of view of shippers and customers is the performance of the supply chain in terms of price, service quality and reliability.

This focus on the chain as a whole is reflected in the efforts of the players in various segments to consolidate, vertically integrate or otherwise enter into long-term contracts, in order to drive costs down but also to increase the level of coordination and synchronization. Such concentration and restructuring carries the risk of generating excessive market power for some of the actors in the chain. It has also increased volatility, meaning that small deviations from expected or planned processes have large consequences for system performance. Volatility increases uncertainty and induces logistics providers to build in redundancy by using more than one of a set of routing options, so as to mitigate route risk. This trend further weakens the shipper or customer's reliance on a specific port.

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Shipping lines vertically integrate, in some cases working towards "extended gates" where shipping lines take control of inland transport and inland terminals and depots. At the level of port terminal operations, some terminal operators have extended vertically in the direction of "terminal operator haulage". The emerging picture is that of market dominance by a handful of large players at each segment of the supply chain, combined with fringe firms specialising in profitable niche markets.

Despite the small number of players, competition in and for the market (within and between ports) is strong, and may be strong enough to alleviate concerns about market power in the supply chain in many circumstances. The market power of integrated, global transport and logistics companies is a concern for ports themselves. Finally, the geographical concentration of flows is increasing as well. For example, the North-South imbalance among ports in Europe is growing bigger, and this is largely because of the more favourable hinterland transport conditions in the North.

It is noteworthy that many actors along the supply chain are involved in attempts to vertically integrate, but that ports as such, have not strongly engaged in this trend. This weakens the ports' market bargaining power. As a consequence, gateway ports have in many cases become a replaceable element of the chain, with relatively little bargaining power. A port that provides service of a given quality at the lowest price does not necessarily gain market share, as other factors – that are not under the port's control – also affect port choice. The focus then shifts from port performance to the supply chain performance. Among other factors, hinterland transport costs have become relatively important, as the cost per kilogram per km on the hinterland is 5 to 30 times as high (depending on the hinterland transport mode) as



the maritime shipping cost. Routing choices, and to some extent port choices, are strongly dependent on hinterland transport conditions and reliability of the total route has become increasingly important to those in the supply chain making the routing decisions.

This is not to say that port price and "internal performance" are irrelevant. In addition, , efforts to improve the reliability of port services can have a substantial payoff and, consequently, reduce the incentives for shipping lines to acquire dedicated terminal capacity.

Ports can increase their attractiveness by exploiting complementarities with other parts of the supply chain, for example through closer ties with inland distribution centres, as well as by making efficient use of capacity in the port and the hinterland where they can.

More than ever, the supply chain has become the relevant scope for analysing port competitiveness. This implies that a port's competitiveness becomes increasingly dependent on external co-ordination and control by outside actors. Port choice becomes more of a function of network costs. Port selection criteria are related to the entire network, in which the port is just one node. The ports that are being chosen are those that will help minimize the sum of sea, port and inland costs, including inventory considerations of shippers. Port choice becomes more of a function of the overall network's cost and performance

# 1.3 Importance of port hinterland

The supply-chain focus on port competition holds clear implications on the role of hinterland connections. Port hinterlands have become a key component for linking elements of the supply chain more efficiently – namely, to ensure that the needs of consignees are closely met by the suppliers in terms of cost, availability and time in freight distribution. Through a set of supply/demand relationships involving physical flows, efficiencies and thus economies are achieved through the principle of flow.

In this setting, the out-of-the-pocket costs of transporting goods between origins and destinations and the port (including cargo handling costs) constitute just one cost component in supply chain routing decisions. The more integrated supply chain decision-making becomes, the more the focus is shifted to the generalised logistics costs. The implications on port and modal choice are far-reaching: shippers or their representatives might opt for more expensive ports or a more expensive hinterland if the additional port-related and modal out-of-the-pocket costs are more than offset by savings in other logistics costs. Growing concerns on capacity shortages in ports and inland infrastructure have made supply chain managers base their port and modal choice decisions increasingly on reliability and capacity considerations next to pure cost considerations. Port congestion in many European ports has demonstrated how the scarcity of port facilities and intermodal throughput capacity can impact a broader economic system. Freight transport has become the most volatile and costly component of many firms' supply chain and logistics operations. Managers have to deal with delays in the transport system, rising oil prices, complex security issues and labour and equipment shortages and imbalances. Each of these problems adds risk to the supply chain, and the problems are likely to worsen before they improve. Managers in the logistics industry, including the port and maritime industry, are spending more and more of their time handling freight transport missteps and crises. Scarcity in markets can lead to a more efficient use of resources, which is positive. But when scarcity reaches a continuous high level, logistics players start to consider capacity problems as the new normal. They can adjust their logistics networks by increasing time buffers in the system (a measure which comes at an extra cost) or by finding alternative routes with lower "resistance" to their needs in terms of costs and reliability. Seaports on inefficient or capacity-tight corridors are obviously at a disadvantage

Logistics actors and transport operators have designed more complex networks that need a high level of reliability. The current development and expansion of global supply chains and the associated intermodal transport systems relies on the synchronisation of different geographic scales. The efficiency of transport systems can be seriously hampered if, despite low transport costs, shipments aredelayed significantly. But when the synchronisation level increases, the sea-land network as a whole becomes less stable. This leads to extra costs to find alternative routes. In order to reduce the risk of major disruptions, logistics players tend to opt for a flexible network design offering various routing alternatives. This "not all eggs in one basket" approach implies that a specific port-corridor combination is seldom in a position where the market will forgive major flaws in system performance.

To add to the complexity, it is worth mentioning that the competitive position of a port vis-à-vis a specific hinterland region cannot always be narrowed down to cost and quality factors only. Historical, psychological, political and personal factors can result in routing of container flows that diverges from a perfect market-based division. Bounded rationality, inertia and opportunistic behaviour are among the behavioural factors that could lead to a deviation from the optimal solution.

Given all of the above considerations, it becomes clear that the success of a port will depend on the ability to effectively integrate it into the networks of business relationships that shape supply chains. In other words, the success of a seaport no longer depends exclusively on its internal weaknesses and strengths. It is more and more determined by the ability of the port community to fully exploit synergies with other transport nodes and other players within the logistics networks of which they are part. The synergies that can be envisaged relate to efficient capacity use and efficient operational synchronisation and integration. In order t be successful the port community has to think along with the customer, trying to figure out what his needs are, not only regarding the port but also throughout the supply chains and logistic networks.

# 1.4 Regionalisation of ports

The port hinterland is to be considered the place for future competition of ports. It is a driving factor in port development dynamics. A further development model for ports has been elaborated by Notteboom (2005) in the concept of regionalization. It expands the hinterland reach of the port through a number of market strategies and policies linking it more closely to inland freight distribution centres. It is a phase which brings the perspective of port development to a higher geographical scale, i.e. beyond the port perimeter.

Port regionalization may refer to offshore hubs or mainland seaports. In the first case, offshore hubs may be located on islands or in regions without any significant hinterland. Such ports are transhipment facility, very easily replaceable by shipping lines. Their potential evolution is to develop value added logistics services to cargo, instead of simply moving containers. They may play a role in the network of lines and be complementary to mainland ports. The logistics services close to the port area may be also in a free trade regime, thus attracting more business. In this case the hinterland is simply the integration of logistics facilities in the business of the ports, extending its functions and added value. In the second case, port regionalization for mainland seaport includes a strong functional interdependency and even joint development of a specific load centres and inland terminals (multimodal) in its hinterland, ultimately leading to the formation of a 'regional load centre network' to serve a distribution area. The main elements of this concept are depicted in Figure 2:

- Corridor: it models the inland accessibility to and from the catchment area of the port and the major distribution systems reachable from the port itself through existing transport infrastructures.
- Inland terminal: terminal activities need to be improved both at the port and in the hinterland close to the distribution facilities. Loading and unloading of cargoes requires efficient terminals located in the hinterland and connected with the port. An Intermodal transport system is fundamental.

#### The role of port-hinterland integration, success factors and strategies

- Transport: efficient and reliable transport services should be available to connect the port with the inland terminal. For this reason, railways are fundamental. On-dock rail transhipment facilities are fundamental in order to connect inland terminals with the port.
- Distribution centres: logistics infrastructures to manage goods are required in order to make the regionalization of port completed and performing. Distribution centres should process large quantities of freight that is to be distributed/collected. Added value logistics services will be key in making attractive such facilities for business (e.g. postponement).



Figure 1.2 - Elements of port regionalisation. Our elaboration on Notteboom.

Some of the main reasons for port regionalization, as a development phase for ports, can be found in:

- Lack of available space for expansion of port facilities.
- Deepwater requirements for even larger ships.
- Inefficiencies coming from transport services to and from the port.
- The Complexity of supply chains affecting the distribution networks the port may be connected with.

However, if we were to consider the regionalization as a strategy to make ports more competitive, specifically the MED ports, the following benefits have to be taken into consideration:

- Regionalization can externalize local constraints of ports, both physical and environmental).
- Regionalization supports the development of a distribution network closer to the requirements of the global supply chains.
- Regionalization supports the improvement of logistics and transport costs, reducing overall distribution costs.

As stated above, regionalization represents the way to optimize accessibility of ports, that is to realize the port-hinterland integration. It is thus important to identify some of the strategies to implement it. Furthermore, in this book other examples will be provided derived from the experiences conducted by the authors in the FUTUREMED projects.

# 1.5 Strategies for port-hinterland integration

Among the different strategies that can be adopted in order to integrate the port with the hinterland, in a logic of regionalization, as described in the past sections, two of them will be discussed in the current section. The first regards infrastructures, and specifically dry ports, whereas the second regards cooperation among stakeholders.

### 1.5.1 Dryports

According to Roso (2008) a dryport is "an inland intermodal terminal directly connected to seaport(s) with high capacity transport mean(s), where customers can leave/pick up their standardised units as if directly to a seaport".

It differs from conventional intermodal terminals (inland terminals) for the services provided along with pure transhipment: storage, consolidation, depot-storage of empty containers, maintenance of containers, customs clearance, and so on. Figure 1.3 depicts the concept in the framework of port-hinterland integration. The dryport concept goes beyond the conventional use of rail shuttles for connecting a seaport with its hinterland. Being strategically and consciously imple-



Figure 1.3 - The dryport concept implemented. Source: Roso et al. (2008).

#### The role of port-hinterland integration, success factors and strategies

mented jointly by several actors, it also goes beyond the common practice in the transport industry. Besides the general benefits to the ecological environment and the quality of life by shifting flows from road to rail, the dry port concept mainly offers seaports the possibility of securing a market in the hinterland, increasing the throughput without physical port expansion as well as better services to shippers and transport operators. The seaport cities, and also often the port authority, benefit from less road congestion and/or less need for infrastructure investments.

A dryport in order to be efficient requires high quality road and rail accessibility, as well as high quality terminal performances. Scheduled high capacity services should be scheduled to and from the seaport. Information systems to process data supporting the movement of cargo and the status of operations have to be implemented and integrated among the different actors. Finally, flows from port should be large enough to facilitate efficient terminal and rail operations, the latter with satisfactory speed and frequency.

Benefits of dryports are different: the concentration of flows between the port and the dryport using railways leads to more sustainable transport, less polluting and at a lower cost; different ports may be connected to the dryport allowing shippers to optimize their services; the port itself becomes more attractive to shippers and shipping lines.

#### 1.5.2 Co-ordination and co-operation

According to the concept of regionalization, the success of a port is determined by the implementation of synergies with the logistics and transport nodes as well as the other supply chain actors within the distribution networks the port is connected with. Such synergies have to be translated into relationships and networks between operators. Co-ordination of activities is fundamental in order to realise an efficient and integrated intermodal service able to comply with the requirements of the supply chains passing through the port. Such co-ordination cannot be realized without the co-operation of the different actors involved, both public and private. At a private level co-ordination and co-operation is being faced through the vertical integration of the logistics industry (e.g. 4PL). But when the public role is determinant (e.g. railways, land-use, networks and ICT development, border controls), a new form of co-operation should be found and put in action, maybe adopting a win-win logic and approaching the issues though discussion and groupwork.

Figure 1.4 depicts the concepts mentioned above. On the one hand, the co-operation among operators such as shipping lines, maritime terminals,

rail freight transport companies, inland terminals and last mile operators is developed through the co-ordination of activities (transport services, storages, facilities, means, labour, ICT), in order to reduce the cost and the risk of transport. On the other hand, when the public role becomes relevant, a partnership among public and private operators is required. The experience of FUTUREMED in this sense has been very positive through the early establishment of stakeholders' platforms at different levels, composed of public and private subjects who agreed on some themes, methods and actions to face specific issues. The work of such stakeholders platforms allowed the identification of local problems and discovery of actions, such as pointed out in the right-hand side of Figure 1.4.



Figure 1.4 - Co-ordination activities and co-operation actors within an effective supply chain

# 1.6 Conclusions

Med ports are still suffering a gap of competitiveness and efficiency with the northern range ports. Well established traffic flows allow these ports to maintain their predominance. Nevertheless, the expected upcoming changes in traffic flows geography will be giving a new chance to Med ports, since eastern European countries will be requiring a direct distribution of goods, at competitive costs and shorter transit times. Suez is being enlarged and the Far East is increasing its market share. Vessels through Suez will be willing to access Europe from the southern ports if these can be reliable and capable to move flows to central eastern countries, such as Poland. Med ports may be competitive if they are able to start a development process defined as regionalization. The hinterland is the core of this process: logistics and transport integration, railways, dryport, inland terminal and distribution centres are the main element. The strategy relies on infrastructures but also on co-ordination and cooperation among the stakeholders.





# Challenges for Med ports in the future

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# 2.1 Introduction

"Trying to predict the future is like trying to drive down a country road at night with no lights while looking out the back window." (Peter F. Drucker).

So this is more or less what will be attempted in the following sections, but by trying to also look out of the side windows, identifying current evolutions that can have a significant impact. Such evolutions can come from four main areas:

- client evolution and requirements
- port competition
- port city/region interaction
- technological innovation.

Throughout this document the main focus is on port-hinterland integration, being a critical issue for all Mediterranean port systems playing a "gateway" role towards their hinterland. Trying to convert this term into a more operational language, port-hinterland integration can be translated into "smooth cargo flow" from sea, to port and to its hinterland, and vice versa.

# 2.2 Client evolution and requirements

Shipping lines, as the main direct users of port services, have always been the main stakeholders pressing for continuous port efficiencies. What is new though, is that pressure's intensification, as a result of a new organisational and a new operational reality: the strengthened ocean carrier alliances and the increased ship dimensions.

Alliances, as a means of capacity and service rationalisation, leads to further concentration of international maritime flows along specific routes and to the decreased number of ports of call. Considering also the service reliability problems experienced (schedule reliability of Asia-Europe services: 65%<sup>[11]</sup>) we are confronted with a situation where less Mediterranean ports are required to serve more ships, while at the same time managing in a flexible and efficient way the delayed ship arrivals.

Those pressures are to intensify more as the dimensions (and resultant capacity) of ships increases. The average size of new containerships delivered has increased from 1,100 TEUs in the 1970s to 7,900 ordered today. During the past 5 years, average ship capacity (TEUs) in the Far East – Mediterranean services has been increased by 35%. The impact of this is to be felt by all Mediterranean ports, as

<sup>1</sup> SeaIntel Maritime Analysis, quoted by Lloyd's List

#### Challenges for Med ports in the future

when ships of 14,000+ are deployed on the major Mediterranean lines, a cascading of 8,000-10,000 TEUs ships is to be expected in the secondary ones, impacting also feeder operators due to increased transhipment times. Moreover, bigger ships means also bigger volumes unloaded within a small time window, transferring congestion pressures towards the hinterland connections (road and rail). Concerns about the impact of bigger ships on final delivery schedules have been raised also from the side of large retail importers .

Within this context, Mediterranean ports are to be faced with a number of challenges, among which the need:

- to balance increased congestion with swift cargo transfer to the hinterland
- to balance additional capacity requirements due to higher handling peaks with the requirement of high infrastructure (port equipment, areas, hinterland connections) utilisation

## 2.3 Port competition

The competitiveness of the Mediterranean ports is influenced by both initiatives undertaken at a global level (e.g. trade agreements like the Transatlantic Trade & Investment Partnership, or major infrastructural projects such as the upgrade of the Suez and Panama canals and the construction of the Nicaragua canal) and by its relative position in comparison to other European port concentrations. Regarding the latter one, the competitiveness of the Mediterranean ports in relation to the North European ones remains an important issue. The precedence of North European ports in terms of efficiencies and market share remains a fact. Among the main parameters having and still contributing to that are the port governance and development models employed, the overall transport infrastructure levels and the development of the national/regional 3PL markets. These issues have been documented by surveys of both the World Bank and UNCTAD (see Figure 2.1).

What should be added to the above overall picture though, are two issues. The first one is what we could call 'functional complementarity' As gateway-port choice is based on the overall efficiency of the supply chain it belongs to, operational integration with hinterland modes (vertical functional complementarity) becomes critical. Equally important becomes ports cooperation (horizontal functional complementarity) aiming at port specialisation and shared capacity benefits. Although important examples of both cases currently exist (the FutureMed port-hinterland pilots being among the ones of the first category) considerable steps still have to be made.

