Integrated and Sustainable Transport in Efficient Network - ISTEN

DT1.3.4 - ISTEN past experiences knowledge database

WP no. and title	T1 Transnational Cooperation Network
WP leader	CERTH/HIT
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Planned delivery date	M10 – September 2018
Actual delivery date	M27 – February 2020
Reporting period	RP4.2

Dissemination Level		
PU	Public	X
PP	Restricted to other program participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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Document information

Abstract

The present document provides a list of best practices on port-hinterland integration, as identified by the ISTEN partners.

Keywords

Port, hinterland, best practice

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Document history

Version	Date	Reviewed paragraphs	Short description
1.0	15/02/2019		1st draft
2.0	07/05/2019		2nd draft
3.0	24/05/2019		3rd draft
4.0	30/09/2019		4th draft
5.0	29/11/2019		Draft final
6.0	18/02/2020		Final version

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1 Introduction

The present report presents a list of best practices in port-hinterland integration, identified by the ISTEN partners. A best practice can be defined as a procedure that has been shown by research and experience to produce optimal results and is therefore established or proposed as suitable for widespread adoption[1]. For ISTEN, this definition is expanded to include not only present practices which are proven to be effective but also any interesting, developing and promising practices in the field of port-hinterland integration. The term 'developing' refers to a practice that is in the concept or development stage and despite not being proven yet, it is showing potential for effectiveness and replicability. The term 'promising' refers to a practice which has shown to be effective in one case of implementation based on some subjective or objective data and has potential for replicability.[2]

Based on the above, a best practice (as defined by ISTEN) must exhibit all of the following attributes:

- to provide a solution to an identified port-hinterland integration problem with superior results when compared to present practices in the corresponding field, which
  - has been proven through objective and comprehensive research and evaluation in the case of an established and widespread practice, or
  - partially proven through subjective and objective data in the case of a promising practice, or
  - presenting a potential for superior results in the case of a developing practice[3].
- To promote port-hinterland integration attributes (efficiency, sustainability, innovation, cooperation & coordination within the port-hinterland corridor) through a unique and/or innovative idea in a way that differs from present practices.
- to be replicable and able to produce in other locations the same/similar results as in the reference case when certain defined prerequisites are met.

The best practices are being reported in Chapter 2, using a common structure, providing:

- a best practice overview, including its title and mission, the main bottleneck categories it addresses (as these were identified in DT1.1.1), the organisations that initiated the best practice and the ones that were subsequently involved and the sources that were used for the information provided
- a description of the best practice
- a description of the impact of the best practice in terms of efficiency, environmental sustainability, innovation embeddedness and cooperation & coordination of the respective port-hinterland corridor
- a description of the main requirements for the successful transferability of the best practice.

[1]Merriam Webster dictionary
[2]Sytel Reply UK, A methodology for identifying best practice for communications providers (www.reply.com)
[3]Compassion Capital Fund National Resource Center, Identifying and promoting effective practices, 2010

2 Port-hinterland integration best practices

Best practice overview			
Best practice title	BP 01: Port investments in hinterland infrastructure and services		
Best practice mission	To promote the development of a port-hinterland network for intermodal transportation through a ports' own investments in hinterland infrastructure and services.		
Bottleneck categories addressed	Market ☒ Institutional ☒	Infrastructural ☒ Innovation ☐	Operational ☒
Initiator of the best practice	Port Authority ☒ Regional Authority ☐	Terminal Operator ☐ Shipper ☐	Rail Operator ☐ Other ☐
Other organisations directly involved	Port Authority ☐ Regional Authority ☒	Terminal Operator ☒ Shipper ☐	Rail Operator ☒ Other ☒ *(Infrastructure developers)*
Information source	• Olaf Merk, Theo Notteboom, OECD - International Transport Forum: Port Hinterland Connectivity, Discussion Paper No. 2015-13. • Roy Van den Berg, Peter W. De Langen, Carles Rúa Costa, The role of port authoritie in new intermodal service development; the case of Barcelona Port Authority, Research in Transportation Business & Management 5 (2012), pp. 78-84. • Roy Van den Berg, Peter W. De Langen, Hinterland strategies of port authorities: a case study of the port of Barcelona, Research in Transportation Economics 33 (2011), pp. 6-14. • Jean-Paul Rodrigue, Jean Debrie, Antoine Fremont, Elisabeth Gouvernal, Functions and actors of inland ports: European and North American dynamics, Journal of Transport Geography 18 (2010), pp. 519–529. • Port of Barcelona: Annual report 2017 • Port of Barcelona traffic statistics 1998, 2017		
Reporting partner	CERTH/HIT		
Best practice description			
The decision of the Port Authority of Barcelona (Autoridad Portuaria de Barcelona - APB) to invest in hinterland infrastructure and services came as part of a change in the ports strategy which was			

initiated in 1998 with the aim of turning the port into a leading logistics hub in the Mediterranean region. APB realized that in order for the port to become more competitive, attract higher volumes of cargo and develop further it needed to enhance its connectivity to the hinterland and expand its catchment area. Furthermore, the growth in volumes, especially of containers, and the expansion of the ports' catchment area made intermodal transportation crucial for the achievement of economies of scale and the lowering of transportation costs.

The new strategy was realised through three consecutive strategic plans which marked the shift from the usual port practice of focusing on the port area's development to development of a supply change perspective. In this context, the second strategic plan (2003) aimed to the development of a hinterland network of services in order to efficiently connect the port to the hinterland and differentiate it from the other ports in the region. However, the private sector did not appear at the time willing to invest the funds required for the development of the necessary infrastructure despite the fact that the relevant projects appeared to be commercially viable for the private investors and at the same time beneficial for the port in several cases. This was mainly because of the uncertainty and long term nature of this type of investments. Thus, APB decided to become actively involved and invest in the development of a network of inland nodes in order to create a platform to start developing logistics services and lead the way for the establishment of a port-hinterland network. These investments, besides the attraction of cargo flows, aimed to increase the ports' market knowledge, to give some control over the hinterland network (mainly concerning the level of services) and also to demonstrate its will to make long term investments and improve rail connectivity.

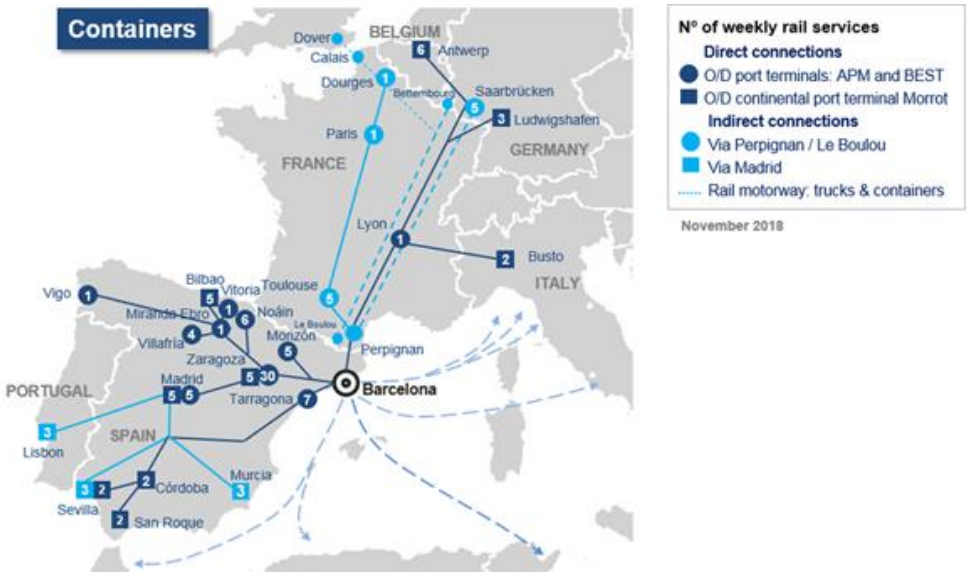
APB was previously involved jointly with other Spanish ports in the development of inland rail terminals, namely in the Puerto Seco de Madrid in Coslada and in the Puerto Seco Azuqueca de Henares. The latter opened in 1995 and was the first such facility in Spain. Within the context of its new strategy, the milestone concerning the active involvement of APB to the hinterland was the investment in the development of a rail terminal in Zaragoza where APB initiated and led the project. The terminal became of strategic importance to the future development of the ports' network in Spain and today it is a central node of its hinterland network.