The second issue involves the identity of investments undertaken in the ports of the two regions (see Figure 2.2). Based on an analysis of the TEN-T funded projects dur-



Liner shipping connectivity index (UNCTAD, 2014)



Logistics services competence & quality (World Bank LPI 2014)



Infrastructure quality (World Bank LPI 2014)

Figure 2.1: Issues affecting the competitiveness of Mediterranean ports<sup>[1]</sup>

<sup>1</sup> the green dotted line shows the average performance of Mediterranean countries, while the red one the best performing country

#### Challenges for Med ports in the future

ing the 2007-2013 period, the average budget of a North European port project is 3 times of a Mediterranean one, reflecting an 'intervention magnitude' gap between the two regions. Moreover, the project mix of the two regions is different. While Mediterranean ports mainly study, the Northern European ones mainly implement, reflecting in this way also a 'development time' gap.



 703
 62.2 %

 603
 57.1 %

 42.9 %
 37.8 %

 303
 307.8 %

 103
 Med ports

Studies vs works

Figure 2.2: Analysis of port-related TEN-T funded projects (2007-2013)

The combination of all the above issues can be translated into the following challenges for the Mediterranean ports:

- to shift competition strategies from port-based, to gateway region-based and to port-centric corridor based
- to explore areas (e.g. marketing & development, operations, policy development) and mechanisms of cooperation (e.g. alliances) among Med ports
- to develop cost/gain sharing models to guide cooperation initiatives
- to align multi-actor performance along complete port-centric corridors
- to focus on the implementation of a limited number of transnational infrastructural projects with a clear European added value (both financial & socio-economic)

## 2.4 Port – city/region value creation

As historically many ports have served as the core of the development of cities, today most of the Mediterranean ports are adjacent or within the city complex. This co-existence requires a fresh look at the spatial diffusion of its impacts. Well-functioning ports can lead to significant economic and innovation impacts for their wider region. It has been estimated that one tonne of port throughput is associated with USD100 of economic value added, while it has been noted that nine out of the 10 world regions with the largest amount of patent applications in shipping are home to one or more large global ports <sup>[2]</sup>. While negative (mainly environmental) impacts occur at the port-city area, the positive ones (mainly financial) are split over many regions, some of which quite distant. To add to this, experience has shown that port authorities, terminal operators, local stakeholders and governments do not necessarily share the same goals and policy perceptions on tackling this issue. This leaves ports with the considerable challenge of 'creating local value' from port operations.

Linking certain port-related activities to place-based smart specialisation strategies<sup>[3]</sup> can play a significant role in that respect. The main rationale behind smart specialisation is that besides the traditional horizontal innovation policies, knowledge investments should be encouraged on particular activities (not in sectors per se) to reflect areas where a region or country has a comparative advantage (specialisation) or areas where new entrepreneurial activities can be developed (di-

3 EC (2010) Regional Policy contributing to Smart Growth in Europe 2020, COM(2010) 553



<sup>2</sup> OECD (2010) The Competitiveness of Global Port-Cities: Synthesis Report

#### Challenges for Med ports in the future

versification). Thus, smart specialisation can be considered as a policy framework for regional innovation-driven growth, setting priorities for public investment in knowledge by combining a bottom-up and a top-down approach, where entrepreneurial actors discover promising activities and the government assesses its outcome and facilitates the most capable actors for realising their potential <sup>[4]</sup>. ICTfacilitated, seamless port-rail hinterland integration can be a potential contributor to smart specialisation.

Clusters are considered as important building blocks of a smart specialisation strategy, as these can generate a collective pool of knowledge among its members and lead to innovation spill-overs in their region or country. Such a process can lead to increased productivity of the companies based in the region, increased pace of innovation underpinning future productivity growth, and stimulation of new business formation <sup>[5]</sup>. The present state and the potential of maritime and logistics clusters in Europe has received considerable attention in the recent years <sup>[6]</sup>, <sup>[7]</sup>. Besides that, an interesting additional view has been provided by the FutureMed project, focusing on the notion of 'corridor-based clusters'. Such clusters bring together all actors along a specific Mediterranean port-hinterland corridor, exploring synergies and promoting innovative solutions to reduce externalities and improve the use of existing infrastructure.

# 2.5 Technological innovation

Following the realisation that technological gaps are among the main sources of inefficiencies across ports <sup>[8]</sup>, during the last decade we have witnessed a strong drive towards the automation of port operations supported by new handling technologies and equipment, information systems (PCSs, TOSs, etc.) and optimisation (yard, berth, etc.) methods. At the same time though, to a large extent all this automation is still based on rather traditional processes within ports and between ports and hinterland means.

Moreover, amply generated information through automatic data capture systems, still remains fragmented in many settings. The first case of fragmentation comes from the information barriers experienced between the various actors of port-cen-

<sup>4</sup> OECD (2013) Innovation-driven Growth in Regions: The Role of Smart Specialisation

<sup>5</sup> PORTER, M. (1998) Clusters and the New Economics of Competition, Harvard Business Review, (76) 6, pp. 77-90

<sup>6</sup> EC (2009) The Role of Maritime Clusters to Enhance the Strength and development in European Maritime Sectors

<sup>7</sup> The European Forum of Logistics Clusters, October 14-15 2014, Brussels

<sup>8</sup> Merk, O. and Dang, T. (2012) Efficiency of World Ports in Container and Bulk Cargo, OECD Regional Development Working Papers, 2012/09, OECD

tric supply chains, and probably the main area impacted upon is port-hinterland visibility. However, visibility comprises of two sub-components: cargo/shipment visibility and intermodal services visibility, with the latter one frequently forgotten. Intermodal services visibility (i.e. the provision to shippers of integrated information on maritime and freight rail services to the Mediterranean ports and further on to their hinterland), is an important prerequisite for enhancing the competitiveness of the Mediterranean port systems.

Another case of fragmentation is experienced between the more and less technologically developed port community members. SMEs involved in a port-centric supply chain (e.g. small freight forwarders, road operators, etc.), will need guidance and tools (e.g. message schema translators, business process configurators, etc.) to interconnect their systems and processes to the ones of other SMEs and also to the ones of the more advanced actors (e.g. ports, rail companies).

Fragmentation also exists between system 'families' with a different core focus. This is the case of regulation compliance systems (e.g. Maritime Single Windows, SafeSeaNet, Customs Single Windows) VS efficiency-oriented (e.g. Port Community Systems, Terminal Operating Systems and Road/Rail Cargo Monitoring Systems). The level of fragmentation varies between countries, but in the majority of the cases the information transfer between the two families (where it is electronic and not manual) is unidirectional, with the potential of generating efficiency benefits out of already existing compulsory reporting systems being missed.

Finally, it should not be forgotten that at the core of any technological and process innovation remains the need to ensure that the right information is available to guide informed decisions. Although the value of such information is widely acknowledged, the awareness on cyber security needs and challenges in the maritime sector is low to non-existent'<sup>[9]</sup>. Cyber threats for the industry are related to ships and safe navigation, ports, and Terminal Operating Systems. Among the incidents reported are: a case where hackers infiltrated cyber systems in a (major European) port to locate specific containers loaded with illegal drugs and remove them from the port undetected; 'denial of service' attacks against ports; and efforts to gain unauthorized access to wireless internet networks in ports. IMO has been urged<sup>[10]</sup> to tackle the issue through a set of voluntary guidelines on cyber-security practices, probably as part of the International Ship and Port Facility Security Code (ISPS). In the same direction, the Round Table of international shipping associations (RT) comprising BIMCO, ICS, Intercargo and INTERTANKO announced that they are

<sup>9</sup> ENISA (2011) Analysis of Cyber Security Aspects in the Maritime Sector, Report of the European Network and Information Security Agency, November

<sup>10</sup> IMO (2014) Ensuring Security in and Facilitating International Trade: Measures toward enhancing Maritime Cybersecurity, paper submitted by Canada to the 39th session of the IMO Facilitation Committee

developing standards on how industry stakeholders should develop, manage, update and secure computer-based systems on ships.

Taking into account all of the above issues, one can identify the following challenges for the Mediterranean ports in the future:

- to integrate pieces of port-hinterland transparency (cargo & services)
- to generate business benefits out of compulsory reporting applications
- to incorporate SME actors into the ICT setting
- to address evolving ICT-related threats Cyber-Security.

# 2.6 The need for a multi-stakeholder governance approach

Addressing the major challenges identified in the previous sections requires the engagement of all stakeholder types involved along the Mediterranean port-hinterland supply chains and the coordination of relevant initiatives to achieve synergistic impacts. Such an approach should ensure that:

- a common vision for the future of port-hinterland integration is developed
- areas of intervention are prioritised and appropriate strategies are agreed upon
- actions for realising the Mediterranean port-hinterland vision are coordinated and undertaken.

FutureMed has already undertaken the first step towards establishing such a multistakeholder governance mechanism with the formulation of the FutureMed Observatory, taking the form of a European Economic Interest Group (EEIG). The Observatory's vision is to *be a key driver of change in the improvement of Mediterranean port-hinterland integration.* This will be realised by:

- building consensus among the various stakeholders on 'what is ahead' for the Mediterranean ports (foresight), regarding market requirements, service responses and regulatory constraints, by using tools such as practitioner workshops, experts' debates and scenario development
- synthesising what its members have learned in the past (experience synthesis), through pilot experimentation, full scale applications and sectorial best practices, capturing opportunities for collective stakeholder-based innovation
- strengthening the role of Mediterranean ports as gateways to the European hinterland, by leveraging its members' synergies in promoting port-hinterland clusters & corridors and providing fact-based proposals on policy issues that will affect the future of Mediterranean ports.

In terms of implementation, the Observatory follows a three-phase agreed-upon implementation roadmap (see Figure 2.3):

- envisage
- engage
- operate & evolve.



Figure 2.3: Implementation roadmap of FutureMed's Observatory

The first phase (envisage) has been completed, with the Observatory's vision enhanced and validated by a diverse set of stakeholders, a first prioritisation of the themes to be addressed in place and a core group of EEIG members already on- board.

The second phase (to be concluded in the following couple of months) involves two parallel work streams. The first is directed towards ensuring the sustainability of the Observatory itself, by defining an initial set of measurable goals to be achieved, identifying long-term funding opportunities, enrolling additional stakeholders and providing a detailed planning of activities.

Finally, the third phase is all about 'doing and evolving'. This is the phase where the Observatory becomes fully operational providing its services to its stakeholder members. This is also when the mechanisms of progress assessment and refocusing are established, to make sure that it continues to address the challenges of the Mediterranean ports as these evolve in the future.

# 2.7 Epilogue

IIn the previous sections, the main challenges to be faced by the Mediterranean ports have been explored, taking into account the evolutions underway in a number of related areas. Twelve main challenges were identified, being:

- 1. to balance increased congestion with swift cargo transfer to the hinterland
- 2. to balance additional capacity requirements due to higher handling peaks with the requirement of high infrastructure utilisation
- 3. to shift competition strategies from port-based, to gateway region-based and to port-centric corridor based
- 4. to explore areas (e.g. marketing & development, operations, policy development) and mechanisms of cooperation (e.g. alliances) among Med ports
- 5. to develop cost/gain sharing models to guide cooperation initiatives
- 6. to align multi-actor performance along complete port-centric corridors
- 7. to focus on the implementation of a limited number of transnational infrastructural projects with a clear European added value
- 8. to create local value from port operations
- 9. to integrate pieces of port-hinterland transparency (cargo & services)
- 10. to generate business benefits out of compulsory reporting applications
- 11. to incorporate SME actors into the ICT setting
- 12. to address evolving ICT-related threats cybersecurity.

It goes without saying that to the above challenges additional ones could be incorporated and probably some could be replaced by others. Whatever might be the updated list though, at the end of the day this will reflect three clear action messages for the future of the Mediterranean ports:

- Think about tomorrow
- Create synergies
- Break long-lived habits.


# Intermodal corridors as a means of strengthening Mediterranean's gateway role

*Carlo Camisetti* and *Fabrizio Camisetti*, *TLS Europe* 



#### 3.1 Importance of maritime-rail intermodality

It can help share the view that the maritime-rail inter-modality is a strategic tool for developing traffics in the Mediterranean ports and for re-balancing north-south traffic flows in Europe. The major ports in Northern Europe such as Rotterdam, Hamburg, Bremen, Antwerp, are characterized by a large hinterland region which is covered by an extensive network of inland connections made with all kinds of transport, road, railway and inland waterways.

To extend the hinterland region and to be able to reach, in a competitive way, faraway destinations, is one of the most important goals of the northern European Ports, since extending the region hinterland means increasing the volume of traffic and thus the importance of the Port in the European context.

Therefore, the Mediterranean Ports, as Genova, La Spezia, Livorno, Venezia etc. which have no inland waterways that connect the ports to Europe, should also have the capacity to offer a widespread network of rail cargo services, with frequent, regular, reliable and competitive services, that can also reach faraway destinations in Europe, thus getting an extended hinterland region over the national borders and largest volumes.

The EU transport Policy in supporting sustainable mobility and in particular rail freight transport, had a decisive impact on the growth of the rail freight intermodality in the European Ports. A policy that has been developed over the years,



the development of which can be seen in the following documents:

- the White Paper of 2007: "European Policy Time to decide" and in particular to the specific actions s: (i) the construction of a specific network for rail freight; (ii) the optimal use of infrastructure with the opening of the market; (iii) the modernization of rail services.
- the Communication of the Commission COM207 608 final: "Towards a rail network, giving priority to freight": that among the various actions indicates priorities: (i) an European rail network with corridors with priority given to transport cargo; (ii) greater coordination between Member States and infrastructure managers to reach a significant improvement in quality of services.
- the White Paper rev. March 2011 where target have been defined for the railways freight transport modal share: 30% for distance larger than 300 km at 2030 and 50% at 2050.

The ports of Northern Europe have been able to benefit from these policies. They have an excellent network of railways cargo services from the Ports and a large share of Railways and inland waterways intermodality, that together constitute on average about the 40%, with a peak of excellence in Bremen with about 60% of the share, with 54% for the rail inter-modality.

The Ports of the Mediterranean, and in particular the Italian Ports, were less able to develop the rail inter-modality in Ports for several reasons. The reason for this is that today there is a strong imbalance in container traffic flows between Northern and Mediterranean EU Ports. A TLS EUROPE study in 2011 found that, the Ports of the Liguria Region and the Port of Livorno together, handled about 10% of the container throughput of the Ports of Rotterdam, Zeebrugge, Antwerp, Hamburg, Bremen together (transhipment cargo not included). The region hinterland of these northern EU Ports is extended widely southbound and almost reaches the Mediterranean coasts, and in some cases the south of Italy.

#### 3.2 Requirements for efficient maritime-rail intermodality

An overall view of some factors with major impact on the development of railway cargo intermodality in the Italian Ports is reported in the following paragraph.

#### 3.2.1 Infrastructural Problems

Removing the major bottlenecks, due to the lack of infrastructure, is mandatory, however sometimes, limited actions, which do not require huge investments and long lead times, they are not made, causing serious problems, for different reasons, such as: bureaucratic issues, conflicts or failing agreements between the parties concerned, etc. The lack of railroad infrastructures or some limit in term of quality (number railway tracks, slopes of the railway line, weight of cargo allowed, maximum length of trains, etc.), is definitely limiting the intermodal railway freight developments; nevertheless there are examples of excellence in performances, like in the Port of La Spezia, where the goal of 35% of railway share is reached, even if the infrastructures linking the Port to the hinterland, are not among the excellence that can be found in Italy.

#### 3.2.2 Horizontal and vertical integration of services

Horizontal and vertical integration of maritime and inland transport and logistics services is one of the most important achievements, for the development and the competitiveness of the railway services, from the Ports to the inland destinations (and vice versa).

In Italy there are some points of excellence in the railway inter-modality, let's mention here at least two examples: the port of Trieste with more than 50% share of the railway network and the port of La Spezia, as mentioned before, with more than 35% share.; both are adopting a model of vertical integration of services.

An example and a success story is represented by the EMT Terminal of Trieste, managed by the Francesco Parisi Group; Ekol Lojistic of Istanbul, one of the most important Turkish carriers, has developed its maritime transport business with Europe, establishing a partnership with EMT, which has set up and equipped, a modern RORO terminal. This terminal, which has grown considerably in recent years, has as of 2014, overcome the 66% share of railway intermodality. The Francesco Parisi Group is also an agent of Kombivekehr, which operates a competitive rail transport service, from the maritime terminal to inland destinations. The collaboration of the partnership is also extended to the railway company Lokomotion which is a German leading hauler in transalpine freight traffic.

In the port of La Spezia there is the example of the "integration" of the transport and logistic services from maritime terminals to inland destinations and vice versa, implemented by companies of the same group: Contship Italia, Sogemar and Oceanogate, which are terminal operators, MTO, a railway company and logistics operator, managing also the inland terminal (f.i. Melzo) and the distribution to the final destination (last mile).