The Zaragoza terminal is located at the intersection of two important corridors, the Ebro and the Iberian corridor, at the centre of an area delimited by the cities of Barcelona, Madrid and Bilbao which accounts for 70% of the Spanish GDP. The project was realised after a small initial investment in 2000 together with other organizations in a container depot called Terminal Marítima de Zaragoza (TMZ) next to an existing logistics zone (MercaZaragoza). In 2006 the port decided to develop in TMZ a rail terminal in cooperation with the Logistics Activities Area of MercaZaragoza (founded by the Municipality of Zaragoza and the Mercasa National Company) and the regional government. The operation of the terminal, which became operative in 2007, was granted by concession to a new operating company, TMZ services, owned by a group of shareholders which include TMZ (owner of the terminal), a terminal operating company (TCB – owned by APM Terminals), the state-owned rail operator (RENFE) and a developer of rail infrastructure (Comsa). The role of APB through TMZ involves the promotion of the terminal and the monitoring of the operator's compliance to the service standards which have been set.

In the years that followed the initial investments in the railway terminal in Zaragoza, the port realised also other similar investments, the type and level of involvement of which was different in each case according to the market demand and the local context. Today the portfolio of the port of Barcelona includes stakes in facilities in different locations in Spain and France, including Madrid, Zaragoza, and Perpignan. It is also working with local partners to promote the development of the Terminal Intermodal Marítima Centro, in the municipality of Yunquera de Henares in Guadalajara and together with the Public Company Cimalsa has formed a company to develop the intermodal logistics hub comprising the future Far de l'Empordà intermodal terminal and the current Vilamalla terminal near Figueras. These investments together with others that

followed APB's initiatives have led to the establishment of a hinterland network for intermodal transportation which connects the port of Barcelona to several Spanish and other European economic centres.

An important aspect of these investments is that APB regards them mainly as tools for the enhancement of the port's connectivity and not as part of its core business. Thus, in the case of the hinterland nodes, APB is willing to withdraw from those investments as long as an efficient, stable and sufficient volume of container flows is achieved and the investment is recovered.



The hinterland intermodal network of the port of Barcelona (source: Port of Barcelona)

Since 1998 when its first strategic plan was formulated, the annual throughput of the port has increased from 24.7 to over 60 million tonnes in 2017 and the container traffic from 1,095,113 to 2,968,757 TEUs. Furthermore, in 2017 the port of Barcelona was the fastest growing port in Europe with +26% growth over the previous year. Notwithstanding the fact that there are multiple factors which affect the volume growth of a port, in the case of Barcelona the investments of APB which led the way to the establishment of a hinterland network undoubtedly played an important role to this development.

Best practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	In order for the investments in hinterland infrastructure and services to be able to enhance the ports' connectivity to the hinterland, investments within the port area were made initially. These investments resulted in the increase of the port capacity and in the creation of a platform which is able to transfer cargo between different modes more efficiently.
on the **environmental sustainability** of the	The APB strategy resulted in an increase of competitiveness of rail transportation and a significant shift of cargo from road to rail. In 2007 the share of rail in the containers that moved between the hinterland and the port of Barcelona was 2.60% while in 2015 the respective

port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	percentage reached approximately 12.50%. The increase in the competitiveness of rail transportation is also evident from the fact that despite a decrease in the volume of containers between 2007 and 2009, the share of rail increased from 2.60 to 5.00%. In addition to the change in the modal share, the improved intermodal connectivity had the external effect of less road congestion in the area around the port and on the roads leading to it.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	The establishment of a hinterland network has promoted the information sharing along the hinterland corridors; the Port Community System of the port of Barcelona is not used only in the port itself but is expanded to include the inland nodes of its network such as the terminals in Toulouse, Zaragoza, Madrid and Lyon.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	The partnership of APB with multiple public and operational actors in its hinterland investments has created a platform for a more efficient cooperation between all those stakeholders on the basis of their common interests. Additionally, the active involvement of APB in the hinterland network of inland terminals provided to the port an insight into the corridor operations and also the ability to participate in the decision making, with significant benefits on port planning and the coordination level of the port-hinterland corridor.
Main requirements for the successful transferability of the best practice	
In terms of **national/local strategies & policies** to be already in place	The national/local strategies and policies must actively promote the establishment of a hinterland network for intermodal transportation. In the case of APB this is evident from the fact that the majority of the investments in infrastructure were realised together with other public organisations.
In terms of **legal and/or contractual requirements** to be already covered	The legal and institutional framework of Port Authorities must provide them with the flexibility to form and implement their own investment policy.
In terms of **infrastructure (hard & soft)** to be already in place	The existence of a rail network adequate to support the growth of intermodal transportation is crucial for the viability of a port's investments in inland terminals and rail services. This is evident in the case of the rail shuttle between Barcelona and Lyon, where the inadequacy of rail infrastructure compromised the viability and delayed the profitability of the undertaking.

In terms of **specific port-hinterland corridor characteristics** to be covered	The case of the port of Barcelona concerns a port with a clear captive area (Catalonia) which competes with other ports of Spain for the economic areas in Central Spain and also with other ports for areas in France (contested hinterlands). This situation which is comparable to the one prevailing in the ports of North Western Europe, was largely the reason that pushed APB to find a solution regarding the establishment of a hinterland network.
In terms of **technical and/or organisational capabilities** to be already in place	The existence of organisational capabilities regarding the formation and implementation of an investment plan and also the technical capabilities required for the design of an efficient hinterland network and its support through IT systems.
In terms of **stakeholder engagement & cooperation** to be already in place	The investment plans must be made in cooperation with the port community which will provide insight into the needs of the sector regarding intermodal transportation. Furthermore, considering the long-term nature of the investments, the engagement of private-sector investors which will participate in the undertakings must be gained in advance.
In terms of **financing for the implementation & operation** to be already available	The possibility of a port to make investments with a low Return On Investment (ROI) requirement (which APB as a public organisation has) is a key attribute for the realisation of investments in hinterland infrastructure and services. This is because of the long-term nature of these investments, which is usually incompatible with the planning horizon of private companies.

Best practice overview					
Best practice title	BP 02: Enhancement of visibility of port-hinterland services & infrastructure through the use of online platforms				
Best practice mission	To provide a better insight into the intermodal services and options to/from the ports and their hinterland to shippers and logistics providers in order to promote intermodal transportation.				
Bottleneck categories addressed	Market	☐	Infrastructural	☐	Operational ☒
	Institutional	☐	Innovation	☒	
Initiator of the best practice	Port Authority	☒	Terminal Operator	☐	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☒ *(Association of Inland Terminal Operators)*
Other organisations directly involved	Port Authority	☐	Terminal Operator	☒	Rail Operator ☒
	Regional Authority	☐	Shipper	☒	Other ☒

			(Inland shipping operators, logistics operators)
Information source	• https://www.inlandlinks.eu/		
Reporting partner	CERTH/HIT		

Best practice description

Inlandinks is an independent online platform implemented in 2011 by the Rotterdam Port Authority together with the Association of Inland Terminal Operators (VITO) with the aim of promoting intermodal transportation from/to the port of Rotterdam. The platform came as a solution to the need expressed by shippers and logistics operators for better insight into the intermodal hinterland services and options related to the port of Rotterdam. In 2007, the modal share of the port of Rotterdam was dominated by road transportation which accounted for 59% of the total hinterland transport, while inland shipping and rail accounted for 30% and 11% respectively. The ports' target for 2035 is for the modal share to be of a maximum 35% of road transportation and for inland shipping and rail to account for at least 45% and 20% of hinterland transportation respectively. InlandLinks is among the tools which Rotterdam has implemented in order to achieve its modal share targets.

InlandLinks collects information of inland terminals and empty container depots which are connected by rail/barge services to the port as well as information regarding the services of the respective rail and inland shipping operators from/to the port of Rotterdam. By integrating this information, the platform provides to shippers and logistics operators the functions of searching for and comparing inland terminals, container depots and intermodal connections, facilitating intermodal planning. More specifically, InlandLinks facilitates the selection of inland terminals through an overview and comparison of the terminals located near or in the immediate vicinity of the user, taking into account specific requirements, such as the existence of facilities for reefer containers. It also provides general information about the terminals (e.g. opening hours, available facilities) and allows users to directly request a quotation. As for the empty container depots, InlandLinks facilitates the selection of a pick-up/drop-off depot based on the location and/or the shipping line of the user. To ensure the quality of the information provided, inland terminals are annually assessed by the Lloyd's Register. With regard to the rail and inland shipping services, InlandLinks provides information about the frequencies of the available services and the transit times based on the departure point or destination of the user, while additionally allows for a selection of a service based on the transport mode or even on the specific operator. Finally, all information is integrated in an intermodal route planning tool, which proposes the three best intermodal routes from/to the port of Rotterdam for the user, based on the required point of departure/destination and the corresponding dates. This tool also provides information about the reduction of CO2 emissions of a specific intermodal route compared to the road alternative.