The vertical integration along the intermodal chain of the freight transport services, including maritime-railway services, is therefore an important challenge for the Mediterranean Ports. The integrated "door to door" service that can be managed directly or indirectly by only one operator, manages the shipping line, the maritime terminal, the railway freight transport (as MTO), the inland terminal operations and the last mile to the final destination. The Messina Group, whose maritime base is in the port of Genoa, might be mentioned for this type of business model; the Terminal Messina reached peaks of more than 55% share of railway inter-modality. The same model might be implemented by a Joint venture of different operators or by a leading operator managing different service suppliers.

This business model might be more and more exploited for new railway services implementation, from the Mediterranean Ports to the EU hinterland, for the transport of Container and RORO cargo.

#### 3.2.3 Improvement in the efficiency of the railway services

Today it is possible and necessary to adopt models of management of the services capable of making railway inter-modality more efficient and competitive. Some aspects, very important in this regard, are specific to the railway transport, such as:

- Self-production of railway manoeuvres in the port area: The self-production of the railway manoeuvres in the port area is possible in the most important Italian ports. However, due to the legislation and other regulations, it has never been implemented so far in the Italian Ports. Bringing the rate for railway manoeuvres inside the Port at market prices, might provide an important contribution to the competitiveness of railway inter-modality in the Italian Ports. A clear separation between the economic aspects and the social ones, might help to solve a problem that has great impact on the competitiveness of services and which is of a relatively limited size.
- Rates for cargo handling in the Port area might penalize the railway intermodality. In some important Italian ports, including for example the port of Genoa, loading a container on the train costs the customer more than loading it on truck. Thankfully this problem does not affect all of the container terminals; nevertheless the adoption of organizational models, able to overcome this problem should be encouraged.

Other issues that concern both the efficiency of the Port System as a whole, as well as the efficiency of the intermodal railway service in particular:

• Operability of the services 24/7. The operability in the port 24/7should comprise all the port services, including customs clearance and railway manoeuvres.

- The same operability should also characterize the railway services outside the port area, which are necessary for freight transport to the hinterland region.
- Pre-declarations. Today possible the "pre-declaration" is possible in the Italian Ports, which allows for the organization of the clearance operations with a long time in advance on the arrival of the ship in Port. Therefore the transport and the release of the cargo to its final destination can be planned in advance.
- ITC Procedure and systems. ICT procedure and systems currently support efficient railways inter-modality in Ports and along the intermodal chain. The continuous improvement in technologies and tools allows for better solutions and performances.

### 3.2.4 Supporting measures for fostering the growth of sustainable railway cargo services

As was mentioned in the opening remarks it is important to encourage and support greater development of railway inter-modality in the Mediterranean Ports, also and above all, where are on-going, works and investments to overcome structural deficiencies, organizational barriers and social problems, which determine a lower competitiveness of the Italian Ports to link the European Hinterland by using railway services, than the northern European Ports. This support, even economical, to the Mediterranean Ports is essential to make fair, in the interest of Europe, the chance of growth of the two European Ports systems (Northern European and Mediterranean) as far as concerns the railways services toward the EU hinterland.

The positive example of Friuli Venezia Giulia, within which the Project FU-TUREMED, has organized this roundtable, shows a possible model, based on diversified actions, which enables an effective support, to the development of railway freight transport and of the railway inter-modality of regional interest; this approach includes the participation in railway companies and MTO and some direct economic support to railway services.

National wide actions to rebalance the modal split between road transport and railway freight transport as the "ferrobonus" or the "Eurovignette" might also contribute. The Eurovignette is an effective and right measure, based on the principle of moving some indirect costs, environmental and social, to the transport mode that has determined them in greater extent; however its implementation will be difficult, at least in the short run, in Italy.

#### 3.3 Analysis of business cases

#### 3.3.1 TRENITALIA Cargo

TRENITALIA Cargo with the other companies of the Ferrovie dello Stato group, dedicated to the cargo sector, offers a comprehensive range of rail cargo services at anational and a European level.

The EU Policy, to foster sustainable mobility and the development of railway cargo transport in Europe, mentioned before in the opening speech, of this round table, has been taken into account in defining the development strategy of the Company and the business planning.

Today TRENITALIA Cargo offers a complete range of rail freight services through the Italina rail network, which is in the process of modernizing, extending and improving. This network is connecting the major Logistics Centres and the railway cargo terminals to the gateway Ports.

Significant investments are planned and are already in place:

- in the railroad network, to increase system performance for both national and international services;
- in rail terminals, for example it is a phase of development a large terminal in Milan, which will serve the ports of Genoa and La Spezia;
- in the ports for strengthening the capacity and increase the efficiency of the railway inter-modality.



From an operational point of view, in addition to national services, Trenitalia Cargo operates directly in France, and is finalizing the acquisition of the license to operate railway services in Austria and Slovenia. In Germany, in the Alps and the Nordic countries in particular, a company of the group TRENI-TALIA operates through TX Logistics, which is dedicated to freight services in Europe.

To address the European competitive scenario, TRENITALIA is investing with continuity on the "Interoperability". There are already available 10 new locomotives interoperable and other 10 are coming soon, thus allowing the traction through the Alps, without interruption.

TRENITALIA Cargo is also focusing on the continuous improvement in the use of existing infrastructure, in this view the results achieved in the development and use of ICT systems , which allow the provision of complementary services are significant, which represent an added value on the competitiveness of transport services, such as tracking and tracing of the complete transportation from the arrival in port to the final destination, through all the components of the transport chain: the terminal, the train and truck.

Still in this context, the Ferrovie dello Stato Group has recently started, in collaboration with the Agenzia delle Dogane, the "secure railway corridor" from the ports to inland final destinations, where checks will be carried out. By activating a pilot service between some Italian ports and inland terminals, this service will gradually be extended to other links between ports and inland terminals and will allow a significant reduction in the time of clearance of goods arriving by sea.

There is still a gap between the use of railway freight transport in Italy and in Northern Europe, but the gap is narrowing.

In order to be competitive it is essential to work in cooperation

TRENITALIA Cargo strongly believes in perspectives that may result from the integration, "horizontal" and "vertical" of the services of transport and logistics along the intermodal chain, from the origin to the final destination.

Horizontal integration:

- Companies as well as competitors, owners of the cargo, which find convenient to reduce costs, share the intermodal transport chain, and the logistics services. The saving of a few percent on the costs of the logistics is reflected in a corresponding increase in profits, which can be even very significant for some products.
- Providers of logistics services that share the supply of services to get the critical mass and widen the offer



Vertical integration:

• Integration along the chain of intermodal transport and logistics, to increase the competitiveness of the "door to door" service, as a whole, overcoming possible criticalities of the weaker ring in the intermodal chain.

#### 3.3.2 ALPEADRIA

ALPEADRIA is a company owned by a group of public shareholders: the Autonomous Region of Friuli Venezia Giulia, through its Financial Institution FRIULIA, the Port Authority of Trieste and TRENITALIA Cargo.

ALPEADRIA is part of the "virtuous model" successfully experienced in the Friuli Venezia Giulia Region for the development of rail cargo transport and of railway-maritime inter-modality.

ALPEADRIA was created to foster the development of the connections of the regional ports, by means of rail services, with the nodes of origin and destination of the cargo located in the region, in Italy and in Europe.

The ALPEADRIA network of services, mainly connects the port and logistics system of the Friuli Venezia Giulia with Austria, and through Austria with Czech Republic, with Slovakia and Hungary and with Germany; on the other side with the North West Europe where there is a link with Luxembourg.

The ALPEADRIA Customers are: cargo owners, shipping lines, freight forwarders and other logistic companies operating in the region.

Interact with shipping companies, freight forwarders, transport operators, listen to their needs and propose new solutions and services, it is part of the institutional mission of the Company.

ALPEADRIA is geared to play its role independently and practice models of collaboration with other operators in an open market of rail cargo services and logistics.

They make use of assets enabling them to provide competitive services; such as the possibility to benefit from "pre-clearing" procedures of cargo for the rail freight, just as it would a ship.

#### 3.3.3 CONTINENTAL RAIL

Continental Rail, S.A. provides rail freight services and complete railway intermodal services. The company is active in particular in the connection between Spanish Ports and the Major Logistic Platform in Spain, including the Madrid logistic Platform.

Comparing the railway intermodal services between the Spanish Ports and the regions hinterland in Europe, and particularly France, with the connection with the UK, and Germany, there are some problems with supplying competitive services.



There are bottlenecks at the border, since the railroad network of Spain is not compatible with the European one. Therefore the change of the set of wagons and the transshipment of cargo are necessary due to the difference in the gauge of railway wagons.

In addition, Spanish trains tend to be smaller, that is they have fewer wagons than others in the rest of Europe. In order to overcome these gaps, a new railroad has been built, and a railway connection is possible between the Port of Barcelona and Germany by a railroad complying with the European standards; therefore using this railroad infrastructure there is no need to the transship the cargo at the border.

There are plans to extend this railroad infrastructure in the next few years, in order to also to connect an intermodal Platform such as Madrid and Zaragoza with another Port such as that of Valencia.

#### 3.3.4 PLAZA Logistic Platform of Zaragoza

"PLAZA: the Zaragoza Logistics Platform is one of the largest logistics platforms in the South West of Europe (lies on an area of about 13 million sqm). The platform is managed by a Joint venture managed by the Government of Aragón, the Zaragoza City Government and a main savings bank IBERCAJA BANCO S.L.U.

The intermodal transport center of PLAZA operates cargo for railways, roads and air transport.

The Platform is connected by railway with the logistic Platform of Madrid, the Ports of the Atlantic Ocean, and particularly the Ports of Gijón and Santander, and with the Mediterranean Ports of Barcelona and Valencia. The railway infrastructures connecting the Logistics Platform with the Mediterranean ports are better and the distances are shorter than those linking the Atlantic Ports.

The Zaragoza Logistics Platform plays an important role at a national level, as it is well connected with railways and road transport services to the most important Spanish industrial areas and logistic centre's. In addition, Zaragoza is the third biggest cargo airport in Spain; therefore the most important shippers in the sector, which operate in Spain, are located in the logistic platform PLAZA.

The Logistic Platform also plays an important role in international transport, due to the links to Atlantic ports and the Mediterranean, through which the cargo reaches the most important areas of Spain.

As far as the railway transport services to the European Regions Hinterland are concerned, the competitiveness of the services lacks the infrastructures already mentioned, which require the need of the transhipment of cargo, on railway wagons which can be used on the railway infrastructures complying European standards.

Therefore there is an alternative option to connect the Logistic Platform of Zaragoza to France-UK and Germany, using railway-maritime inter-modality: railway transport to the Port of Gijón and then by sea the northern Ports from where they reach their final destinations"

#### 3.4 Conclusions and recommendations

The Time is ripe for the improvement and growth of railway intermodality in Mediterranean Ports. The Best practices for railway intermodality have been identified in Italian Ports, the Port of Trieste with a 50% rail intermodality modal split, with a pick in one of the RORO terminals with about 66% of railway intermodality in 2014, and the Port of La Spezia about 35% of railway intermodality modal split; therefore within the present limits and constraints of the Italian transport and logistic systems, excellent performances in railways intermodality can also be achieved in the Italian Ports.

The EU Policy that started with the "White Paper in 2007" and revised from time to time, about the development of railway freight transport has been continuously and progressively turned into reality and the resultss of the EU supporting measures have been very positive.

The development of railway inter-modality in the Mediterranean Ports is nolonger significantly limited by infrastructural constraints, considering the present state of the art and substantial developments planned in the near future to enhance, modernize and enlarge the railroad network linking Mediterranean ports to the inland region of EU.

The market of railway operators is open in most of the countries, including Italy, where competition among the players is open, which means that about 40 companies have the license to operate in Italy; therefore continuous improvement in railway services will hopefully be achieved in the future.

The EU policy developments concerning "freight railway Corridors" and have been very effective so far, in the enhancing and growing of the railway freight transport in EU; nevertheless today, some specific actions and measures are necessary. They are necessary From a Mediterranean point of view, toward "quality corridors" which among others aspects, fosters the use of the Mediterranean gateway Ports for access to Europe, in order to mitigate the strong imbalance between northern and southern EU Ports, linked by the "corridors". This recommendation might be acknowledged and taken into consideration by the EU Commission, for example in the characterization of the next calls of the program Connecting European Facilities (CEF/TEN-T).

Stronger efforts are also required to foster:

- Cooperation among service providers (even among competitors) and vertical and horizontal integration of the services in the door – to - door intermodal chain, using effective business models.
- Dissemination and the replication at a national and a European level of the best practice, excellence models, success stories, already existing and identified in the round table.

the service performance could be further improved by: (i) self-production of the railway manoeuvres in ports; (ii) 24/24 h and 7/7 days services operation; (iii) take benefits from pre-clearing operations; (iv) use of "safe corridors", tracking and tracing of cargo, paperless procedures and custom clearance at the final destination (authorized terminal or warehouse).

During the transitional period, in which efforts are produced to reduce the gap with the railway cargo services in the northern EU ports, supporting measures including financial support, are required at a national/regional level, to overcome technical, organizational and social barriers, which are still preventing the use of railway inter-modality in Ports.



## **Public private partnerhips for Mediterranean port-hinterland development**

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#### 4.1 Introduction

In the current economy, cooperative ventures between public authorities and private enterprises can provide effective ways of <sup>[1]</sup>:

- delivering infrastructure projects
- providing services to the public
- financing innovation (thereby contributing to economic growth and job creation)

As announced in its Strategy for the Internal Market 2003-2006, the European Commission has published the Green Paper on public-private partnerships (PPPs). PPPs have been expanding rapidly over the last fifteen years or so. Public authorities make increasing use of them in view of the budgetary constraints with which they are confronted. In this way, they can benefit from the private sector's know-how. Another advantage lies in the savings made possible by PPPs as they incorporate all the stages of a project, from its design through its completion.

PPPs describe a form of cooperation between public authorities and economic operators. The primary aims of this cooperation are to fund, construct, renovate or operate an infrastructure or the provision of a service. PPPs are present in sectors such as transport, public health, education, national security, waste management, and water and energy distribution. At a European level, they help implement the European Initiative for Growth and trans-European transport networks.

PPPs are innovative financing solutions promoted by the European Union (EU). On the 17<sup>th</sup> of December 2013 the European Commission launched eight contractual PPPs of strategic importance for European industry. The partnerships will leverage more than  $\epsilon$ 6 billion of public investment with each euro of public funding expected to trigger additional investment to develop new technologies, products and services which will give the European industry a leading position in world markets. Three of the PPPs (factories of the future, buildings and green cars) were first established in 2009 in response to the economic crisis and have already shown their success in strengthening European supply chains and innovating key industrial sectors. Under Horizon 2020, commitments will be firmer and more transparent.

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<sup>1</sup> The European Commission official website: ec.europa.eu/, last seen May, 11th 2015.

#### 4.2 Ports and hinterlands

#### 4.2.1 Ports

Nowadays, ports have become true activity axes. They face the demands of shipping companies, who compete for the business of freight forwarders as they seek door-to-door transport which is faster, safer and at a lowest price. Freight forwarders themselves compete with each other (Cole and Villa, 2006).

These real activity axes must also recognize their economic power, and the social and economic impact generated in the adjacent port area and in the hinterland. In an increasing competitive setting, the "battle" between shippers and ports is also fought on land. It is precisely on land where the greatest productivity gains can be achieved (Atlantic Transnational Network of economic and social actors, 2006).

The port development is closely linked to the territory to which it is related. Both on sea and on land, this territory transforms, develops, raises new questions, offers new opportunities and imposes changes of scale.

Located about halfway along routes around the world, Mediterranean ports are in an exceptional position to establish themselves as maritime hubs (Figure 4.1). Table 1 shows the Mediterranean's busiest ports, among which pure hubs in southern Italy and Spain stand out, as well as in Malta and Egypt. The growing importance of the Egypt in maritime traffic is noteworthy, thanks to its privileged location near the Suez Canal and its important investment in port infrastructure. One of



Figure 4.1 - Main "hubs" of the Mediterranean and its distance to the main sea route. Source: Rodrigue y Noteboom (2010).

its hardest competitors has been the Greek port of Piraeus. The location of Greek ports, such as that Thessaloniki and Piraeus offers them the potential of becoming some of the most strategic shipping gateways to South East (SE) and Central Europe, as well as major transhipment hubs. Both ports could play a pivotal role in the growth of intermodal transport in Greece and especially in the further development of rail-maritime intermodal transport.

1.	Valencia (España)	3,6	6. Génova (Italia)	1,7
2.	Gioia Tauro (Italia)	3,4	7. La Spezia (Italia)	1,2
3.	Algeciras (España)	3,3	8. Port said (Egipto)	1,0
4.	Barcelona (España)	2,6	9. Marsella (Francia)	0,9
5.	Marsaxlokx (Malta)	2,3	10. Damietta (Egipto)	0,9

Note: Hub ports whose traffic load percentage is over 50% are shaded.

Table 4.1 - Main container ports of the Mediterranean (mill. TEU, 2008). Source: ESPO (2009). APL (2009).