Currently, the platform includes information on 58 container depots and 85 inland terminals which are connected to the port of Rotterdam through rail or/and barge services by 14 operators. InlandLinks encourages terminals/depots and rail/inland shipping operators which fulfil certain criteria to register their services to the platform in order for them to benefit from the visits to the platform which are 4,000 per month on average and thus help InlandLinks to expand its coverage.

Best practice impact

on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	InlandLinks increases the efficiency of the port-hinterland corridors by providing shippers and logistics operators with the required information, such as the transit times and the availability of customs services to inland terminals, to facilitate the selection of the optimal route in terms of total transport time and cost.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	InlandLinks promotes the environmental sustainability of the port-hinterland corridors of the port of Rotterdam in several ways. The better insight into the hinterland network of inland terminals and intermodal services which InlandLinks provides, promotes the use of environmentally transport means (rail, barges) instead of road transportation. Furthermore, the platform provides information regarding the CO2 emissions per container transported, as well as a ranking of the efforts and measures taken by the terminals in order to reduce the emissions of their operations. This allows shippers and logistics operators to consider the overall environmental footprint of their operations during the route selection process. Finally, the empty container depot tool allows for empty containers to remain on an inland terminal to be re-used for export cargo instead of being transported back to Rotterdam and then shipped back empty to the hinterland for re-use. The environmental benefit of this process is significant, considering that approximately 25% of all containers handled in the port of Rotterdam (2.50 million TEUs) are empty.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	InlandLinks promotes the sharing of information regarding the facilities and operations of inland terminals and rail/inland shipping operators among the port-hinterland actors and provides insight into the intermodal transportation from/to the port of Rotterdam.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	InlandLinks increases the level of cooperation between the port, the inland terminals and the rail/barge operators through the sharing of information and the promotion of intermodal services. With regard to the coordination level of the port-hinterland corridors, the information provided through the platform (e.g. transit times to inland terminals) allows for shippers and logistics operators to improve the alignment of their operations.
Main requirements for the successful transferability of the best practice	

In terms of **national/local strategies & policies** to be already in place	There are no specific national/local strategies & policies required.
In terms of **legal and/or contractual requirements** to be already covered	There are no specific legal and/or contractual requirements.
In terms of **infrastructure (hard & soft)** to be already in place	No requirements additional to the software and hardware required for the operation of an electronic platform.
In terms of **specific port-hinterland corridor characteristics** to be covered	The implementation of a platform such as InlandLinks makes sense only when an established hinterland network of terminals and services is relatively dense and complex, offering multiple choices of modes and routes to the hinterland. In such cases the platform has the role of assessing and combining the elements of the hinterland network in order to help the shippers and logistic operators to plan more efficient routes.
In terms of **technical and/or organisational capabilities** to be already in place	Availability of technical capabilities for the development, implementation and maintenance (software and data update) of the platform.
In terms of **stakeholder engagement & cooperation** to be already in place	The operation and reliability of such a system relies on the cooperation and long-term engagement of inland terminals and rail/barge operators to provide and regularly update information regarding their facilities and operations.
In terms of **financing for the implementation & operation** to be already available	Financing capacity for the development, implementation and maintenance of the platform and the required data.

Best practice overview					
Best practice title	BP 03: Automation in port-hinterland freight transport operations				
Best practice mission	To implement a new, innovative, environmentally-friendly and highly efficient system for the transportation of goods to the hinterland as an answer to the anticipated future transportation capacity problems.				
Bottleneck categories addressed	Market	☐	Infrastructural	☒	Operational ☒
	Institutional	☐	Innovation	☒	
Initiator of the best practice	Port Authority	☐	Terminal Operator	☐	Rail Operator ☐

	Regional Authority	☐	Shipper	☐	Other ☒ *(Entrepreneur)*
Other organisations directly involved	Port Authority	☐	Terminal Operator	☒	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☒ *(Transportation technology companies)*
Information source	• https://www.dpworld.com/ • https://hyperloop-one.com/ • https://www.meed.com/dp-world-virgin-hyperloop-construction/ • https://marketmadhouse.com/first-freight-brand-for-hyperloop-is-here/ • https://automotivelogistics.media/intelligence/146079 • https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/a-physical-version-of-the-internet-how-hyperloop-could-be-the-broadband-of-transportation • https://www.maritime-executive.com/article/hyperloop-and-hhla-to-trial-container-by-tube-service • Catherine L. Taylor, David J. Hyde, Lawrence C. Barr, Hyperloop Commercial Feasibility Analysis: High level overview, July 2016				
Reporting partner	CERTH/HIT				

Best practice description

Hyperloop is a concept of a new mode of transportation which was introduced in 2013 by Elon Musk, an entrepreneur active in the field of innovative technologies, through a published white paper describing a high-speed system linking the cities of Los Angeles and San Francisco in California (Hyperloop Alpha). Hyperloop systems are based in the magnetic levitation of pods and moving them with the use of linear motors through a low-pressure steel tube, which allows very high speeds to be achieved due to the ultra-low aerodynamic drag. They are electrically-powered, close-architecture systems intended for the transportation of both passengers and cargo and consist of a station or a loading platform, a capsule or pod that carries passengers or cargo and a tube through which the capsule travels. The tube can be constructed either elevated above the ground or underground depending on the local conditions (e.g. densely populated/congested areas). In its paper Elon Musk urged other entrepreneurs to develop and implement hyperloop technology and in the following years, several startups were established with the aim to explore the possibilities of the new technology, such as Virgin Hyperloop One, Hyperloop Transport Technologies (HTT), TransPod and Arrivo. While initially these companies were mainly focused on passenger transportation, gradually some of them also started to explore the possibilities of Hyperloop technology regarding cargo transportation and the connection of ports to the hinterland. These initiatives are realised through joint ventures with actors of the logistic sector and today, Virgin Hyperloop One and Hyperloop Transport Technologies are close to begin the construction of the first hyperloop enabled systems for cargo transportation.

DP World Cargospeed is an initiative launched in April 2018 through a joint venture between DP World, a major global ports operator based in Dubai and Virgin Hyperloop One. The aim of this initiative is to develop and operate the first hyperloop-enabled cargo system which will be able to transport palletised cargo in a fast, sustainable and efficient way. Initially DP World planned to build and operate a Hyperloop-based system that would transport cargo from the Jebel Ali Port in Dubai to a new inland container depot. DP World Cargospeed is a much larger scheme which consists of a global hyperloop network which will connect the ports operated by DP World and also airports around the world. Specific details regarding the design of this network are not available since the project is under development but the company is dealing with potential projects in India, the United Arab Emirates and Saudi Arabia. Within this context, a route connecting the cities of Mumbai and Pune in India, which is considered to be commercially viable, will be the first to have one of its sections constructed. The 150km-long route is expected to become operative between 2024 and 2025. DP World is the operator of the Nhava Sheva container port in Mumbai, the largest container port in India which handles around 55% of the total container handled by all major ports in India.

A similar initiative was launched in December 2018, in the port of Hamburg. The terminal operator Hamburger Hafen und Logistik AG (HHLA) and the Hyperloop Transportation Technologies company have established a joint venture with the aim of developing a hyperloop system for transporting containers to the hinterland. The system aims to relieve the strain on the transport infrastructure in and around the Port of Hamburg and to use the capacities of the terminal facilities in an efficient way. A letter of intent has been signed and the plans include the construction of a transfer station for testing purposes at a HHLA terminal in Hamburg and the development of a transport capsule for standard shipping containers.

Regarding the model for the implementation of Hyperloop systems, in the case of the Cargospeed projects it is expected by the developers to be carried out in the majority of cases as a public-private partnership with a significant emphasis on local participation. Currently, the process includes signing by the government of an ‘intent to build’ agreement, followed by the launch of the project with an in-depth feasibility study, which will analyse and define the route alignment, including the environmental impact, economic and commercial aspects of the route, and the cost and funding model recommendations.

Hyperloop systems are considered by their developers to offer several operational advantages compared to the existing cargo transportation systems. Besides the achievement of very high speeds, up to 1,000 km/hr which is two to three times faster than high speed rail, the system is expected to be less vulnerable to weather conditions, natural disasters, mishaps and sabotage because of the protection that tubes and tunnels provide. Furthermore, the systems will be fully automated with no human vehicle operators which allows for automatic adherence to safety protocols and thus minimizing the chances of accidents.

With regard to the corresponding costs, the capital expenditure for the construction of the system is estimated by the developers to be less than two-thirds that of high-speed rail per km. As for the operational costs, they are also expected to be significantly lower than high speed rail mainly because the motor power is used for less than 10% of the journey; the pods glide for the rest of the journey through a near-vacuum environment. Furthermore, because of the minimum friction in the system, the total lifetime cost (including maintenance) is expected to be much lower than that of high-speed rail. These features make the developers aspire to be able to offer services with the speed of airplanes at a cost comparable to that of road haulage.

Best practice impact

on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	Hyperloop is a highly automated system, with the potential to radically shorten hinterland transportation lead times, minimize congestion delays and thus increase the overall efficiency of the port-hinterland corridor.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	Hyperloop is an environmentally friendly transport system. It is 100% electrically-powered thus having zero direct emissions and can be powered from non-fossil fuel energy sources such as nuclear power, solar-panels, wind turbines, or hydropower. With regard to wider environmental benefits, hyperloop systems can reduce congestion and pollution by shifting cargo from road, and also can reduce the nuisance in high density urban areas through the alternative of underground construction. Additionally, the system can facilitate the transfer of port operations to the hinterland (e.g. temporary storage, customs services) through a high-speed link to inland terminals and therefore it can free space in port areas, which is of quite significant importance in cases of ports located within the urban fabric.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	By its very nature, hyperloop is a new and highly innovative transportation system which pioneers in the employment of technological achievements of engineering.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	As it consists of a fixed-route infrastructure (partly underground) its design will require the cooperation and coordination of a number of private and public actors.
Main requirements for the successful transferability of the best practice	
In terms of **national/local**	Hyperloop systems can have an impact on the current port-hinterland supply chain models and actors, therefore, the decision to implement

strategies & policies to be already in place	them must come as part of a national/regional strategy which will consider all positive impacts and will try to mitigate all negative ones.
In terms of **legal and/or contractual requirements** to be already covered	The establishment of a legal framework to regulate the construction and safe operation of Hyperloop systems will be required.
In terms of **infrastructure (hard & soft)** to be already in place	Hyperloop is a completely new transportation system which uses dedicated infrastructure that is built from scratch. Regarding the costs of the Hyperloop infrastructure, it is difficult to make a reliable estimate since the total capital costs of an infrastructure project include besides the construction costs and other costs such as land acquisition, environmental planning and engineering design. Furthermore, the research and design costs of Hyperloop technology, which are likely to be significant and are ongoing right now, must be included to the construction cost.
In terms of **specific port-hinterland corridor characteristics** to be covered	Hyperloop systems are sensitive to underutilisation of capacity because of the high implementation costs and therefore, their implementation must be realised in highly congested corridors with low uncertainty regarding the future demand for transportation services.
In terms of **technical and/or organisational capabilities** to be already in place	Hyperloop projects are large scale, high technology, complex projects which require a high level of technical and organisational capabilities from all the actors involved in their implementation.
In terms of **stakeholder engagement & cooperation** to be already in place	The complexity of hyperloop projects and the long-term nature of the required investments make the engagement and cooperation of stakeholders necessary to be established at an early stage, especially in cases of routes which pass through multiple countries/regions.
In terms of **financing for the implementation & operation** to be already available	Hyperloop is a system which requires significant funding for the construction of the respective infrastructure. The developers of the system expect that the funding will come in most cases from public-private partnerships with an emphasis on regional participation which implies that the governments and/or regional authorities must have a considerable level of financing capacity as well.

Best practice overview					
Best practice title	BP 04: Transfer of seaport activities to inland terminals				
Best practice mission	To decongest deep-sea terminals by transferring seaport gate activities to inland terminals.				
Bottleneck categories addressed	Market	☐	Infrastructural	☒	Operational ☒
	Institutional	☐	Innovation	☒	

Initiator of the best practice	Port Authority	☐	Terminal Operator	☒	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☐
Other organisations directly involved	Port Authority	☐	Terminal Operator	☐	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☒ (synchromodal service provider)
Information source	• Veenstra, A., Zuidwijk, R., Van Asperen, E. (2012) 'The extended gate concept for container terminals: Expanding the notion of dry ports', *Maritime Economics & Logistics, 14(1), p14-32* [online]. Available at: https://www.studocu.com/en/document/technische-universiteit-delft/freight-transportation-systems-analysis-and-modelling/other/the-extended-gate-concept/49154/view (Accessed: 25 February 2019). • Van der Lugt, L., Rodrigues, S., Van den Berg, R. (2014) 'Co-evolution of the strategic reorientation of port actors: insights from the Port of Rotterdam and the Port of Barcelona', *Journal of Transport Geography*, 41, p197-209. • www.europeangatewayservices.com (Accessed: 25 February 2019).				
Reporting partner	CERTH/HIT				

Best practice description

Hutchison ports ECT Rotterdam is a leading terminal container operator, handling the majority of the containers in the port of Rotterdam through the ECT Delta and ECT Euromax deep-sea terminals, both located at the Maasvlakte area at the North Sea. In 2005, after a period that followed its acquisition from Hutchinson Port Holding (HPH) during which ECT largely withdrew from hinterland operations in order to focus on the more profitable deep-sea terminal operations, ECT became again active on the development of an inland terminal network. This shift in strategy coincided with the surge of containers from China which put pressure on the infrastructure of ECT terminals as well as on other container terminals in the Le Havre-Hamburg range. The congestion phenomena which occurred worsened several already existing problems of the terminals related to environmental issues, delays in the administrative and physical transfer processes and the balance between the value-added services and the cargo handling operations of the terminals. In 2008, ECT reached its terminal capacity limits which led to the decision to remove the empty containers and to reduce the dwell time of containers in the terminal. Thus, the development of an inland terminal network apart from increasing the competitiveness of the terminal by offering a better connection to the hinterland, also aimed to mitigate the consequences of the aforementioned increase of container volume by facilitating the decongestion of the deep-sea terminals.

ECT started implementing its strategy by investing in its owned terminals in Venlo, Duisburg and Willebroek. In 2007 it created a subsidiary, the European Gateway Services (EGS), to establish a network of inland terminals and to operate as a synchromodal service provider, offering high frequency connections through rail and barge services from/to the deep-sea terminals of ECT.

Additionally, to further facilitate the decongestion of the deep-sea terminals ECT began to develop the Extended Gate concept to several inland terminals of the EGS network.

The Extended Gate concept is an extension of the dry port concept which was described by Leveque and Roso (2002) as "an inland intermodal terminal directly connected to seaport(s) with high capacity transport mean(s), where customers can leave/pick up their standardized units as if directly to a seaport", to include the choice of the seaport to control the flow of containers to and from the inland terminals. The main goal is to move the delivery point from the seaport to an inland terminal or a distribution centre of a logistics service provider. For the shipper or receiver the gate of the deep-sea terminal is now located to the inland terminal. The main feature of this concept which differentiates it from the usual practice in dry ports is that in the case of an Extended Gate, ECT has the control of the container flows by assuming the legal responsibility and performing the transportation of containers through its subsidiary (EGS) from the deep-sea terminal to the extended gate with no interference of the shipping company, the shippers/receivers or customs. That is, the inland leg of transportation, between the deep sea terminal and the Extended Gate, is performed similarly to the ports internal cargo movements. The non-involvement of customs to the transportation of containers to the inland terminals is achieved through the continuity of the ports' terminals customs regime to the inland terminals which operate as Extended Gates.

The development of the Extended Gate concept began in 2007 in the link connecting the ECT deep-sea terminals and the inland terminal of Venlo, with the establishment of a regular train service by EGS. Today, four inland terminals which are operated by ECT and are part of the EGS network operate as Extended Gates. ECT has further plans for an Extended Gateway in Nuremberg and also other regions in the European hinterland.