#### 4.2.2 Hinterlands

The hinterland of a port is the area of land with economic impact and is defined by commercial rather than just geographical factors. The hinterland is the area that covers the origin and destination of the goods using the port. It depends on the level of economic activity and competition between different ways of transport and intermodality. The hinterland of a port varies for each of the products transported; therefore they vary depending on whether it is a loading or unloading commodity.

- When choosing a bulk port for instance (such as building materials, wood, raw materials or chemicals), distance is critical, so the priority is to limit the distance of land transport (the proximity between the port and the industrial processing place). For this reason, the port used for traffic will normally be close to the hinterland, which will be small.
- In the case of manufactured goods transported in containers or trailers, time is a critical factor. Therefore, accompanied traffic focuses on a short sea route, while unaccompanied traffic probably has a longer distance path (by sea). For these products, the hinterland of the origin and destination points is likely to be large. For example, the Port of Koper (Slovenia) is a multi-purpose port. Its basic activity is implemented on specialized terminals, which are technically equipped in terms of organization for the transshipment and storing of individual types of goods or product groups .

A port can have an immediate hinterland covering the production and consumption areas of the region, and also an indoor area that is non-exclusive, whose size will depend on transport network connections from the port.

The size of a hinterland has also to do with the existence of specialized facilities in ports, such as load centers, storage areas or packaging areas. The specialization of a port may place it in a competitive position of advantage. In Sheffi (2012), companies follow their customers in deciding where to locate facilities -"The first thing they actually look at in terms of location for a distribution center is basically manufacturing clusters where large numbers of customers are".

As an example, the Friuli Venezia Giulia (FVG) port system's (Trieste, Monfalcone and Portonogaro ports) current hinterland is international, covers Austria, southern Germany, Hungary, Czech Republic and Slovakia, in addition to some areas of northern Italy (principally the regions of Friuli-Venezia-Giulia, Veneto and Lombardia). The FVG intermodal logistic terminals serve mainly the local production and distribution system. They are connected to the port system of FVG and to the systems of road and rail infrastructures for national connection and with neighboring countries and of the surrounding area.

#### 4.2.3 Port-hinterland development

As a port is developed, it is important that the transport infrastructure linking the port with its markets (the private side constituted by commodities production, mass and distribution centres) is at a similar stage of development.

Historically, ports have experienced a growth or decline in the function of their economic activity, especially the industrial activity of its hinterland. For example,, major structural changes in heavy industry have led to a decline in port traffic.

As a greater concentration on major ports has been taking place, and deep sea shipping type only takes one or two scales, the structure of the hinterland of many ports has changed. The hinterland of the largest container ports has been growing since the main European container ports have served a wider area. However, this simple view masks the fact that, for container traffic, smaller regional ports will have a regional hinterland and many containers will be transhipped to continue their journey by sea.

Ports and hinterland connections with their indoor markets are essential. Thus, Shanghai relies on the Yangtze River for transporting goods to collect from within China; Los Angeles and Long Beach base their competitiveness in effective and fast rail connections, while in Europe trucks continue to predominate as the main means of transport, even over relatively long distances. Northern European ports continue to show a relative dominance of trucks, although with a significant difference from southern ports such as Marseilles, as the share of 60% of trucks in Hamburg and Antwerp becomes 80-90% in the Mediterranean area. This 30-40% which is transported by river or rail in northern Europe corresponds precisely to longdistance transits (southern and eastern Europe away markets), much less economical by road. In general, traveling more than 500 km starts to be more economical by rail, with a very clear advantage from 1,000 km away (Van Klink and Van den Berg, 1998). This dominance of the truck definitely favours the ports of northern Europe, closer to the major consumer markets.

# 4.3 Public-private partnerships in port-hinterland development

#### 4.3.1 Public private partnerships

Port facilities have different implications of the public sector by region. In general, however, a growing participation of the private sector is observed, either in association with the State or through concession or management contracts of terminals. Thus, a first level of relations in ports is structured in *Figure 2*.

In the vast majority of cases, the ultimate ownership of infrastructures belongs to the State, whether it is the central, regional and local governments (Fleming and Baird, 1999). The state can also choose to delegate its management to public authorities or consortia, which can even engage the private sector or civil society. In the Spanish port authorities, for example, it is often the case that trade union representatives, shipping agents and commercial local chambers appear. These delegated entities, in turn, can entrust the management of certain facilities to private operators, usually under administrative concession. This process of port service privatization, including, in many cases, the construction and financing of terminals and other facilities, has favoured precisely the emergence of major business groups in this field, such as the Hutchinson Ports (Hong Kong), PSA (Singapore) or DP World (Dubai).

Delegated own public entities are sometimes responsible for managing port facilities, but in recent times they usually share the responsibility with private operators. In spite of the expansion of large international groups, the truth is that the port management sector remains relatively fragmented, according to UNCTAD (2008): The market share of 60% of container traffic assigned to 7 large international groups is mainly due to its control over the main container ports in the world, but there are still dozens of ports with independent operators or in public hands. Also, the concentration is much lower in other segments of the port market beyond the container (bulks, liquids, etc.).

The bottom of Figure 4.2 also illustrates a trend in recent years in terms of port



management, which is the progressive implication of users or customers as operators. In particular, large shipping companies are vertically integrated into the management of terminals (e.g., APM Terminals, which is actually the port management division of the shipping group AP Moeller Maersk).

The international shipping transport peculiarities should take into account the final customers in Figure 4.2 that is, exporting and importing customers who sometimes respond in periods of a few months, according to the evolution of their orders depending on world demand. However, shipping companies have a limited vessel capacity, which can only be extended by 2-3 years for the time needed to build new and the capacity of the shipyards. In turn, ports cannot easily react to sudden changes in demand, since the expansion of their facilities can take up to ten years (taking into account planning, expropriations, licenses, construction, etc.). Thus, the unstoppable demand in recent years led, first to shipping companies ensuring space in ports through their involvement in business management. On the other hand, investments in the improvement and expansion of ports were multiplied, like, for example, the construction of new facilities.

#### 4.3.2 Future public private partnerships

Fleming and Baird (1999) remind us that throughout European history, land - port connections have been a subject of continuous and controversial State support, even to the point of generating tension with neighbouring countries. In the nineties, the Dutch authorities subsidized shuttle services from Rotterdam by rail and waterway during their first two years of activity (Van Klink and Van den Berg, 1998). Nowadays, the debate of "State aid" to the port sector and related activities is still open, in the absence of rules by the European Commission despite all complaints from the Ports European Association (ESPO, 2009).

However, the American experience confirms the need to strongly support rail connections. The Railroad Rehabilitation and Improvement Financing Program (RRIF) of the US federal government, for example, grants soft loans of up to 100% for a project to modernize roads (e.g. split), whose model could also be replicated in Europe. The beneficiaries may be local, state governments and railway companies and companies from both of these and shipping companies.

In the framework of the uniform rules on the EU field to avoid distortion, the State supports the view that the infrastructure of connection should be complemented by developing a greater involvement of the private sector in "PPP" formulas. It is common practice to grant compensation to the investor and infrastructure operator in the event of traffic flow not reaching a specified level on projects like motorways and other private infrastructures. Similarly, constructions in rail and river lines promoted by private companies or in cooperation with port authorities should be structured. Regarding this last point, it should be necessary to make the conditions for integration and vertical cooperation between ports, shipping companies and infrastructure managers flexible, such as by granting exceptions to the "cartels" so reviled in the European competition politics (Van Klink and van den Berg, 1998).

A better regulation to encourage railways and waterways investment must be accompanied by a greater interest of large groups of infrastructures, many of which are Spanish and have, so far hardly acted in the port or related field. Table 2 shows the top 10 global management infrastructure groups, which include up to 6 companies with home businesses and headquarters in Spain. However, only 2 of them, ACS and OHL, are involved in port concessions in a relatively modest way. The gradual liberalization of rail transport, already begun with the EU, could facilitate private participation and therefore a re-launch of this mode of transport for the benefit of the ports.

Along with the construction and renovation of networks, it should also be beneficial to open new shuttle services within the existing infrastructure. It is an advantage that public resources are used to improve existing roads, above all, to support the operating costs of shuttle services. In this context, the port of Barcelona opened a new route to Lyon (BarceLyon), in February 2009, with 3 trains per week. It is necessary to remember how Rotterdam began its service with Italy with a similar schedule in the nineties and today this has risen to 9 trains weekly. Lyon could be considered a distribution centre for intermediate cargo (thruport).



 Table 4.2
 The largest infrastructure management companies in the world (by worth of concessions, 2008). Source: Public Works Finance (Soler, J., Ye, L., 2010.

Algeciras, for its part, opened rail shuttles to Madrid, Barcelona and Zaragoza (Spain) in March 2009, all the while maintaining its sea routes to North Africa, including Maersk weekly service, Algeria.

The opening of distribution centres to the Mediterranean area for Asian companies could be an attractive product. The collaboration between ports and inland regions is essential here to free up space on the docks, concentrating loading on dry ports, offering storage services and even accumulating the many empty containers that generate unequal trade with China.

# 4.4 PPP example for MED port-hinterland developments: SPHIIS

Within the FUTUREMED project, a number of pilot projects have been foreseen. The Spanish Port Hinterland Intermodal Information System (SPHIIS) worked inside the Interoperability Framework and Visibility Platform of the FUTUREMED project, in which public-private partnerships have a place within this Interoperability platform. The main objective of the pilot was to improve the efficiency and visibility of intermodal seaport-hinterland containerized transport corridors on transnational maritime door-to-door transport chains, through the development of interoperable solutions and standards to integrate port systems with inland logistic infrastructures. This improvement in integration involves not only terminal operators at seaport and inland facilities but also all related stakeholders in intermodal corridors such as railway operators, shippers, railway undertakings, maritime agents, freight forwarders, truck companies and customs (Figure 4.3).



*Figure 4.3 - Graphical representation of SPHIIS pilot and the actors involved. Source: Zaragoza Logistics Center (FUTUREMED project).* 

The pilot was developed in the Valencia-Zaragoza corridor, which connects the Port of Valencia, a main container port in the Mediterranean, with the Logistics Platform of Zaragoza - PLAZA, the largest logistics premises on the European continent (Figure 4.4).



Figure 4.5 shows the different systems involved in the pilot development. The main system is the Valencia Port Community System (PCS), which has already developed many links with other transport chain actors, especially with those related to maritime area (maritime agent, shipping line, maritime and rail port terminal operators) and customs. Although the PCS has some links with the inland actors (railway operator, railway undertaking, road transport, inland terminal, shipper, freight forwarder), the pilot project aims to develop additional ones that achieve the objectives set by the analysis carried out.



Figure 4.6 shows the solution proposed based on standards, that allow the exchange of information. This application will support the Web services for document exchange between actors and between actors and existing solutions (Customs, Port Authority, Spanish Railway Infrastructure Manager, Terminals Operating Systems and railway company Transport Management System).



Figure 4.6 - Figure 6: SPHIIS Web platform. Source: Zaragoza Logistics Center (FUTUREMED project).

#### 4.5 Conclusions

The necessity and benefits of public-private partnerships are clear within the maritime sector. This cooperation allows private participation in major projects, sharing risks traditionally assumed by the public sector and private contribution to the financing of such projects (Commission interpretative communication, Brussels 2008).

With the establishment of these relations the competitive position of ports is favoured, hinterlands are effectively extended and land transport infrastructure is improved, connecting, for example, the Mediterranean ports with the large consumer market in Northern Europe.

With regard to recommendations, it would be interesting to highlight the following:

- Uniform European legal framework to avoid distortions.
- State support to connection infrastructures.
- Develop a higher involvement of the private sector in formulas "PPP".
- Structuring works in railway and river lines promoted by private companies or in cooperation with port authorities.
- Relaxation of conditions for integration and vertical cooperation between ports, shipping companies and infrastructure managers.
- Increased interest of large infrastructure groups in the rail and river transport investments (some large groups have not yet acted in the port sphere).
- Continue the gradual liberalization of rail transport, already begun by the EU, which could facilitate private participation and, therefore, the re-launch of this way of transport for the benefit of ports.



# VISION MARKETING PROACTIV PLAN SOLUTION BUSINESS MANA GEMENT ANALY Sis

# The multiple functional roles of port community systems roles in the Mediterranean countries

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**FUTUREMED** 

#### 5.1 Introduction

At present, ports are currently facing multiple challenges. These challenges consist of the continuous traffic growth, concentration of the maritime industry with mergers and acquisitions, the use of increasingly larger ships linked with hub and spoke models that concentrate operations, the need for higher efficiencies at ports and port-hinterland door-to-door corridors and increased pressure to comply with environmental and security requirements. Within this context, information and communication technologies (ICT) play a key role in leading ports in order to face many of these challenges.

Besides Port Management Information Systems (PMIS), Customs Management Systems (CMS) and other regulatory agencies systems, Terminal Operation Systems (TOS), Transport Management Systems (TMS), etc., the most ICT related extended concepts to support the modernisation of the ports and trade facilitation are the "Single Window" (SW) and the "Port Community System" (PCS).

#### 5.2 The Single Window Concept

Single Window is a broadly used term in the area of international trade and transport. Efforts have been made to define and describe this term and its associated concepts. The idea of a Single Window challenges the conventional models of regulatory control of the movement of goods and means of transport.

A Single Window is not an Information Technology (IT) system but a philosophy of governance in which traditional structures of government are transformed into new arrangements to serve the needs of citizens and businesses. Under this approach, citizens and businesses would receive government services through a single interface to the government (WCO 2011).

The Single Window concept examines regulatory controls through the eyes of the port user and views all interactions between transport, trade and regulatory agencies without regard for the internal divisions within government institutions. This approach highlights all of the procedural redundancies such as the duplication in the filing of information and the wastefulness involved in the overall effort in fulfilling cross-border regulation. From this analytical approach, a set of solutions arises that greatly simplifies the government-trade interface by reorienting procedures and reorganising regulatory data requirements.

In more general terms, the Single Window approach can be applied to different types of government entities. For instance, different governmental departments could re-organise their back-offices that are responsible for the delivery of individual services under one roof, such as issuing a driving licence, parking rights, benefits administration, etc. Similarly, the same concept can also be applied to the complex regulatory processes in the international trade.

As a summary of the concept, the United Nations (UN/ECE 2005) in the Recommendation 33 describes it as "a system that allows traders to lodge information with a single body to fulfil all import or export related regulatory requirements". This is the most widely acknowledged definition.

This institution (UN) points out that a Single Window environment provides one entrance, either physical or electronic, for the submission and handling of all data and documents related to the release and clearance of an international transaction. This entrance is managed by one agency, which informs the appropriate agencies, and/or directs combined controls. For this reason, trade actors are strongly in favour of Single Window approaches because it creates the vision of a dramatically simplified interface for cross-border regulatory agencies (CBRA), and in recent times, the value of SW, as a trade facilitation tool, has been increased enormously.

It should be noted that apart from customs, there are a number of government agencies that are in charge of examining and controlling the goods crossing the border, such as agricultural inspection, controllers of drugs and pharmaceuticals, sanitary inspection, veterinary inspection and controllers of norms of quality and security of products. Currently, due to the lack of sharing of information among these agencies, an undesirable effect for the trader exists in the form of providing the same information to different government agencies. Consequently, multiple inspections are carried out by these agencies at different points in time and the as-



sessment of regulatory risk is carried out on the basis of agency specific data and not on the entire data that the government receives from traders.

In addition, as part of this complex problem, on the one hand, any one of these concerned government agencies could propose a project to establish a cross-border regulatory Single Window and on the other hand, port or cargo community systems that have been implemented in several countries already provide a single point of interface between the logistics operators at the port and the trade and transport community. These systems have acted as an interface in some cases, with Customs providing the means for customs to control goods movements more efficiently. Therefore, stand-alone systems built by government agencies and cargo communities have evolved over the years by developing extensive inter-linkages to share information and to facilitate trade. Some of these systems have also positioned themselves as Single Window solutions.

In this sense, taking into account the mentioned difficulties, there are some questions that may arise around the Single Window concept. Some of these questions have been pointed out in WCO (2011) and are reproduced herein: should there be a single "Single Window" or should multiple "Single Windows" coexist? If for any reason, should multiple Single Window solutions emerge for different sectors (maritime, trade, transport, customs) in support of international trade, how would these single windows interact with each other? Is the Single Window a single automated system or a collection of inter-connected systems operated by different agencies? Should there be a single orchestrator who manages the development of these multiple "Single Windows"?

An appropriate response to these questions is to consider a Single Window as a framework or environment. Thus, the Single Window environment will be composed of a shared space between individual cross-border regulatory agencies, their respective regulatory roles, legal requirements, business processes and automated systems.

In this sense, the process of building up a Single Window environment is a complex task due to the need to harmonise the objectives of all the actors involved and numerous changes may be required. In fact, phases of the implementation of Single Window projects sometimes extend beyond 5 years. Each phase and sub-phase is built upon the previous phase leading to progressive simplification for trade and more processing elements within the environment. Moreover, the targeted environment may not be the result of a single project but could be the outcome of a set of projects.