Best practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	The possibility of Extended Gates to allow for the transportation of containers to the inland terminal directly from the deep-sea terminals without having to obtain customs clearance (advertised by EGS as "paperless" transport) or issue inland transit documents reduces significantly the dwell time of containers in the seaport terminal. Furthermore, the control of the port over the hinterland flows allows for freight to be transported from the Extended Gate to the seaport in loading sequence and just in time for transshipment or during off peak hours, increasing further the efficiency of the physical transfer processes.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	The almost exclusive use of rail and barges by EGS in the links connecting the Extended Gate terminals to the seaport terminals facilitates the modal shift in the corresponding port-hinterland corridors. Additionally, the control of container flows by ECT allows for better utilisation of vehicles.
on the **innovation embeddedness** of the	By assuming the responsibility to transport the containers from/to an Extended Gate in the hinterland, ECT also obtains the required cargo

port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	information through EGS which acts as a collection agent for this information. The sharing of this information which is usually known only to the owners of goods and the freight forwarders, creates insight into the hinterland transportation for the terminal operator.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	Undertaking the inland transportation of containers by the terminal operator within the Extended Gate concept results in a better coordination of port-hinterland transportation. Furthermore, the transfer of customs processes to the inland terminals requires an increased level of cooperation between the port and the public actors.
Main requirements for the successful transferability of the best practice	
In terms of **national/local strategies & policies** to be already in place	The development of an Extended Gate network must come as part of a national/local development strategy since it can facilitate the development of industrial and economic activities in inland areas and thus directly impact regional economic development.
In terms of **legal and/or contractual requirements** to be already covered	The extension of the ports' customs regime to the hinterland terminals and the addressing of possible legal issues regarding the way in which the terminal operator will assume the legal responsibility for the transportation of containers between the seaport and the inland terminal.
In terms of **infrastructure (hard & soft)** to be already in place	Existence of the necessary infrastructure to inland terminals that can accommodate the value-added services (including customs) and also the existence of rail/barge transportation networks which allow for high capacity connections.
In terms of **specific port-hinterland corridor characteristics** to be covered	Significant flows of containers along the port-hinterland corridor which will facilitate the increased vehicle utilisation and the high use of shuttles in the link connecting the seaport to the Extended Gate terminals.
In terms of **technical and/or organisational capabilities** to be already in place	Technical and organisational capabilities regarding the network design and the optimisation of operational activities across the nodes and links of the Extended Gate network.

In terms of **stakeholder engagement & cooperation** to be already in place	High level of cooperation and engagement among the ports' terminal operator, the transport service provider and the inland terminals, in order to establish a seamless link to the Extended Gate terminals.
In terms of **financing for the implementation & operation** to be already available	The port must have the financial capacity to invest in the development of an inland terminal network and the establishment of intermodal transportation services.

Best practice overview					
Best practice title	BP 05: Collaborative port-hinterland network development (NARCON)				
Best practice mission	To provide a system of distribution of containers to the hinterland that is sustainable from an environmental, economic and social point of view and guarantees quality and reliability of transport.				
Bottleneck categories addressed	Market	☐	Infrastructural	☐	Operational ☒
	Institutional	☐	Innovation	☐	
Initiator of the best practice	Port Authority	☐	Terminal Operator	☒	Rail Operator ☒
	Regional Authority	☐	Shipper	☒	Other ☒ *(Transport and logistic stakeholders)*
Other organisations directly involved	Port Authority	☐	Terminal Operator	☐	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☐
Information source	• European Intermodal Association – EIA: Intermodal Freight Transport & Logistics Best Practices (2014) • Rodrigue J.P., Notteboom T., Shaw J. (2013). The SAGE Handbook of Transport Studies. SAGE Publications • www.interferryboats.be • www.portofantwerp.com				
Reporting partner	UNIMED				
Best practice description					

Antwerp is one the leading railway ports in Europe, with a rails over 1.000 KM of rail tracks interconnecting the docks and the industrial areas (total annual system capacity= 24 trains/day for 5 days/week for 50 weeks/year= 6.000 trains/year).

Rail network NARCON connects the seaports of Antwerp and Zeebrugge with inland terminals (Figure 1). In this network the 'border' terminal Mouscron largely serves the northern pan of France just as Athus mainly serves the industries of Luxemburg and of the region around Metz. One of the aims of the NARCON is the decongestion of Belgian highways, for which reason the European Commission has sanctioned the Belgian subsidies to the network.

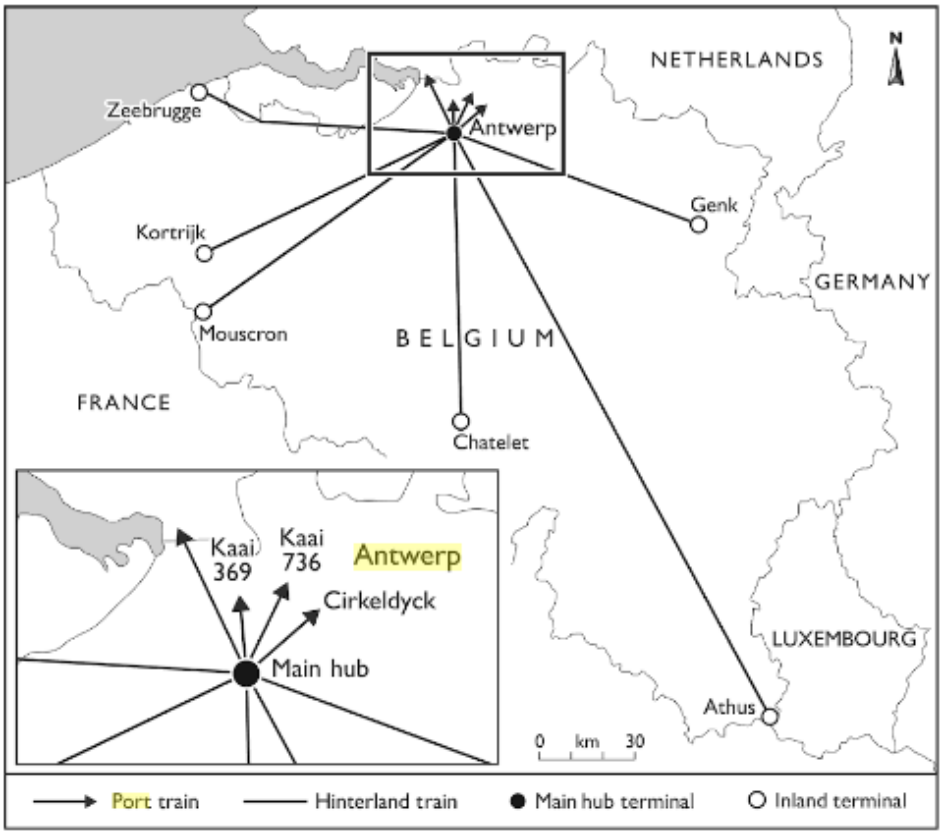


Fig.1: NARCON and the main hub terminal of Antwerp in 2008

The idea of the NARCON was born from the cooperation of different actors:

- the Belgian Railways, B-Cargo: rail operations and wagon management;
- the Hinterland Terminals: commercial and operational partners, knowing exactly the needs in their area;
- the Deep sea Stevedores: fixed timeslots and commitments for rail traffic;
- IFB: overall organisation including monitoring, handlings, documents, last mile truckings, one clear responsible towards the clients;
- Major clients, directly or via the hinterland terminals.

NARCON is based on planning train connections between container terminals in and out of the port of Antwerp, using fixed wagon sets allowing an optimal rotation of the wagon park. It

combines various players (railways, terminals, intermodal operator, ports, stevedores,…) in a reliable and intermodal transport chain.

Daily programmed train shuttles between the Hinterland and the main Antwerp docks are provided. Transhipment is being done at a main hub (also serving as buffer for fluctuations on maritime side) via vertical shunting by moving the containers while the wagon sets stay together. Especially the day A/B delivery time between a specific dock in Antwerp and inland terminal is very attractive. In fact the quick delivery time is one of the major arguments that convinced the customers of the efficiency of the NARCON-concept: the containers leave on departure side as late as possible in the evening of day A and arrive on the destination terminal as early as possible in the morning of day B. Therefore the NARCON network guarantees daily A / B delivery time and availability of a daily departure / arrival at scheduled times.

The system is based on fixed shuttle train compositions outside a fixed NARCON pool of axle 60 '4 axle wagons. All 20', 40' and 45' sea containers are accepted. Each rail link (for traffic direction) is based on a fixed set of 27 4-axle wagons, for an equivalent of a maximum of 81 TEUs and 1600 tons of gross weight. Based on the above figures, NARCON initially offered a total annual capacity of 243,000 TEUs, while in mid-2008 a capacity of 300,000 TEUs.

B-Cargo has created a special wagon pool of about 400 4-axled wagons. Each wagon makes approximately 20 trips per month. Knowing that the rotation average of railway wagons in Europe is around three trips a month, this is a good result. Damaged wagons are immediately replaced in the pool.