Therefore, it can be asserted that there is no single way to build a single window environment. Different solutions could exist around the world and it is important to understand the similarities and differences between these solutions. But, the common aspect to consider in all of them is that the Single Window should be designed to reflect its true business needs.

At present, advances in Information Technology interoperability and IT architecture have introduced new paradigms in understanding how organisations can collaborate and encourage transformation. These advances clearly have a bearing on the way government agencies can collaborate between themselves and with the private sector. New ways of collaboration have been invented and new architectural paradigms have enhanced their popularity since the United Nations published the Recommendation 33.

#### 5.3 The Port Community System Concept

Information flows at modern seaports are very complex as they involve a large number of different agents, generating a lot of paperwork. Process standardisation and the advanced management of information flows between them will be a key factor to coordinate and enhance the efficiency of logistics chains. Port Community Systems (PCSs) are technological platforms that link actors in the transport chain so that they can efficiently manage the information associated to international trade.

According to the International Port Community Association (IPCSA, 2011), a PCS is defined as an electronic platform that connects multiple systems operated by a



Figure 5.1 - The port community at the same virtual table. Source: valenciaportpcs.net Copyright © 2014.

variety of organisations that make up a seaport or an airport community. Two key characteristics of a Port Community System are:

- It shall be a neutral and open electronic platform enabling intelligent and secure exchange of information between public and private stakeholders in order to improve the competitive position of the sea and air ports' communities; and
- It shall optimise, manage and automate port and logistics efficient processes through a single submission of data and connecting transport and logistics chains.

PCSs deliver both B2B (business-to-business) and B2G (business-to-government) services or messages, and even G2G (government-to-government) services in some cases.

The vision of a Port Community System shall be to enable the electronic exchange of information between all port and logistics sectors and it is acknowledged as the most advanced method for the exchange of information within a Port Community infrastructure.

A port community system is constituted by a platform for information exchanges linked to a port, and therefore geographically restricted, which primarily seeks to serve the interests of the various companies and entities linked to port activities. A relatively wide variety of companies are involved, which include terminal operators, transport operators (maritime/oceanic, road and rail), freight forwarders, customs, cross border regulatory agencies and port authorities (TrainForTrade 2009).

One of the reasons for creating port community systems is that port service users and customers need anincreasing amount information every day to innovate and to optimise their own processes. Such innovations in the trade, logistics, transport and port sector should not only contemplate the internal approach of each individual company, but look beyond this to see the companies and other entities related to transport as links in one single chain where the speed of the chain is determined by the slowest link. Therefore, all the parties involved in the transport chain must make a firm commitment to innovation and technological innovation processes to be prepared for the future and behave as a virtual enterprise.

Essentially, PCS's respond to the need to focus on maximising physical infrastructure and managing the efficiency of the port operation as a whole. The system exists in an environment where an important number of stakeholders play different roles in trade, and supply logistics and transport chains.

The existence of a port Single Window is not conditioned on the existence of a port community system. We can find ports where there is no port community system

but there is a single point of entry for the presentation of declarations by means of a Single Window. On the other hand, we can find ports where there is a port community system but there is no coordination of the various government agencies that could give rise to a Single Window. Moreover, there is a fundamental difference between a Single Window and a PCS: a Single Window must be national in scope and, being national, it must be applicable throughout the country and in all ports, while a PCS has a more local scope, which makes it possible to be limited to a single port.

#### 5.4 "One Time Submission", "One-stop Shop", SW and PCS

The defining characteristic of a Single Window is the "one time submission" of information to government agencies whilst seeking information from traders and transport participants. This enables the application of regulatory measures on cross-border movement of goods (including import, export and transit, and all means of transport). Any of these government agencies could establish a Cross-border Regulatory Single Window. For example, a Maritime Authority may raise the idea of a Maritime Single Window facilitating the services associated with the electronic reporting for ocean-going vessels<sup>[1]</sup>.

Similarly, a PCS provides a "one-stop shop" interface between multiple operators and stakeholders offering a clearing centre for port services trade, logistics and transport. By doing so, it avoids double input, maximises the use of existing infrastructure, optimises port processes and increases transparency, respects confidentiality, supports business needs and minimises changes. PCSs even act as the interface and gateway between Customs and the trade and transport community by providing the essential functions and features to carry out customs formalities.

"One time submission" and "one-stop shop" means that is not necessary for a trader or transport operator to provide the same piece of information multiple times to multiple stakeholders. However, it does not imply the delivery of the bulk of information in a single transmission of data. Information may be submitted in multiple transmissions, allowing the traders to provide data incrementally

In fact, it has now been mandated by the Directorate of General Mobility & Transport of the European Union that all Member States of the European Union shall accept electronic reports from ships or their agents via a Single Window at the earliest and no later than June 2015. Such Single Windows have been described as "Maritime Single Windows" (OJEU, 2010). Such a Single Window may have to work alongside other Single Window facilities provided by Customs and Trade licensing authorities.



Figure 5.2 - PCS as gateways to National SW. Source: EPCSA (The role of PCSs in the development of SWs Note: NSW stands for National Single Window.

according to the logic of business processes covering cross-border operations and regulatory clearance in its entirety. Such interactions require the standardisation of information and documentation.

To sum up, the characteristic of (a) "one time submission" and (a) "one-stop-shop" is based on the following principles:

- Incremental submission of data. The ability to link-up individual submissions of data by a trader is part of the intelligence of a Port Community linked with a Single Window Environment.
- Harmonised regulatory declarations. Under a Single Window Environment, stakeholders are not obliged to submit the same data repeatedly to different agencies.
- Sharing of information amongst Cross-border Regulatory Agencies (CBRAs) and port community. It enables the use of the same data to coordinate port, transport and logistics operations with the required application of controls by the respective CBRAs, reducing important costs and delays.
- Harmonised CBRA response. Each CBRA can process its responses independently, but the single window shall provide a unique harmonised response that a port community system may intelligently distribute to the trader, logistics, transport and port operator simultaneously, thus avoiding the use of paper and automating the arrival and departure of goods and vehicles to/from ports.
# 5.5 Ports as virtual enterprises and the role of Port Community Systems

A port is like a virtual enterprise where assortments of specialised companies work together to provide a unified front to the customer. In most cases, the front-end company that provides services to the port user is not necessarily the organisation that provides all of the underlying services. In fact, the port front-end reveals very little of the numerous processes, document exchanges and organisational arrangements that go into the delivery of the service.

An important number of players take part in everyday port activities, serving the port traffic directly or indirectly, such as shipping lines, terminal operating companies, customs, port and maritime authorities, cross-border regulatory agencies and police, logistics service providers, freight forwarders, carriers, etc. All of these independent public and private players form the "Port Community", where each can be considered as a department of the same virtual company tied together by a common interest in maritime transportation.

The nature of relationships among the participants in the port community is the key element of the efficiency of the individual functions, the port's logistics system and the import and export trades of a country.

In this analogy, the management of this virtual enterprise is directly related to the governance of the seaport cluster where the Port Authority is a central actor. The Port Authority's main functions are focused on regulating and coordinating the port community. It could be said that the Port Authority should be the central element that guarantees the efficiency of port traffic.

In this sense, ICT tools, such as Port Community Systems, are a resource of vital importance for the effective and efficient performance of port activities. Consequently, facilitator or entrepreneurial Port Authorities need to treat ICT projects with the utmost priority due to requirements of new port governance models and increasing demands from public and private sector stakeholders for improvements in trade facilitation and performance.





Figure 5.3 - Theportasavirtualenterprise.Source:TradeFacilitationintheIntegrationMesoamericanCorridor IDB (Iberoamerican Development Bank) 2011

A PCS, as a "one-stop-shop", supports the commercial transactions of the virtual enterprise by being the only information carrier. It handles data input and output and also coordinates the business processes associated with the information exchange. A typical on-line transaction may involve numerous business processes and document exchanges, different individual companies and their respective management systems. However, the commercial transaction is able to come through within seconds because pre-managed business processes are sequentially executed behind the one-stop shop through the exchange of highly standardised electronic messages between various parties. The IT systems of the different organisations are fully interoperable and messaging between them is highly standardised.

Specifically, a PCS may enable a shipping line to electronically send a call request to the Port Authority asking for authorisation for berthing a container ship and receive the authorisation back electronically. In addition, a PCS may also allow freight forwarders to electronically book space in a ship, arrange land transport to pick up empty containers or send the cargo manifest to customs and receive an electronic customs clearance.

In summary, PCSs could be described as a "one-stop-shop" where all electronic shipment transactions can be performed and the many participants in the cargo network are easily accessible, connecting both private and public stakeholders in a single communication channel. Therefore, the PCS is ideally placed for becoming a backbone component of the 'Single Window' environment (IPCSA 2011).

Much like the EDI links of the 90s and the present day web-services, the integrative processes created in the Port Community System help to join business and services coming from different "real" organisations and to deliver a composite business service to the end user as a one-stop shop. The virtual enterprise emerges from these electronic interconnections and offers its services through the virtual interface of the entire port community through a network of collaborating facilities and organizations.

As previously explained, a one-stop shop allows traders to have a simple view of the transaction completely transparent to the complex and carefully managed series of exchanges that may take place between the different companies of the cluster. However, this is only one part of the story. Building a collaborative environment — in the case of Port Community Systems — involves moving from a situation where each participating organisation has its own independent concept of operations to a position involving process interdependencies and document exchanges.

Dominant organisations in a port community will have a greater chance for their interfaces in operation being accepted as interface standards regardless of whether or not these standards meet the "international norms", and will be adopted widely within the trading community that is part of the port cluster. Customs is a frequent example, given its centrality in most port operations that involves the flow of information. Port community systems can be configured with the following characteristics:

- ICT in ports is the result of a strategic association of the existing vertical silos of non-competing entities.
- No organisation can take unilateral steps to implement a single system that replaces the existing network of facilities.
- The standards adopted by the dominant IT systems would be followed by the entire community (dominant enterprise effect).
- A system orchestrator for building up the ICT environment in ports should be formally appointed.
- Formal agreements with participating IT Systems and organisations should be properly managed.
- A common ICT environment architecture should be established to guarantee sustainability of the solution (business, technology, security and data architectures).
- Service & interface standards should be enforced.
- Trust among the collaborating entities should be fostered.

### 5.6 The role of Customs in PCS

Efficient and streamlined Customs procedures are seen as vital for the functioning of ports which have to cope with increasing volumes and speed to meet trade demands. In 2004, the World Custom Organization (WCO) published the Customs Guidelines on Integrated Supply Chain Management (ISCM). These guidelines (WCO, 2004) stressed the need to implement common standards on customs control, risk assessment and authorised supply standards for becoming truly effective measures of protecting the international trade supply chain from acts of terrorism or other criminal activities, while pursuing established facilitation principles.

A tight collaboration of business stakeholders with Customs Administrations could help to reach more efficient and effective custom controls and risk management solutions. As stated in the WCO ICSM guidelines, since the supply chain consists of the physical origin-destination movement of the goods and the parallel movement of commercial data, the overall goal has to be to receive the necessary information to perform risk assessments as early as possible in the supply chain from the origin of the information to allow the free and smooth flow of the goods. A PCS shall bring the principles where timely and quality information used in intelligent processes are the most critical elements for an integrated supply chain management. As stated in the WCO ICSM guidelines, "where electronic systems which allow the exchange of information between interested parties (so called cargo community systems (CCS)), have



been established at ports (namely PCS) or airports by the participants in the transport chain, Customs should consider participating in such systems and receiving the data required for risk assessment through these systems".

In June 2005, the WCO unanimously adopted the so-called SAFE Framework of Standards. This agreement not only means that a unique international instrument was adopted to improve the security and efficiency of international trade transactions, but the basis of a new framework was established that affects the functioning of customs and the relationship between customs administrations and business. A PCS can contribute to the SAFE Framework of Standards in different ways such as:

- Harmonisation of electronic information
- Achieve integrated supply chain management
- Facilitate the generation of reliable and high quality advanced electronic information
- The integration of new technologies to facilitate the interchange of information and the preservation of the integrity of supply chains
- The strengthening of public-private collaboration
- Transferring good practices and establishing joint quality and security criteria in the supply chains
- Enable business and customs to work in conjunction to improve security conditions
- Facilitate international trade originating or occurring within the limits of each customs territory.

The commitment that WCO members have shown in implementing the SAFE Framework of Standards clearly demonstrates their intention to continue developing measures and instruments to help facilitate international trade, especially in the present economic and financial situation.

The objectives of the SAFE Framework of Standards are the following:

- To establish standards to provide supply chain security and increase reliability and predictability levels in transportation operations.
- To allow integrated supply chain management, including all modes of transportation.
- To empower the role, functions and capacities of Customs to respond to present challenges and opportunities.

- To strengthen cooperation between Customs and administrations to detect those trade and transportation transactions with risk to the security of persons or other merchandise.
- To strengthen the cooperation between Customs and businesses.
- To promote and facilitate the movement of merchandise through secure and reliable international logistical chains.

# 5.7 Key drivers for the establishment of a PCS and benefits

Key drivers for the establishment of Port Community Systems are twofold. On the one hand, the need for a standardised communication platform in order to improve the systems in terms of punctuality, reliability or costs and, on the other hand, the need to increase the competitive position of ports.

The critical need in the setting up of the respective PCS is to achieve an understanding between the different parties in the port community, each having divergent roles and different interests, whereby they agree on the procedures to be followed by all for the benefit of the overall port performance.

In an advanced landlord model, the port authority is uniquely positioned to take a leadership role in building a port community and setting the basis to successfully implement a PCS. The Port Authority is a neutral participant in the logistics business and is not benefitted by the cargo being moved by one agent or the other, but by the overall cargo being handled by the port in general. The agents perceive the Port Authority as the provider of the public infrastructure and, therefore, it is easy for them to assume that they are providing the public info-structure.

Generally speaking, the main benefits of a PCS are based on a network effect and are exponential according to the number and role of the logistics agents that are connected to the system. Among the benefits and motivation of PCS implementation we can find the following:

- More benefits to the port stakeholders i.e. increased efficiency, enhanced information flow, etc.
- Increase of competitiveness among other ports in the region
- Fulfilment of requirements from customers / stakeholders in the port
- Fulfilment of the port / national policy's requirements
- Optimal use of expensive and limited port infrastructure

• Increase of security and control of vessel and cargo flows by the responsible public bodies at the port

This being said, due to the complexity of the system and the number of stakeholders involved, it is difficult to put the benefits into numbers and since a PCS is regularly regarded as a strategic asset rather than profit-oriented, a traditional cost benefit analysis is not suitable for the task of evaluating its worth. In terms of costs there is, of course, the initial investment to develop the system. This includes the hardware and software necessary to maintain the operations of the PCS. Once operational there are a number of on-going maintenance costs to keep the system operational.

Each port is different and we can find many different types of PCSs addressing different combination of users or clients, providing different set of services and with different business and operation models, but in all the cases PCSs are key for the development of ports and the efficient management of maritime transport and international supply chains.





## Port-hinterland infomobility applications as key driver for accessibility

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### 6.1 Introduction

Within the framework of the FUTUREMED project, the accessibility of ports is a key topic addressed at different levels, such as at an infrastructural level, an operational one as well as in terms of information provision.

A pilot project has been conducted specifically on the issue of improving accessibility through information provision, by means of dedicated information technology applications in the context of port services and the services connecting the port with its hinterland. The main objective has been to design and demonstrate an infomobility system for passenger flows, able to dynamically integrate in real-time the information coming from the current port management systems and other sources, and to provide them to users with the aim to increase information accessibility and consequently the quality of services.

The pilot has been coordinated by the Lazio Region Direction for Mobility, also lead partner of FUTUREMED, in cooperation with the Port Authority of Civitavecchia and of North Sardinia. The territorial scenario of the pilot is depicted in Figure 6.1.



Figure 6.1 - Scenario of the pilot project on infomobility. Source: FUTUREMED project.

Infomobility can be defined as the provision of information aimed at improving the mobility of people and goods, characterized by high accuracy, and possibly real-time updating. It makes use of Information and Communication Technolo-

#### Port-hinterland infomobility applications as key driver for accessibility

gies (ICTs) and is related with ITS – Intelligent Transportation Systems, even if it is more oriented towards providing information on traffic and accessibility the on infrastructure. Current infomobility applications consist of dedicated websites, information services via SMS, variable message signs, smartphone apps, and so on. These applications can be used, for instance, to calculate the best route to a specific destination using public transport means or private cars, to know the available number of parking slots in a city, to know the time of arrival of a bus in a specific stop, to know the traffic congestion level in a specific road, with the support of maps and notifications.

In the context of FUTUREMED, the pilot project has been focused on infomobility applications concerning the ports of Civitavecchia (port of Rome, Italy) and Olbia (North Sardinia, Italy) and their respective hinterland, thus related to the traffic of passengers and cruise travellers.

As for the management of the involved ports, there is the need to guarantee quick and effective operations, to make r the fruition of the port services and of the local transport services easier, and to have a limited impact to the surrounding urban area (e.g. on traffic congestion). In addition, it is crucial to monitor and control all the transits, inside or outside the harbour area, and manage all the generated traffic, both for security and safety reasons, and for economic reasons.