Arriving at the main hub from the inland terminals or docks, containers are moved by gantry cranes from one wagon to another wagon (Vertical shunting method). This system allows working with fixed wagon sets, which both guarantees a respected transit time as well as a better wagon rotation.

Best practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	• Vertical shunting method; • Special wagon pool; • Day A/B delivery time and availability of daily departure/arrival in programmed timetable; • 6 round trips per day to and from the hinterland; • 6 round trips per day to and from the quays; • Fixed wagon sets, 27 x 60’ wagons (older low-cost wagons); • 6000 trains/year; • The system of fixed wagon sets allows an optimal rotation of the wagon park. The utilisation degree of the trains reaches an average of 60 to 65%, guarantying the necessary flexibility; • Quality management system; • Improving intermodal capacity on existing corridor; • Improving customer service and flexibility; • Increasing economy / traffic flows.
on the **environmental sustainability** of the	• Modal shift of 200.000 trucks - equal to 30.000.000 trucks-km per year to rail

port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	-
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	Several customer relations are present in the global context of the NARCON-services: B-Cargo sells its traction package to the intermodal operator IFB, who provides a total logistic package (rail traction, terminal handling, truck delivery, administration, monitoring) to the inland terminals. These terminals sell on the transport organisation to their final customers as part of the total sales concept. Most worldwide known shipping lines are daily users of the NARCON system: Maersk, MSC, K-Line, Norasia, OOCL, CMA- CGM, Grimaldi Group, CSCL, COSCO, Hapag Lloyd, etc. All the companies involved took a collaborative and cooperative approach that guaranteed the success of the NARCON. It is also necessary to highlight the Belgian Government's support for the NARCON initiative. A grant envelope of € 30 million (in total, for all operators) per year was granted to intermodal operators. The grant guarantees greater degrees of freedom to logistics and transport operators and promotes the success of the initiative
Main requirements for the successful transferability of the best practice	
In terms of **national/local strategies & policies** to be already in place	The national/local strategies and policies must actively promote the establishment of a hinterland network for intermodal transportation.
In terms of **legal and/or contractual requirements** to be already covered	The legal and institutional framework of Port Authorities must provide them with the flexibility to form and implement their own investment policy.
In terms of **infrastructure (hard**	The existence of a rail network adequate to support the growth of intermodal transportation is crucial for the viability of a port's

& soft) to be already in place	investments in inland terminals and rail services. This is evident in the case of NARCON. Furthermore, it is necessary to develop and adopt rapid freight handling systems at the port in order to significantly reduce the downtime at the node.
In terms of **specific port-hinterland corridor characteristics** to be covered	-
In terms of **technical and/or organisational capabilities** to be already in place	Availability of technical capabilities for the development, implementation and management (software, data update, qualified staff)
In terms of **stakeholder engagement & cooperation** to be already in place	The operation and reliability of network relies on the cooperation and long-term engagement of terminals, rail operators and transport and logistics stakeholders.
In terms of **financing for the implementation & operation** to be already available	Financing capacity for the development, implementation and management of the network. Possible state / government grants

Best practice overview					
Best practice title	BP 06: Streamlining port-hinterland actor processes using a PCS				
Best practice mission	To optimise of the processes in the transport chains that run through the port of Rotterdam by means of on-line information and communication services to boost the efficiency levels of its customers. This port-wide ICT platform is an essential instrument for streamlining the transport chains from the port of Rotterdam.				
Bottleneck categories addressed	Market	☐	Infrastructural	☐	Operational ☐
	Institutional	☒	Innovation	☒	
Initiator of the best practice	Port Authority	☒	Terminal Operator	☒	Rail Operator ☒
	Regional Authority	☒	Shipper	☒	Other ☒ *(Transport and logistics operators; Industry companies)*

Other organisations directly involved	Port Authority ☐	Terminal Operator ☐	Rail Operator ☐
	Regional Authority ☐	Shipper ☐	Other ☐
Information source	• Chandra D. R., van Hillegersberg J. (2017). Governance lifecycles of inter-organizational collaboration: A case study of the Port of Rotterdam. Procedia Computer Science 121 (2017) 656–663 • Morton R. (2016).Port Community Systems and the Agent. LPA Meeting, FONASBA, London. • National Transport Commission (NTC) Australia (2014). Opportunities for information technology systems to improve port-related supply chain performance. Information paper. • Srour F. J., van Oosterhout M., van Baalen P., Zuidwijk R. (2008). Port Community System Implementation: Lessons Learned from an International Scan. (https://www.researchgate.net/publication/236278299) • www.portbase.com • www.portofrotterdam.com		
Reporting partner	UNIMED		

Best practice description

In general, a Port Community System (PCS) is not an IT project, but a change management project.

A Port Community System is (Figure 1): 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. It can optimise, manage and automate port and logistics efficient processes through a single submission of data and connecting transport and logistics chains.

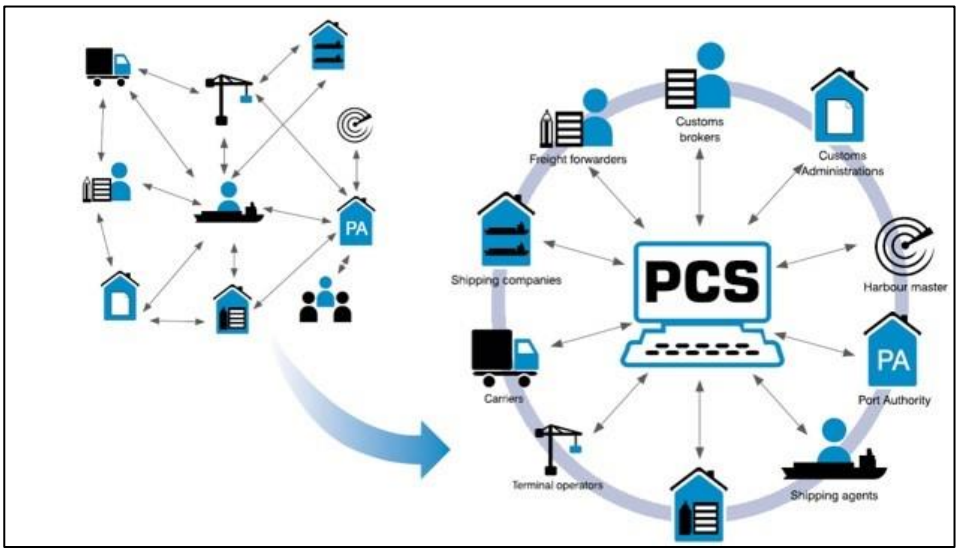


Fig.1: PCS overview

In 2009 at Rotterdam port PORTBASE was introduced, a central hub system originated from Port INFOLINK and the Amsterdam' system PORTNET. Both systems where used to create a new universal system for both ports with the goal to get nationwide coverage. Up until today PORTBASE is being used as communication platform for many actors in the port. PORTBASE operates as a non-profit organization and is owned by the Port of Rotterdam (75% shareholder) in partnership with the Port of Amsterdam (25% shareholder), with each contributing to the financing of the system where services are of interest to the ports. Companies only pay a contribution for the use of services with demonstrable added value. Off-set against the advantages, the costs to the business community are relatively small. This created a structure which let PORTBASE grow into one of the most successful PCS in the world.

The Advisory Board of PORTBASE is formed by representatives of many sectors in the port, hereby creating an independent company with support of the port actors. PORTBASE is a neutral hub for all logistics information in the ports of Rotterdam and Amsterdam. PORTBASE strives to optimize all international logistics processes via Dutch ports through information and communication services.

The PORTBASE community system includes three components:

- an application layer with the services;
- a platform with the facilities common to all services;
- a central database to gather all the information that companies and government authorities exchange via PORTBASE

There are 41 different services provided by PORTBASE, including for example, cargo declaration, customs scanning, declarations for food and consumer products, discharge confirmation reports, export control systems, bonded warehouse notifications, and notifications of container arrivals and others.

Moreover, the PORTBASE system simplifies customs clearance procedures and communications on delays and accidents, streamlines inland multimodal transportation processes and helps agents choose optimal multimodal transportation plans.

In general, the offered services can be grouped into 4 macro-categories:

- Vessels Call

  Agents, shipping companies and shipbrokers in the bulk and container sector can speed up the logistic processes around vessel visits by using the PORTBASE services. This improves the logistic process because authorities - such as Customs and the Harbour Master - and port authorities are informed in good time about the arrival of a ship, the cargo and the country of origin. There is also more coordination between all the parties involved. As a result, activities can be scheduled well in advance and potential risks evaluated ahead of time. Any inspections can be scheduled before the ship actually enters the port. Throughput times in ship handling are being reduced further.

- Import Cargo Management

  Agents, shipping companies, shipbrokers, importers and forwarders are required to notify various authorities of the cargo they want to import to the European Union. This applies to both bulk and container transport. The PORTBASE services make it easy to comply with these requirements. Information is provided efficiently and transparently to all the parties involved, such as Customs and the Food and Consumer Product Safety Authority.

Timely information makes a smooth flow of goods possible. Within the PORTBASE services, the re-use of information enables a further simplification of logistics processes.

- Organization of Hinterland Transport

  The port represents the gateway to and from the hinterland. Road operators, barge operators and rail hauliers use the PORTBASE services to deliver and collect containers at the sea terminals. For cargo that needs to be moved to and from the port, the PORTBASE services provide a user-friendly way of exchanging information. Thanks to the PORTBASE services, terminals are informed well ahead of time and all the required information is known. As a result, logistics processes run smoothly.

- Export Cargo Management

  PORTBASE offers forwarders, exporters, agents, shipbrokers and shipping companies a one-stop-shop solution for handling the export formalities. The PORTBASE services improve the flow for both bulk and container transport. They provide optimum information for all parties involved, including terminals and Customs, and make it easy for all requirements to be met.

Each service includes several service processes, which describe the desired message exchange and interaction between parties. This involves messages to and from systems (system messages) and messages between people (notifications). The platform ensures that the processes run in accordance with the established rules. The central database enables the re-use of information in this connection. Companies need only enter data once. Regular training of employees in information security is essential.

This enables all the participants to optimize their logistics processes, thereby improving their own competitive position and profitability as well as that of the ports.

Best practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	PORTBASE services benefit the market via a variety of cost reductions: • Decrease of costs in engagement; • Decrease of costs in ICT management; • Decrease of labor costs, as a result of less mistakes that need to be corrected; • Overview in the operational processes; • Better management information; • Increase of productivity and decrease of labor costs; • Improved services to customers; • Improved accessibility for the users; • Decrease of phone and fax costs; • Decrease of paper costs; • Increased number of checks; • Quicker scheduling of containers; • Re-use of data; • Minimal interruptions of the logistic process;

	• Quicker working and cost efficiency; • Better use of hinterland transport capacity; • Quicker turn-around time in the port; • Better overview of the state of the process.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	Multimodal transport becomes more competitive, potentially leading to a reduction in environmental damage.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	PORTBASE system allows to respond to the innovation needs of the transport and logistics market: Gateways into Single Window(s) (EU Directive 2010/65); Globalisation; Multimodal Logistics Chains.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	PORTBASE allows an active and intense Consultation of the actors in the port community, creating a collaboration and an active cooperation among the different stakeholders that allows a speeding up in the procedures for the management of the physical and information flows that must be treated.
Main requirements for the successful transferability of the best practice	
In terms of **national/local strategies & policies** to be already in place	The PCS need to work within specific legal frameworks – for example, Data Protection Acts, Marine Acts and Directives, Customs Acts and procedures. For this reason, the legal framework of the PCS must consider regulations, legislation and Directives in context: • International /Worldwide; • European; • Member State;

	• Regional/local, e.g. local municipal rules.
In terms of **legal and/or contractual requirements** to be already covered	Customs Integration: • It is all about Customs procedures reforms; • Work through World Customs Organisation (WCO) guidance; • Stakeholders moving to Authorised Economic Operators (AEO).
In terms of **infrastructure (hard & soft)** to be already in place	The level of digitalisation of internal management tools and digital staff, skills is necessary.
In terms of **specific port-hinterland corridor characteristics** to be covered	-
In terms of **technical and/or organisational capabilities** to be already in place	-
In terms of **stakeholder engagement & cooperation** to be already in place	Bring together the community around the port, including port authorities, users, shipping lines, Customs and other business or government agencies that have an interest. For the success of a PCS such as that of Rotterdam and Amsterdam, an effective involvement of all the actors of the port community is necessary, taking examples and asking opinions. In particular, it is necessary to identify the key stakeholders in the community to work in development groups to resolve and develop the electronic solution to the identified ones business processes (group experts for each business process) All sites are different. There will be significant similarities, but different regions have different stakeholders with different interests and, of course, different business processes. Therefore, it is important to involve the actors of the port community and the actors that gravitate around it.
In terms of **financing for the implementation & operation** to be already available	Identify the legal and business model, including finance; Identify the development finance to create a legal and business model that the community will see as a “trusted and honest broker”.

Best practice overview	
Best practice title	BP 07: Automated Container Terminal operations

Best practice mission	To improve the efficiency of containers handling operations by reducing the time and cost of node crossing, guaranteeing better routing to the hinterland while respecting the environment				
Bottleneck categories addressed	Market	☐	Infrastructural	☒	Operational ☒
	Institutional	☐	Innovation	☒	
Initiator of the best practice	Port Authority	☐	Terminal Operator	☒	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☐
Other organisations directly involved	Port Authority	☐	Terminal Operator	☐	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☐
Information source	• Gattuso D., Cassone G.C. (2017). AGW for efficient freight transport in container yard. Supply models and costs. 45th European Transport Conference - 4 to 6 October 2017 - Barcelona (Spain). • Jansen R. (2014). Determining the cost savings for the participants in a joint inter terminal transport system at the Port of Rotterdam. Master Thesis Supply Chain Management. TUDelft. • Krośnicka K. (2015). Comparison of technical parameters of automated container terminals in Europe. Gdynia Maritime University. Logistyka 3/2015, pp. 5695-5703. • Saputra R. P., Rijanto E. (2012). Automatic Guided Vehicles System and Its Coordination Control for Containers Terminal Logistics Application. Research Centre for Electrical Power and Mechatronics, Indonesian Institute of Sciences. • Siroky, J. (2011), Automatic transhipment systems for container transport in terminals, Perner's Contacts, 3(4), 145-154 • van Gils R.J.W., Negenborn R. R., G. Lodewijks (2013). A comparison of the performance of automated vehicles in container terminals. Delft University of Technology. • Zrnić N., Petković Z., Bošnjak S. (2005). Automation of Ship-To-Shore Container Cranes: A Review of State of-the-Art. FME Transactions (2005) 33, 111-121. • https://www.ect.nl/en/terminals/hutchison-ports-ect-euromax				
Reporting partner	UNIMED				

Best practice description

Automation is an emerging trend in port terminal development, but taking place at different scale, pace and locations. There are different degrees of automation and in many ways

automation is present in a large number of terminals depending how it is defined and if it focuses on infrastructure (e.g. stacking cranes) or information systems (e.g. yard management).

The most common definition classifies terminals as fully or semi-automated, which is a rather partial one. For instance, a fully automated terminal is defined as such when the stacking yard and horizontal transfers between the quay and the yard are automated. A semi-automated terminal only involves an automated staking yard. Such a definition is obviously incomplete since it does not consider automated terminal gates and other 'softer' forms of automation such as appointment systems. Further, as containers become automated the need to provide a more nuanced perspective about port terminal automation will become even more salient.

The strength of automated or semi-automated container terminals lays most of all in their specific spatial organization. The terminal consists of the quay area, and 3 buffer zones. So, next to the quay, opening an access from the water, and the land access zones, the terminal has: a waterside transfer area, automated stacking area, and a landside transfer area (Figure 1).

The equipment in these zones operate independently, usually without waiting for each other. Moreover, all the cycles are doubled, as equipment can load or discharge within the same cycle. Separation of these activities, and further spatial specialization of the container terminal, allows also for elimination of people and trucks from the stacking area, and at the same time for uninterrupted work of trucks in the landside zone.

Most of the automated terminals are newly built (greenfield type of investment). Only some of them are basing on restructuration process of the existing terminal (brownfield type of investment). It seems, that the process of restructuration of the existing terminals will slowly appear.

Automated container terminals are based on automated equipment such as: ASTSs (semi-automated ship to shore cranes), ASCs (automated stacking crane), AGVs (automated guided vehicle), AutoStrads (automated straddle carriers).