In the following sections the developed applications will be illustrated.

#### 6.2 Infomobility on port services in Olbia

#### 6.2.1 Context and problems

The Port Authority of North Sardinia is a public entity established by the State and is subject to central government control. The Port Authority has the planning and policy functions and acts as the regulatory body of port operations and manages the ports of Olbia, Golfo Aranci and Porto Torres. This is currently the main Sardinian seaport system, and it counts more than six million of passengers, twelve million tons of cargos, and cruises traffic in constant evolution. For this reasons, there have been increasing efforts, to improve their competitiveness and make them more attractive within the Euro-Mediterranean setting.

The harbour sites of the Port of Olbia are facing heavy passenger and vehicle traffic, generated by leisure cruises and the regular ferry service. For the Port Authority of North Sardinia it is crucial to monitor and control all transits, inside and outside the harbour area, and manage all the generated traffic which can have a deep impact on adjacent urban areas. Ships and cruises are increasing, in number and

size, causing an increase in the harbour traffic and generating congestion in all the boarding operations. This situation can have a severe impact on the harbour infrastructure, which has not been designed for peak traffic, but it is sized to the average numbers of transits in the harbour. The same happens in the urban area close to the harbour.

The only current ICT facilities of the Port of Olbia are those that manage the security of the maritime station (access control, video surveillance) and the information on ships (monitors reporting departures and arrivals, berth, time,...). The port has no Port Community System implemented. The Port Authority does not currently provide any real-time information on the ships. They use paper documents to manage ship berthing. The maritime station is equipped with informative monitors, which are currently inactive.

#### 6.2.2 The piloted system

A prototype PCS has been designed, developed and tested in order to acquire, elaborate and provide the port users with all the information needed to increase the quality of the services and thus the accessibility of the port.

According to the best practices on PCSs acquired during the FUTUREMED project, the Port Authority developed a modular system:

- Ship-Info Module. This module processes data from the AIS system and generates ship arrival and departure records in specific tables of the PCS.
- Info-Port Module. This module receives and processes data received from other PCS modules, as well as data from other telecommunication systems, such as PMIS (legacy system of Italian harbour master's office) and LUCEV-ERDELAZIO (regional infomobility system of Lazio Region) and publishes it in a dedicated section of the PCS.
- **Check-in Module.** This module allows security workers use a commonplace iOS Tablet to scan barcodes on travel documents and provide the PCS database with departing passenger data.
- Arrivals Monitoring. This module will allow for monitoring passengers and cargo in arrival at Olbia through data exchange with other third-party computer systems (PMIS, those of several border ports, and those of the Navigation Companies).

The system is accessible through a dedicated web-portal named FUTUREPORT, collecting the information provision of the different modules above. A screenshot is reported in Figure 6.2.



Figure 6.2 -Screenshot of the FUTUREPORT web portal. Source: www.futureport.it.

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and the second second	Nove Alle pre	MOBY TOMMY 20:30	In partenza per Compagnia	LIVORNO MOBY
Ticket barcode scanning	Nave Alle ore	MOBY WONDER 21:00	In parterua per Compagnia	LIVORNO MOBY
5	Nove Allo pro	LURGI PA 21:00	In partenza per Compagnia	PIOMBINO MOBY
Assignment to ship	Nave Alle pro	ATHARA 22:30	In partenza per Compagnia	CIVITAVECCHIA TIRRENIA
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Checked-in passengers

Figure 6.3 - Process of the check-in module of the prototype PCS in Olbia.

From the FUTUREPORT home page it is possible to have access to different information of ships' arrivals and departures, to the infomobility services of Sardinia, Tuscany and Latium, and on weather conditions. Through a dedicated area for operators, it is possible to use an application to check-in tickets before boarding on a vessel.

As an example, in Figure 6.3 depicted the process of the Check-In module of the prototype PCS described above is depicted. This module allows the controlling operators to scan tickets before allowing the traveller to get on board. The application automatically operates a cross-check with the ship (if already docked and ready for boarding) and with the list of expected passengers. For security reasons, the Port Authority is thus enabled to know in advance the number of passengers moving through the port. This also allows for reliable statistics to be conducted.

### 6.3 Infomobility for hinterland services in Civitavecchia

#### 6.3.1 Context and problems

The Port Authority of Civitavecchia manages the main commercial ports of the Lazio Region, namely Civitavecchia, Fiumicino and Gaeta. While Fiumicino is basically a port dedicated to oil and yachting, Civitavecchia and Gaeta are commercial ports, the first being the most important when it comes to cruises. The port of Civitavecchia handled more than 2.5 Millions of cruisers in 2013, being the first port in Italy for cruises. Port land is a State property. The Civitavecchia Port Authority is a public entity established by the State and is subject to central government control. The Port Authority has the planning and policy functions and acts as a regulatory body for port operations. The Civitavecchia Port Authority can't be directly involved in terminal and port operations or be a shareholder in a terminal operating company located in its port area, but it can play a role in the integration between the port and the territory.

The port of Civitavecchia has implemented different systems to manage information related to the processes of the port, even if it has no PCS implemented. Specifically, the so-called "Giada" system (Gestione InformaticA Domanda Accosto = Information Management Berth Requests) is an application platform that can handle the exchange of information between operators and Public Administrations. It is owned and managed by the Port Authority. It is mainly focused on the information/data regarding the ships and their activities, ensuring a better flow of communications inside the port community. In this way it represents an important tool to strengthen the competitiveness of the port-system. The port is also equipped with the Automatic Identification System (AIS), an automatic tracking system used on ships and by vessel traffic services (VTS) for identifying and locating vessels by electronically exchanging data with other nearby ships, AIS base stations, and satellites. This system is owned and operated by the port captain's office. The Port Authority also manages the gates for the access control of vehicles to the port area. Different info-panels in the port offer real-time information on the status of the ships (berth, timetable, ...) to all the travelelrs (passengers and Ro-Ro traffic).

As for the **Port Authority of Civitavecchia**, the information on passengers mobility currently automatically collected by the available systems (Port Authority, Terminal Operator) are related to the ship-cycle. This kind of information regards the time of arrival and departure, berth and cargo transported. As for cargo traffic, the source of information used is the demand of berthing. This is a provisional document elaborated by the existing Giada system. The official document is the cargo manifest and is not elaborated by the systems of the Port Authority. The port is equipped with monitors on which all the passengers on departure can take the information on the ship, the departure time and the berth. The current systems don't provide the the passengers arriving on a ship any information regarding transport services and related timetables. These systems are anyway open and could be connected by web-services in order to provide real-time information, for instance using Luceverde<sup>[11]</sup>. Other issues are:

1 Luceverde Lazio is the regional infomobility system implemented by the Lazio Region and public available online at http://regionelazio.luceverde.it/



- The Luceverde Lazio system doesn't currently receive or integrate any real - time or static information from the Port of Civitavecchia and from the Port of Olbia.
- In Civitavecchia there are already existing web-services to provide real time information on the time of arrival of ships (delays) but they are not used since nobody accesses the information which is owned by the Port Captain's Office.

In the port of Civitavecchia two operations centres exist, the first in the Port Authority offices, the second at the Port Captain's Office. The official information on the arrival of a ship is generally communicated to the Port Captain's Office by phone or radio. An interface between the Port Captain's Office and the Port Authority system is missing, but it would be sufficient to allow the Port Authority to know time of arrivals and to publish them in real-time for the users.

#### 6.3.2 A pilot "app" for cruisers

Due to the relevant traffic of cruisers through the port of Civitavecchia, a pilot infomobility system has been developed (see Figure 6.4) and specifically an App for mobile devices has been launched and tested with the users. The objective, starting from the current scenario of the port described above, has been to integrate in the current port



Figure 6.4 - Concept layout of the pilot infomobility application in Civitavecchia.

Real time	Itinerary	Ships	Trains	Bus	Flights	Port	FutureMed	11
1	di ROMA	5	Ship	Arriva	al and D	epart	ures	
	Arrival							
Date	Hour	Shi	ip			1	Wharf	From
13 05 2015	06:00	NEF	TUNE GALL	ENE		1	25(S)	BORUSAN
13 05 2015	06:00	NOF	WEGIAN E	PIC		1	12BIS(N)	BARCELLONA
13 05 2015	06:30	BON	BONARIA				18	OLBIA
13 05 2015	07:00	ANT	ANTHEM OF THE SEAS				13(S)	NIZZA
13 05 2015	07:00	BER	BERLIN		BERLIN 13(S)		13(S)	VENEZIA
13 05 2015	08:00	SOV	SOVEREIGN		EIGN 12BIS(S)		12BIS(S)	NAPOLI
13 05 2015	14:30	MAJ	MAJESTIC		2		TERMINI IMERESE	
13 05 2015	16:00	MSO	MSC POH LIN		:	25(N)	GIOIA TAURO	
14 05 2015	08:00	COS	COSTA FORTUNA				12BIS(N)	SAVONA
14 05 2015	12:00	CAL	CALA PULA			1	25(S)	MOIN
15 05 2015	06:00	QUI	QUANTUM OF THE SEAS			1	13(S)	BARCELLONA
15 05 2015	07:00	SILV	SILVER CLOUD				12BIS(N)	VENEZIA
15 05 2015	07:00	CAF	CARIBBEAN PRINCESS				SOUTHAMPTON	
15 05 2015	10:30	MAJ	ESTIC				16BIS	TERMINI IMERESE

Figure 6.5 - Screenshot of the infomobility application showing the status of ships in the port of Civitavecchia.

mobility system information on mobility. FUTUREMED developed an infomobility application based on the integration of different information sources and basically on the regional infomobility system Luceverde Lazio, provided by the Lazio Region.

In this way, an integration module has been developed to put together all the information coming from different sources, and related to: public transport services available from and to Civitavecchia (trains, bus, flight info), ships' arrival and departing (see also Figure 6.5) status, weather conditions, an interactive map of the port, and so on.

A relevant and innovative module that has been developed is the Multimodal Travel Planner (see a screenshot in Figure 6.6). This is an application devoted to the search of the best route by car of public transport, considering the actual and real-time offer and also the current status of traffic. It has been developed in order to the users of the port, specifically cruisers not organized, a mobile app through which they can plan their trip in advance. The application can be downloaded as they are approaching the port and can get access to the port wi-fi network. A cruiser wishing to plan its travel can receive all the information on its mobile and use the multimodal travel planner to acquire information on all the public transport services (trains, bus) running close to the port.

Through the web portal of the mobility company of the port passengers have access to all the information they need, in which complementary information can be found, for instance on touristic itineraries.

#### **FUTUREMED**



Figure 6.6 - Screenshot of the multimodal travel planner.

#### 6.4 Conclusions

The pilot described above resulted from the cooperation of the Lazio Region Mobility Department, who coordinated the FUTUREMED project, the Port Authority of Civitavecchia and the Port Authority of North Sardinia. The common objective has been to demonstrate the role of infomobility to improve the accessibility of a port, specifically for what concerns passengers traffic, both generic travellers and cruisers. The availability of information on mobility through mobile devices (smartphones), web-portals or screens in the port area, enhances the fruition of the port services and makes the port more attractive to users.

The prototype PCS developed by the Port Authority of North Sardinia demonstrated the opportunities both for the port authority and the port users to acquire, elaborate and present real-time and reliable information on the services of the port. With the system the Port Authority has been able to acquire travel information on ships and monitor them on screen, complemented by analysis and statistics. The development of a web-portal also allowed the users of the port to access information on waiting times, mobility services to and from the port, and mobility services at destination (Livorno, Civitavecchia). Particularly of interest and value, the check-in module revealed to be fundamental to improve the security of passengers in the port area and to have reliable statistics to well dimension additional services. The Port Authority is in the process to full develop the prototype.

#### Port-hinterland infomobility applications as key driver for accessibility

The infomobility system developed in Civitavecchia and provided through the web and a mobile app revealed to be very interesting to the users who tested it in real life. In the port it is now possible to access real-time and accurate information on the mobility public services available, trains or busses, be informed on the status of the road traffic. Information also includes the current status of ships arriving and departing, actual schedules and number of berth for boarding. The infomobility module has also been included in the port mobility system portal, complementing the current provision of information to the users.





## Information based visibility for facilitating ports & maritime policy development

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### 7.1 Introduction

Information based visibility is an area of great potential and a current need identified by both industrial as well as policy makers in the Mediterranean maritime arena. Following a large transnational survey between seven Med countries that took place during the first year of the FutureMED project, information visibility seems to be a critical, yet weak link and a priority in both Mediterranean maritime based intermodal Supply Chains and cruise ecosystems. The main messages that came out of this exercise highlight:

- the existence of a Multitude of Actors and of a Wide Variety in Information Provision Sophistication
- the Fragmented Mediterranean Port-Centric Intermodal Services Visibility
- the Limited or Missing Interconnection between Relevant Actors' Systems
- the lack of Cruise-Related ICT Solutions that Focus at a Mediterranean-Level.

Information visibility is an important asset for both the industrial actors, facilitating and optimizing their day-to-day operations, as well as for policy planers and decision makers at different levels (local, regional, transnational).

Policy making is an important yet delicate process that, if properly structured and exploited, can support the development of the Mediterranean maritime network, benefiting transportation and other interrelated areas such as tourism, employment and social cohesion. In the complex Mediterranean maritime network, of around 480 nodes (ports and terminal) located in a dense populated area with more than 250 million consumers living closer than 150 km of Mediterranean coastline, to be effective, policy making process should rely on the 'integrated' picture and on the evolution analysis of a variety of aspects affecting the system operation.

Taking into consideration the above needs, FutureMED focused on the development of smart ICT tools that are based on the exploitation of information visibility to facilitate ports and maritime policy development. In the framework of this 3-year strategic project of the MED programme, two ICT platforms were developed aiming to provide integrated information visibility in the port-centric intermodal freight supply chains and within the Mediterranean cruise sector. In this paper we present those two ICT platforms with a particular focus on their specific tools and relevant services developed to facilitate policy planning and decision making, relying in both cases on a dedicated Key Performance Indicators' (KPIs) system in the form of a dashboard.

Setting up a KPI system implies that this should facilitate an effort to assess, manage and improve the current situation. Performance measurement and target-setting are important to the growth process and they facilitate the achievement of strategic or operational goals. Based on a 3x3 KPIs' matrix, FutureMED dashboard, provided by the two information visibility platforms, serve as evolution monitoring mechanisms focusing on key parameters of each examined environment (e.g. accessibility, services etc) and on specific policy intervention levels (eg regional, Med).

## 7.2 Med port-centric Supply Chains Visibility Platform: an Intelligent Visibility integrator

Supply Chain Visibility is perceived as the "ability to access or view pertinent data or information as it relates to logistics and the supply chain, regardless of the point in the chain where the data exists"<sup>[1]</sup>. Interoperability<sup>[2]</sup> on the other hand, refers to the ability of Information and Communication Technology (ICT) systems and the business processes they support, to exchange data and to enable sharing of information and knowledge. Interoperability, as identified in one of the EU 2020 Strategy flagships, the Digital Agenda for Europe<sup>[3]</sup>, is essential to maximize the social and economic potential of ICT.

FutureMed Visibility Platform<sup>[4]</sup> is a central virtual information hub developed by the Hellenic Institute of Transport<sup>[5]</sup> with the aim to provide port-centric intermodal chain services' visibility in the Mediterranean territory. This virtual hub<sup>[6]</sup> collects, integrates and provides information on the port-centric intermodal SC to the different users of the Supply Chain. More specifically, the visibility platform integrates into a single functional and Graphical User Interface five major services providing:

- visibility of the available intermodal transport services (sea, rail, IWW) from all major ports of the world to each of the ports of the core and comprehensive TEN-T ports network in the Mediterranean and from there to an intermodal terminal in the European hinterland
- information on the "intermodal footprint" of all the Mediterranean freight ports (eg ports connected in a time distance of 3 and 7 days, and inland terminals reached within the next one or two days)

<sup>1</sup> Council of Supply Chain Management Professionals (CSCMP), "Glossary of Terms", 2010.

<sup>2</sup> CEC, "iDA: Interchange of Data Between Administration, European Interoperability Framework for Pan –European e-Government Services" FRAMEWORK, working document-V4.2-January 2004

<sup>3</sup> CEC, "The Digital Agenda for Europe - Driving European growth digitally", Brussels, 18.12.2012, COM(2012) 784 final

<sup>4</sup> www.futuremed.imet.gr

<sup>5</sup> www.hit.certh.gr

<sup>6</sup> Awarded with the Excellence performance Award (Transport& Logistics Awards 2015)

- proposed intermodal (sea-rail-IWW) routing from all major ports of the world to the European mainland terminals, taking into account the available transport services and their scheduling
- user based evaluation of the available services (maritime rail, etc.) on a corridor basis, based on specific criteria /determinants of transport means, terminal or freight corridor selection
- monitoring of intermodal services development of the ports to the hinterland by using an indicator system (port-centric intermodal chain evolution dashboard).



Figure 7.1 - FutureMed Visibility Platform



Figure 7.2 - Geographical footprint

Through the above services, the platform provides one stop shop port-centric intermodal chain services' visibility in the Mediterranean territory promoting port-rail integration. It addresses a wide spectrum of SC actors (shippers, Mediterranean port & rail terminal operators, shipping lines, rail operators and policy makers) which can benefit from the different services of the platform in various ways (Table 7.1).

	Actors	Benefits obtained by the platform
Shippers		provision of a Mediterranean-wide view of the Med ports that shippers can use as intermodal gateways to the Euro- pean hinterland (liner services and fixed schedule rail ser- vices connecting each Med port to a hinterland intermodal terminal).
	guidance on the combination of maritime-rail services they can use to have their cargo shipped from any major port in the world, to a Mediterranean port and from there to a hinterland intermodal terminal, and vice versa (inter- modal planner).	
		share their experiences with other shippers, on the quality and effectiveness of the services they have received along a specific intermodal corridor (service feedback).
		promotion of their role as intermodal gateway nodes and their services to/from the Mediterranean and the European hinterland
Mediterranean port rail terminal operate shipping lines and r operators	Mediterranean port & rail terminal operators,	gain insight on the development of competing Med port-cen- tric supply chains
	shipping lines and rail operators	gain insight on the development of their terminal's catchment area
		receive first-hand feedback on the quality and effectiveness of the services they provide by the actual users of those services (i.e. the shippers).
Policy Makers		gain insight on the development of intermodal accessi- bility, customised at the level of their interest and policy intervention (Mediterranean, national, regional)
	ranking of their interest area (region, port area) in rela- tion to other Mediterranean regions based on a number of intermodality-related criteria, thus substantiating the need for specific policies to bridge territorial perfor- mance gaps.	

## 7.3 Maritime policy development facilitator

An important goal that FutureMed aimed to achieve through the Visibility Platform (VP) was to provide services able to support policy actors on the maritime policy development process exploiting the VP's ability to provide an integrated view of the evolution of Mediterranean ports as intermodal nodes (port-centric intermodal chain dashboard service).

For this purpose a 2-dimension approach was followed combining the perspectives of the intermodal transport services providers (intermodal view) and of the territorial development and cohesion aspect (territorial view) in a single service, the **port-centric intermodal chain evolution dashboard**.



Figure 7.3 - Integrating the intermodal and territorial view

The combination of the intermodal and the territorial view, resulted in 9 groups of KPIs that meet the specific needs of the main users of the platform (service providers<sup>[7]</sup>, users of the logistics services and policy/ decision makers) in three policy interventions levels (namely the Mediterranean, national and regional level, and wider port area level). The following figure gives an overview of the different elements integrated in the 3x3 FutureMed KPI's based port-centric intermodal chain evolution dashboard.

7 shipping, rail, inland waterway, port management and rail terminals



Figure 7.4 - FutureMed 3x3 KPI's based dasboard

This 2-dimensional approach allows platform users to gain an insight into the current situation and at the same time monitor intermodal transport development having as a reference point the Mediterranean ports and focusing on different levels of analysis based on their interests (e.g. services of a particular shipping company or alliance, or all ports in a region or specific freight corridors).



Figure 7.5 - FutureMED port-centric intermodal chain evolution dashboard

The policy intelligence dashboard, provided by the VP is a data visualization tool, relying on a wide dataset<sup>[8]</sup> exploited by the different platform services, that displays the current status and the evolution of 18 key performance indicators (KPIs) grouped in the 3x3 matrix presented above.

The dashboard allows policy makers to monitor the evolution of key parameters of the Mediterranean port-centric SC network such as the accessibility, the available intermodal services and the key actors, in three main levels in line with the respective policy making levels, namely the lower level which is the port, the medium level -regional and finally the top level that concerns the whole Mediterranean.

The "performance" and the ranking of a port, a region and of the Mediterranean as a whole towards the selected KPIs leads to the identification of the strong and weak points in each case, which subsequently lead to the identification and prioritisation of potential policy intervention areas.

The monitoring of the KPI's and performance levels evolution can lead to a useful conclusion on the parameters that facilitate or block the development of a specific port/region etc. This is actually the main goal of the dashboard, namely to serve as a reliable policy support guiding tool by exploiting the wide variety of data and information provided by the Visibility Platform.

## 7.4 Promoting the Mediterranean Cruise: FutureMed cruise platform

FutureMed supports the development of sectors with a high potential for sustainable jobs and growth in the Mediterranean, in line with the targets of the EU Bleu Growth agenda<sup>[9]</sup>. Further to the port- centric intermodal freight transport, the project emphasised on one of the most important for the Mediterranean ports and countries sector, the cruise sector through the development of a dedicated ICT platform facilitating Mediterranean cruise development.

Cruise (cruising) is an important sector for the Mediterranean region with the Mediterranean Sea being the second biggest region globally, attracting 19.9% of the globally deployed capacity. As A.Pallis highlights in his recent ITF position paper on Cruise<sup>(10)</sup>, when exploring the longer trends and changes that occurred in the cruise industry over the past decade, the Mediterranean is considered to be the success of the decade gaining ground from the large Caribbean cruise market. In

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<sup>8</sup> Ports database, hinterland intermodal terminals database, maritime/ rail/IWW connectivity, services schedules, port-centric Supply Chain actors etc

<sup>9</sup> COM/2012/0494 final (Blue Growth opportunities for marine and maritime sustainable growth)

<sup>10</sup> Cruise shipping and Urban Development: State of the Art of the Industry and Cruise

the 2004-2014 period, the total number of cruise passengers in Europe increased by 136.2%. This great interest provided the incentive to cruise lines to build more itineraries throughout the continent, and foremost in the Mediterranean sea. It 2014 the Mediterranean cruise industry corresponded to 35.7 million bed days, noting a 160.6% over the period 2004-2014. The contribution of cruise in the European economy is of particular importance. In 2013, according to CLIA<sup>[11]</sup>, the cruise industry generated 16.2 billion Euros in direct expenditures. Italy, Spain, France, Greece and Cyprus, being important cruise destinations attracted 46% of the abovementioned amount.

Currently, ICT solutions facilitating Mediterranean cruise development are limited and focused mainly at a local level and in a fragmented way. This becomes evident from the long list of ICT applications that are still needed as the CEC's public consultation on maritime and coastal tourism recently reveale<sup>[12]</sup>. Also there is a lack & poor compatibility of KPIs and data and a strong need to promote dialogue among relevant stakeholders.

The Cruise Platform<sup>[13]</sup> developed by FutureMed, seeks to bridge the existing gap stepping from data fragments to an integrated view of the Mediterranean. This ICT solution brings together information from the Mediterranean cruise lines, ports and regions to facilitate the sector's future development. The platform provides an integrated view of the current state and evolution of the cruise sector in the Mediterranean. Policy makers, operators and cruise ecosystem members are among the beneficiaries of the platform. The main benefits for each actor type are presented in the next table.

Actors	Benefits obtained by the platform			
Cruise port & terminal	promote their role as cruise homeports and/transit ports			
operators	gain insight on the development of other regions and ports			
	promote their services to/from the Mediterranean			
Cruise Lines	have a Mediterranean-wide view of the evolution of cruise services serving the Mediterranean ports			
	can gain insight on the development of the cruise sector, customised at the level of their interest and policy inter- vention (Mediterranean, national, regional)			
Policy Makers	ranking of their interest area (region, port area) in rela- tion to other Mediterranean areas based on a number of criteria, thus substantiating the need for specific policies to bridge territorial performance gaps.			

*Table 7.2 - Benefits to the different actors' types* 

11 CLIA, 2013 State of the Cruise Industry Report

- 12 CEC (2013) Challenges and Opportunities for Maritime & Coastal Tourism in the EU
- 13 www.cruise.imet.gr

The FutureMed Cruise platform integrates into a single functional and graphical user interface that offers four main services involving:

- the provision information on cruise ports, cruise itineraries and schedules
- service newsfeed focusing on new services, port calls etc
- the Med cruise viewer, a KPI based dashboard service facilitating cruise development
- the cruise ecosystem, an area facilitating synergies identification and interface development



Figure 7.6 - Main services of the cruise platform

## 7.5 Cruise development facilitator FutureMed cruise Viewer

The KPI based consideration that was exploited in the Visibility Platform was also used in the Cruise Platform through which FutureMed also aimed to deliver a policy/ decision making facilitator in the form of a dashboard.

The Med Cruise Viewer service integrates in the form of a data visualisation dashboard, the territorial view covering three territorial levels (port, region and Mediterranean) and the cruise – centric view allowing to obtain insights on the cruise actors, available services and different aspects of the socio-economic impact of the Mediterranean Cruise .

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Figure 7.7 - FutureMED Med cruise viewer evolution dashboard

The cruise business intelligence dashboard relies on 10 Key Performance Indicators spread on the 3x3 groups. This tool can be exploited to provide insights on the Mediterranean Cruise targeting Policy makers, cruise operators as well as the greater cruise ecosystem. Some examples of the information that can be retrieved through this mechanism are summarised in the following questions list:

- How are cruise services in the MED (and my) region evolving?
- Which nearby services could be of interest to my region?
- Which cruise (thematic) products are offered & where?
- Which port clusters or regions are developing fast and which are slowing down?
- Which nearby services could be of interest to my port?

platform users can gain insight on the current situation and at the same time, through the cruise viewer they can monitor cruise development having as a reference point the Mediterranean ports and focusing on different levels of analysis based on their interests (eg actors, services provided by individual cruise lines or alliance, socio economic impact).

Policy and decision making is supported by the tool which provides the ability to monitor the 'performance', the evolution, as well as the ranking of each port/ region towards its 'competitors' and therefore identify the main intervention areas calling for policy support.



## The potential role of ICT in supporting the cruise sector's development

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### 8.1 Introduction

The maritime cruise industry is nowadays recognised as an important economic activity with expected increasing worldwide expansion trends. The Mediterranean is the second most important cruise destination, after the Caribbean. Increasing demand and higher customers' expectations call for innovative approaches in the field of management and also in providing of high level of services for cruise passengers.

One of the innovative fields in focus is also ICT. In particular, ICT technologies and the tools needed for providing all relevant information for cruise passengers about the port, cruise destination and its hinterland.

In that respect, new ICT solutions have many fold functions such as:: increase satisfaction of cruise passengers, increase consumption in the city port and hinterland and enable dynamic management and optimisation of the supply of services (including hinterland and city port transport) and goods.

In this chapter, the main development trends of the global and the Mediterranean cruise industry are presented in order to highlight the need for implementation of innovative ICT solutions. New solutions are needed not only to support the commercial aspects of the cruise tourism in the city ports and hinterland, but also to mitigate the negative side effects of cruise passengers in the city ports (e.g. congestions).

The concept of ICT solution for cruise passengers developed within the FU-TUREMED project will be presented in order to show the potential development path and expected benefits in case of implementation of a single information system in several Mediterranean ports.

### 8.2 Global and Mediterranean cruise tourism

Beginnings of the modern cruise industry could be traced back to the 1960s. Cruise ship companies were then concentrated on vacation trips in the Caribbean, and created a 'fun ships' image which attracted many passengers who would have never had the opportunity to travel on the superliners 30 or 20 years beforehand (Grace 2008). The 1970s and 1980s were a period of moderate growth, increasing from half a million passengers in 1970 to 1.4 million passengers in 1980 and 3.8 million passengers in 1990. In the 1990s, cruise ship tourism reached Europe, Asia and Oceania and started a period of high growth, which was led by economies of scale and fall in prices that made cruising available to a larger segment of tourists, even to those with lower incomes (Brida 2009).

Over the last ten years from 2003 to 2013, demand for cruising has increased from

12.0 million passengers to 21.3 million (+77%) worldwide with a 2.0% growth achieved in 2013. Over a similar period, global tourist arrivals, mainly land-based tourism, have risen by around 57% to an estimated 1.087 billion tourists in 2013. The UNWTO reports that 5% of global tourists arrived at their destination by water, cruise and ferry in 2013 (UNWTO 2014). According to the Cruise Market Watch, 24.1 million cruise passengers are expected to be carried worldwide by 2018, of which 58.8% will originate from North America and 27.2% from Europe.

Region	2003	2008	2009	2010	2011	2012	2013	10-Year Growth
North America*	8,23	10,29	10,40	11,00	11,44	11,64	11,82	43,6%
Europe	2,71	4,47	5,04	5,67	6,15	6,23	6,40	136%
Subtotal	10,94	14,76	15,44	16,67	17,59	17,87	18,22	66,5%
Rest of the World	1,08	1,54	2,15	2,40	2,91	3,03	3,09	186,1%
Total	12,02	16,30	17,59	19,07	20,50	20,90	21,31	77,3%

 Table 8.1 - International demand for cruises (mio passengers, 2003 to 2013)
 Source: Cruise Line International Association 2013

\* Including Russia and Central and Eastern European countries outside the EU-27.

The global cruise port system is characterized by a high level of regional concentration as well as a clustering of port visits. The observed destination patterns clearly underline the prominence of port visits around the Caribbean and the Mediterranean, in line with the operational characteristics of 7 days cruises calling 3 to 5 ports.



Figure 8.1 - The global cruise port system, 2011. Source: Rodrigue and Notteboom, 2013.

To understand the general picture of the current global cruise system, we need to also take into consideration a structure of cruise ship ownership. The cruise industry has a very high level of ownership concentration. The top three cruise companies Carnival Corporation (NYSE: CCL), Royal Caribbean Cruises Ltd. Co (NYSE: RCL) and Norwegian Cruise Line Holdings Ltd (NASDAQ: NCLH) account for 81.6% of the worldwide share of passengers carried and 76.7% of the worldwide share of revenues. In 2014, direct spending by passengers and crew at all cruise ports in the world was estimated at \$18.9 billion.

Carnival	Royal Caribbean	Norwegian	<b>Others</b> (18,4%)	
Corporation	Lines	Cruise Line		
(48,1%)	(23,1%)	(10,4%)		
Carnival (21,3%) Princess (7,9%) Costa Cruises (7,4%) AIDA (3,7%) Holland America (3%) <b>Other (4,8%)</b>	Royal Caribbean (16,7%) Celebrity (4.2%) Other (2.2%)	Norwegian (9,5%) Other (0,9%)	MSC Cruises (5,2%) Disney (2,8%) Other (2,4%)	

Table 8.2 - World market share of main cruise lines (% of passengers 2014). Source: Cruise Market Watch, 2015.

As pointed out earlier, the two main centres with the highest density of cruise ships are the Caribbean and the Mediterranean. Due to cultural diversity and the variety of nations, languages, landscapes and history, the Mediterranean has a great advantage compared to other cruising destinations. It has a significantly favourable geographic position among three continents with a large amount of modern and historical city ports, which enable diversification of the offer. Density of ports in the region enables the creation of differentiated itineraries of cruises. A great contribution in that manner is also the fact that the ports are modernized and renewed. Weather conditions are suitable for cruising from spring to fall, due to the mild winters in the Mediterranean. A cruise operator has also already started with some cruise trips during the winter and may therefore become all year round destination for cruising.

There are over 100 destinations in the Mediterranean area, providing possibilities for the cruise industry. On one side all these destinations are facing severe competition, but on the other, there are many possibilities for collaboration. In 1996 the Association of Mediterranean Cruise Ports – "MedCruise" was established in Rome in order to boost the cruise industry in the region and its neighbouring seas.


Figure 8.2 - Cruise Passengers Visits, Mediterranean, 2011. Source: Rodrigue and Notteboom, 2013.

The association is trying to help its members to develop their cruises with ensuring lines, promotion and possibilities to develop. Today MedCruise comprises of 72 members and 31 associated members, which represent other associations, tourist tenderers and agents. It stretches through more than 100 ports, 20 countries and 4 regions (Mediterranean, Black Sea, Red Sea and Near Atlantic).

## 8.3 Cruise industry development trends

As recognized by Jean-Paul Rodrigue and Theo Notteboom (2013), the cruise industry is a typical case of supply push strategy where operators are aiming to create demand simply by providing new capacity (ships). The first dedicated cruise ships began to appear in the 1970s and could carry about 1000 passengers. By the 1980s, economies of scale were further expanded with cruise ships that could carry more than 2000 passengers. Today the bulk of cruise ships is within a range of 3000 to 4000 and the biggest of about 6000 passengers.

According to the Cruise Market Watch (2015), worldwide cruise capacity of 486,385 passengers (7.3% increase over 2014) and 298 ships in total could be expected at the end of 2015. Only in 2015, 7 new ships were added with a total passenger capacity of 18,813. From 2016 to 2017, 15 more new cruise ships will come online

adding 39,637 to world-wide passenger capacity, or 8.1%. The new cruise ships (from 2015 to 2016) will add \$3.6 billion in annual revenue to the cruise industry.

The tendency to use giant-scale cruises will soon require adaptation of the Mediterranean ports to accommodate larger ships and destination ports to provide adequate land services. Huge numbers of tourists landing at a certain point and time requires well organized logistics services and well-functioning transport and other services. Capacity constraints are causing negative external effects like congestions and emissions. Because of that, there is a need to improve efficiency of port services, especially in the field of info-mobility, infrastructure capacities, accessibility and hinterland connectivity. Solutions are also sought after in the relevant field of ICT solutions in order to provide a high level of services and to decrease negative effects.

On the other side, the cruise industry is not focused only on mega ships that appeal to a mass market audience. There are also other three types of cruising known as "Niche Cruising or Specialty Cruising":

- small ships with less than 1.000 passengers that call on both popular ports and more "off the beaten path" destinations that may be inaccessible to mass market ships;
- smaller, luxury ships with superior levels of service, looking for both popular ports and "off the beaten path" destinations; and
- adventure or expedition which offers very exclusive experiences geared around learning and adventure, often to destinations that are more remote on very small ships (often less than 500 passengers).



To satisfy the needs of different tourist's, destinations have to provide a variety of services dedicated to particular interest groups. Beside the most popular cruise ports that are generating demand by themselves (Venice, Barcelona, Civitavecchia – Rome, Dubrovnik, etc.), cruise lines are searching for additional destinations that could diversify their offer. To attract as many calls as possible, destinations have to provide attractive hinterland excursions and take care of reliable logistics services. Cruise lines are even conditioning their arrival to some ports upon the high quality of local excursions since this part of tourist service contributes an important share to the revenues of the ship owners.

Although there has been extensive market and consumer research, the cruise industry seems to have a problem selling its rather diversified products (Papathanassis, 2012). This is particularly the case in the Mediterranean, which has very diverse offers, but very few thematic tours. One of the preconditions to do that is to know what customers are looking for and understand their personal and financial characteristics. Passengers distinguish themselves by culture, hobbies, goals and interest. There are also differences between American, European and Asian tourists. American tourists tend to enjoy and relax more on their trips. They allocate more time to free time, activities in nature and to the exploration of local food and drinks. European passengers are more interested in historic sites, local culture, nature and gastronomy. In contrary to American guests, their choices are always more thought-through. Asian passengers would usually rather stick to the group excursions with pre-determined groups. They take a lot of photos, send postcards and buy a lot of souvenirs. However the motives of passengers in the ports are quite common:

- to see tourist sights, cultural and historic heritage, famous people and events,
- to see tourist sites in the hinterland with the support of organized trips or in self-organisation,
- to experience local tourist offer (shops, souvenirs, restaurants, bars, etc.),
- to admire the view of the city from the ship,
- to get to know a destination's culture (way of life, language, food, habits, etc.) and
- to take photos of the place.

Trends show that operators are starting to offer more individualized approach for hinterland excursion trips. Some of them are offering bicycle tours and various shore-side excursions. Star Clippers operator introduced cruises with sailing vessels to improve passengers' experience. All these approaches influence the intensity of hinterland visits, thus creating more spending and greater organisational needs (Skips-Revyen. 2013). Internet and novel technologies also enable us to virtually see and experience places on earth without visiting them. Tourist destinations must today offer more than that. By designing and improving cruise itineraries, we must bear in mind that we are living in the era when an individual is and must be in the centre of consideration. Ultimate success is achieved when each individual gets a feeling of tailored made experience.

To make an impression on the cruise passengers, current tourist services need to be combined with their individual wishes and needs, taking into consideration also the toughest criteria: time limits (in the port) (Smrkolj 2013).

All these issues have to be taken into consideration by developing innovative ICT solutions for cruise passengers. The ICT solution should not only provide the relevant information for cruise passengers, but it should also be able to identify which aspects of cruiser stay in the port are valued the most by consumers (passengers), whether the services offered are relevant or not for the passengers, how they can/ should be improved and finally measure the satisfaction rate of service improvement. At the end of the day, all of this, effects of the cruise passenger's satisfaction rate, which is the most important element for the further development of cruise tourism.

## 8.4 ICT for supporting the cruise sector development

The accelerated emergence of information and communication technologies (ICT) is shaping our lives. The internet has dramatically affected jobs and business practices in all professional sectors. With the rising popularity of smartphones, people become used to being online and available all the time, and have access to all possible services 24/7. ICT is playing an important role also in all phases of cruise services, from booking to after sales activities.

Online booking and reservation process have become very important for the cruise tourism. In the execution phase, the management of efficient and effective information flow on cruise ships is essential for the success of a cruise vacation. The more complex the offered cruise product gets and the more extensive the onboard content becomes, the more difficult it is to provide the individual customer with the demanded information (Papathanassis, 2012).

Information systems are also playing an important role in the segment of cruise excursions. Excursionists come from the safe cocoon of the ship into a far more uncontrollable and ambiguous environment. The efforts of cruise companies have been concentrated on enlarging the microenvironment artificially by providing guided tours executed by contracted incoming agencies and intensive customer service in the port of call (Papathanassis, 2012). On the contrary, information

about other local services (and products) providers are lacking and all those that do not go for organized excursions have to search for the offer when they debark. Since they are limited by time, a lot of longer trips are inaccessible for them.

With the suitable ICT solutions, tourists could choose and pre-arrange their activities, according to their individual wishes, before they debark from the ship. In that case several local tourist offices could handle the diverse and rich offers, optimally manage the transport services and optimize passenger flows in the port.

Some local transport and tourist providers, already today, advertise their services on the web. Great variety of different offers, with questionable reliability and quality, is often more of a disadvantage than advantage. On top of that, it is difficult and often also quite time consuming, to find the appropriate transportation solution. From the non-structured information available on the websites it is often difficult to select the transport services, which would suit the most the individual tourists' requirements or preferences.

A Concept of mobility strongly supports the tourist industry, including omnipresent connectivity, location based personalization and a set of mobile applications for tourists. Tourist's applications are specialized ones, mainly providing detailed pieces of information on different points of interest, booking, navigation, but very few of them contain reliable, complex and updated information on mobility (infomobility). This is the segment that should be covered and further developed in the



near future.

In addition to that, applications should not merely replicate the information, which is (more efficiently) accessible via other channels. They need to evolve into platforms for interactive information interchange among tourists and destinations, as well as peers and friends with common tourist aspirations (Kennedy-Eden 2012).

Last but not least, ICT will also play a very important role when connecting tourists with things. The approach is known as the Internet of things (IoT), which is a broad concept of connected devices and solutions based on the data they provide. This is a relatively new technology domain in terms of established use-cases, so applications in tourism are rather rare (mobility would have been one of the first). However, the potential is immense, especially because "IoT" can provide really novel solutions to enhance existing as well as create new tourist services.

## 8.5 Cruise passenger information system FUTUREMED pilot

Analysis of the cruise passengers' needs, infrastructural and organizational bottlenecks in the port of Koper (Slovenia) revealed the need for implementation of the new ICT solution dedicated to cruise passengers and for the improvement of infomobility services in order to decrease the problems of congestion in the port.

On average, about 30% of cruise passengers take part in organized excursions in and around the port. Excursions are well organized and there are no information gaps.

The rest are staying on board or approximately 60% of all passengers opt for selfexploring visits through the city and hinterland. They are not organized, nor properly informed and they cause congestion in the phase of disembarking and embarking. In addition, the majority of those passengers remain in the city of Koper, they do not take the opportunity to visit other coastal cities or explore the near hinterland attractions, which negatively affects their satisfaction rate. This is caused mainly due to the lack of information about the tourist potential and the pending tourist services of the destination (according to the in - depth analysis, 45% of cruise tourists are not satisfied with the provided information on the above mentioned potentials).

The need to develop cruise passenger information is supported also by the study of Jaakson (2004) that revealed the following: cruise passengers, which are not properly informed of possibilities and options available at the destinations, are willing to delocalise themselves only 200 meters beachfront.

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That means that the potential of the destination is not exploited at all for the 60% of the non-excursion organised part of the cruise passengers. It may be concluded that there are many possibilities for improvement.

The above mentioned pattern of behaviour of cruise passengers is not typical only for the port of Koper, but it is similar also in all other destinations in Mediterranean from very small to the biggest port destinations.

Following before mentioned issues and the in - depth analysis of cruise sector needs, FUTUREMED aimed to develop the concept of operation (architecture) for the innovative Cruise passenger information system, which would serve as a tool for better management (scheduling, routing) of passengers' flows in the port, the city and the hinterland.

The main elements of the proposed system and its functionality are presented in the following figure:



Figure 8.3 - Cruise passenger's information system concept of operation.

The proposed system is based on the state of the art technologies and would contain two main interfaces:

- front-end for providing information to the end user in the most appropriate way and
- back-end, which is used for editing, publishing of the offers and managing/ optimisation of the supply side.

The main benefit of the proposed cruise passenger information system would be the establishment of the information database, which could serve as a basis for infomobility, analysis of the supply performance, planning and development of new services according to customers' demands and wishes, measuring the effects, supply improvements and for all other optimisations e.g. transport services. On the suggested web platform, passengers could get information on available (offered) services already before and during the cruise trip. Planning and booking in advance would allow passengers to form specific interest groups. In addition to the dynamic organization of tourist tours upon interests for predefined services would be possible. Offered transport services could be based on the predefined demands. Suggested turn by turn navigation, which should be part of the application, would allow for dynamic optimisation and provide logistically optimised tours based on the points of interest, time availability, dynamic changing of routes, etc.

The Proposed cruise passenger information system could not eliminate all negative effects of the cruise ships, but it could greatly benefit the plan of arrivals and help effectively scatter the passenger throughout the city or region. With the latter achieved, passengers would experience more of each destination, spend more and therefore contribute more to the local economy of certain destination.

We can support that statement with the results of a field trial of using mobile recommenders in the small city of Gorlitz in Germany. It revealed that people using the mobile recommenders saw in 1,5 hour around 4 times more as the group without a mobile device in 4 hours (Kramer, 2007). Taking into consideration these results we can conclude that the use of a cruise passenger information system would make the destination look 4 times richer and diverse and would also considerably increase the consumption.

## 8.6 Conclusions and recommendations

The tourist and travel industries were heavily affected by technological developments. The internet era enabled people to see places in advance, talk to people who had visited those places, book plane tickets and hotels, and all of these in the comfort of their home. Especially young generations are fond of this kind of travelling because they can adjust every little detail to their wishes and needs. That is the reason why individual journey planning around the globe rapidly inclines. To gain those kinds of travellers, all mass tourism providers are looking for new solutions in order to be able to offer new tourist niches or even micro-niches.

Nowadays cruisers are becoming larger and larger. Because of the economies of scale cruise owners are also more and more oriented towards mass tourism. However, content of tourist offers is following the trends of niche tourism during the

stops in different ports with which they try to meet various needs and wishes of each segment of passengers. Operators are trying to adopt the variety of tourist services in different ports to the individual interest and wishes of the tourists.

In order to achieve this aim new tailor made innovative information systems and business models are to be studied and developed. The new business model should integrate the interests of all stakeholders, such as: cruise owners, ports, transport and tourist operators, city ports, service providers etc., in order to be sustainable and successful.

The Mediterranean cruise market is maturing and therefore requires new approaches and new services to cover, as much as possible, niche passenger segments. The innovative ICT solution, which would be tailor - made for cruise passengers and applied, as a single version, in as many as possible Mediterranean ports, according to the highlighted FUTUREMED pilot project results, contribute to the improvement of the Mediterranean cruise tourism competitiveness and allow better exploitation of the existing individual potentials of the Mediterranean ports and their hinterland.

Development and introduction of new ICT solutions and new business models should not be considered as isolated goals. There are also environmental issues to be taken into consideration and tackled in order to be able to assure sustainability of cruise ship tourism.

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#### Partners

The project covers an extended geographic area and includes partners from Italy, Greece, Spain, France, Slovenia and Cyprus and associated partners also from Malta, Croatia, and Morocco. It covers the whole MED area.





Autorità Portuale di Civitavecchia













#### Lazio Region - the lead partner of the project

The Lazio Region Transport Direction is engaged in public transport management and planning of infrastructure and services for both the freight and passenger sectors. In accordance with the national plan for transport and logistics (Ministry of Transport 2010), port-railways intermodality, motorways of the sea, the development of ports and the increase of their competitiveness, along with telematics for freight transport, logistics and environment are priorities the Direction intends to address for the development of the region. www.regione.lazio.it

#### Port Authority of Civitavecchia

The Port Authority is a non-profit public entity, endowed with administrative autonomy, established by law 84/94, which attributes to it management, scheduling, coordination and promotional tasks as well as control of port operations and other commercial and industrial activities that take places within the ports, including powers of regulation and order. www.portidiroma.it

# Autonomous Region of Friuli Venezia Giulia - Central Directorate for infrastructure, mobility, spatial planning and public works

The Autonomous Region of Friuli Venezia Giulia, Central Directorate for infrastructure, mobility, spatial planning and public works, Mobility Division, has a long lasting experience and competence in the management of EU projects and in cooperating with partners at regional, national and international level. www.regione.fvg.it

#### Institute for Transport and Logistics Foundation

The Institute on Transport and Logistics (ITL) is a Foundation with pubblic partecipation that has been set up the 17 December 2003 to contribute to the development and the promotion of the logistics and transport systems in Emilia-Romagna region by providing research, consulting and training activities. www.fondazioneitl.org

#### Port Authority of North Sardinia

Ports and landscapes of sun and sea. The ports of Olbia and Golfo Aranci have a natural calling for tourism and cruising thanks to their morphological features, the quality of services offered, and their position in the heart of a land rich in priceless natural and historic-artistic beauty. www.olbiagolfoaranci.it

#### Hellenic Ministry of Infrastructure, Transport and Networks

The Hellenic Ministry of Development, Competitiveness, Infrastructure, Transport and Networks is the national body responsible for transportation issues, as well as IT services, in Greece. The main mission of the Hellenic Ministry is to plan and implement national policy on transportation and create the appropriate institutional framework, on European and international level, for the development of top quality transport, ensuring healthy competition conditions. www.yme.gov.gr

# Centre for Research and Technology Hellas / Hellenic Institute of Transport - CERTH/HIT

The Hellenic Institute of Transport is part of the Centre for Research and Technology Hellas (CERTH) which is a legal, non-profit entity organized under private law, under the auspices of the General Secretariat for Research and Technology (GSRT), of the Ministry of Infrastructure, Transport and Networks. www.hit.certh.gr

#### Thessaloniki Port Authority S.A.

Thessaloniki Port Authority S.A. is the company with the exclusive right to exploit the port of Thessaloniki which is situated in North Greece in a strategic position, serving as a gateway port for the Southern Balkan countries. www.thpa.gr

















TRAINOSE S.A. was established in 2005, initially as a subsidiary of OSE S.A., for the purpose of providing railway passenger and freight transport services. Today, this Greek State company operates independently from the OSE Group and is currently the only railway transportation service provider in Greece, with suburban, national and regional routes. www.trainose.gr

#### Fundación Zaragoza Logistics Center

Zaragoza Logistics Center (ZLC) is a research institute established by the Government of Aragon in Spain in partnership with the Massachusetts Institute of Technology and the University of Zaragoza. www.zlc.edu.es

#### Valencia Port Foundation

The Valenciaport Foundation for Research, Promotion and Commercial Studies of the Valencian region (Valenciaport Foundation hereafter) is a private non-profit research centre that was created in 2004. www.fundacion.valenciaport.com

#### AFT

The AFT, founded in 1957, is part of the AFT-IFTIM which is the leading organisation for training in transport, logistics and tourism in France. It represents 32 professional bodies and has 24 000 company members. With its 2 000 employees, the AFT-IFTIM trains over 200 000 persons per year. www.aft-iftim.com

#### University of Maribor

The University of Maribor is the second largest university in Slovenia educating about 22.000 students and employing about 1.800 employees. It is an autonomous, scientific research and educational institution with purpose to transfer knowledge through different educational programs. www.fg.uni-mb.si/tec

## BSC, Business Support Centre, L.t.d., Kranj – Regional Development Agency of Gorenjska

We are a regional development agency for Gorenjska and we meet development challenges together. We are building Gorenjska as a community which, with its healthy Alpine environment, enables us to work, live and entertain ourselves, as well as to fully unleash our creativity and ambitious ideas. www.bsc-kranj.si

#### Cyprus Center for European and International Affairs (CCEIA)

The Cyprus Center for European and International Affairs is an independent non-profit-making research center and think-tank, associated with the University of Nicosia. Since its establishment in 1993 the Center, has sought to advance research, contribute to the study and analysis of important economic, political, social and strategic issues of concern to Cyprus, the Eastern Mediterranean and the European Union at large. www. cceia.unic.ac.cy & www.unic.ac.cy

#### The Cyprus Ports Authority



The Cyprus Ports Authority (CPA) is an autonomous semi-governmental organization established by law in 1973. It is governed by a nine-member Board of Directors that is appointed by the Council of Ministers for a thirty month term. The Board applies government policy which is conveyed and supervised by the Minister of Communications and Works. The activities of the Authority are two-fold. According to its legislative framework, it operates as the administrative organization of Cyprus ports, which on the one hand has a public role incorporating administration, construction and management of port infrastructure and on the other hand, carries out activities with commercial value relating to the provision, coordination and control of port services offered. www.cpa.gov.cy



Publisher: Institute for Transport and Logistics Foundation



Layout & Printing: Maggioli Editore