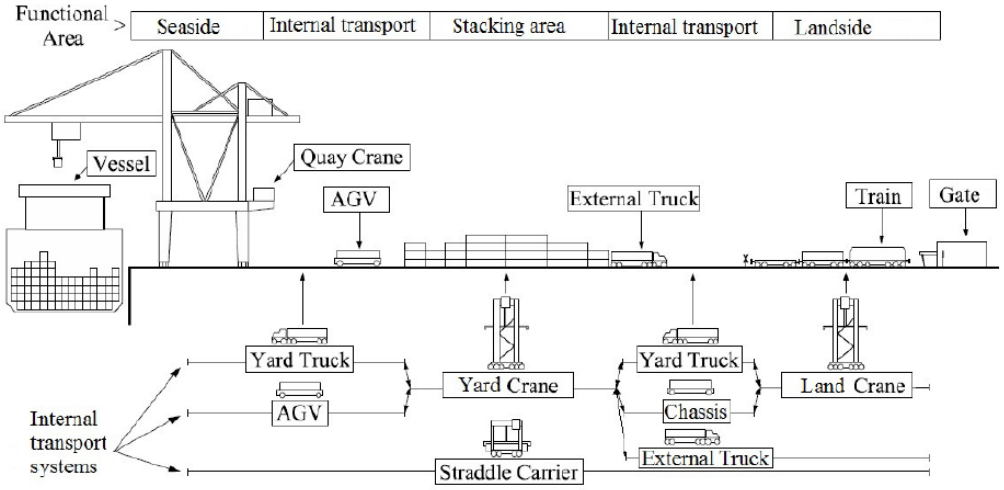


Fig. 1: Loading and unloading processes of container at a typical container terminal (Jansen, 2014)

In particular AGVs, allow horizontal cargo handling; a specific version is called Lift-AGV because load lifting occurs thanks to special mobile platforms placed in correspondence to the loading platform. In both cases, they are simple, flexible vehicles, with a reduced mass, low consumption, and high loading capacity (about 60 t). Guides have been installed on the platform to make positioning containers easier, as well as anchorage clamps. Sensors on the sides of the vehicle help avoid possible collisions with other AGVs, structures and other Hus (Handling Units) in the

terminal. AGVs (14.8 m in length) move containers at a speed that can reach 6 m/s. It can transport containers of different lengths. Thanks to computer control, it carries out travel orders on schedule, working almost silently. It travels forwards, backwards, sideways and can even overtake one another. AGVs are controlled and supplied with data and orders by management and navigation software, and so-called transponders, i.e. electro-magnetic route markers embedded into the surface of the terminal. An AGV is generally used instead of the straddle carrier for transfers to and from the quay and the loading yard. It is placed at the buffer crane and when the container has been loaded, it moves along guides traced on the terminal surface, until it reaches the pre-defined position where a gantry crane retrieves and stores the container. At the yard blocks there are racks where the automated vehicle can deposit the container without waiting for the crane to pick it up; in this way downtime is avoided, and the vehicle's productivity is enhanced as it can then start a new operation. The whole system is managed by an operating and control room that draws up travel orders for each vehicle, checking second by second the position and times for each single handling operation (Figure 2).

Fig. 2: Operative scheme with AVGs

AGV systems include vehicle, vehicle control, navigation, positioning, and communication with supervisory control. An AGV is usually a mobile robot that follows a specific routing of wire or magnetic tape, fast-flowing wire, or line, so that it can move freely without any guidance infrastructure. A system that can locate the robot in the form of absolute position or relative position is needed. The first AGV container terminal was introduced at the ECT Delta terminal in Rotterdam in 1993 (ECT, 2013). The capacity of this vehicle is two TEU, so it can carry one or two 20 or one 40 [ft] containers. With 4 wheels (which can be steered independently) the vehicle can drive asymmetric curves and perform crab moves (moving sideways with low forward speed, without changing the vehicles orientation). A quay or stack crane is needed to load or discharge this vehicle, therefore the interchange processes at the stack and quay are called linked.

L-AGV is an AGV of which the loading platform can be lifted. This allows the vehicle for loading and discharging the containers by itself. However, a rack is required in which the containers can be placed. At the interchange point between the vehicles and the stack, these racks can be placed, making this interchange decoupled. However, using these racks at the quay crane is not possible because the position of quay crane is not fixed. The manoeuvrability is equal to the AGV. Two new container terminals in the Port of Rotterdam will be equipped with this type of vehicles. Table 1 shows the main characteristics of AGV and LAGV.

The Euromax Terminal is situated at the north-westerly corner of the Maasvlakte, just around the corner from the entrance to the Rotterdam port. From the North Sea, container vessels can be moored at the new container terminal in no time at all and shipping traffic is not hampered by any restrictions whatsoever. With its depth of 16.65 metres, the Yangtzehaven can easily accommodate even the largest fully laden container vessels. And should much larger container vessels be taken into commission in the future: the quay walls of the Euromax Terminal, which

go 34 metres into the ground and are 1.20 m wide, have been designed with a further deepening of the port to 19.65 m in mind.

Terminal ECT Euromax Rotterdam (Figure 3) was opened in the year 2008, and is operated by Europe Container Terminals (ECT). The Hus operating in the terminal are: ASTS – AGV – 2 ASC working of the same height per stack – chassis/trucks.

Tab. 1: Dimensions and performance of automated Hus

		AGV	**Lift-AGV**
Dimensions	Length (m)	14,8	14,8
	Width (m)	3,0	3,0
	Height load piano (m)	1,7	2,2
	Tare (t)	25	34
Technical Data	Positioning Accuracy (mm)	+/-25	+/-25
	Fuel tank Capacity(l)	1.400	1.400
	Consumption (l/h)*	8	10
Load Mass	Single Container (t)	40	40
	Two containers (t)	60	60
	Max towing capacity (t)	-	-
Speed	In straight layout(m/s)	6	6
	In curved layout (m/s)	3	3
	During steering (m/s)	1	1
	Average driving (km/h)	4	4
Average cost	1 HU ($)	500-600	550-650

Terminal general data		**Capacity**	5,0 MioTEU/year
		Surface of the terminal	84 ha
		Length of the quay	1,5 km
		Depth at quay	16,8 m (max. during tidal water 19,6 m)
Buffer zones	**Landside**	**Type of equipment**	18 TT, 130 chassis, 3 RS
		Technical parameters of equipment	All together in the landside transfer zone there is about 100 positions for serving trucks
		Remarks	Automated system of gates and truck coordination – cargo card, OCR
	Automated stacking area	**Type of equipment**	58 ASC working in pairs
		Number of blocks	46 blocks
		Parameters of blocks	Stacks are 10 containers wide, 5+1 high, and 36 TEU long 2136 refrigerated slots
		Location of blocks	Perpendicular to quay
	Waterside	**Type of equipment**	96 AGV
		Technical parameters of equipment	Diesel-electric AGV, Speed 6 m/s
		Remarks	4 lanes for AGV are outside the gantry span AGV are steered by Navis System
Quay		**Type of equipment**	12 semi-automated STS, 4 STS serving feeders and barges
		Technical parameters of equipment	ASTS are able to handle 23 rows of containers (64,0 m) ASTS has twin lift (able to carry 2 TEU at the same time) and tandem lifting (able to carry 2 40 feet containers or 4 TEU simultaneously) The height of ASTS is 43.0 and 47.0 m

Fig.3: Facilities of ECT Container Terminal in Rotterdam (Krośnicka, 2015)

Container vessels are handled at the Euromax Terminal using the largest quay cranes in the world. They were designed to realise a production that is as high as possible. Behind the cranes, AGVs move the containers to and from the stack.

In addition, AGVs are suitable for twin-carrying (two 20-foot boxes at the same time). Because the AGVs at the Euromax Terminal pass behind the crane, the vehicles are always able to take the shortest route to the stack. Behind each crane, there are four lanes for AGVs (as opposed to one at the Delta). This prevents unforeseen situations in which a quay crane needs to wait for the next AGV. Also of remark is the fully automatic refuelling of AGVs at the Euromax Terminal. The moment the fuel level of an AGV drops below a certain level, the terminal system issues the order to drive to an automated filling station.

Best practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	The benefits of automation process in container terminals are: improved productivity, reduced wage and operating costs, increased safety, predictable, continuous operation almost completely independent of the weather, maximum use of space, resource-saving operation. Inefficiencies with port and carriers cost the industry as much as $17 billion a year and a fully automated terminal can reduce the number of workers required by at least 45%. There's also the reduction of human errors and delays, and the fact that fully automated terminals are capable of providing 24/7 service - through the night, in complete darkness, and with no need for a caffeine or bathroom break.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the	One purpose of bringing automation to ports and terminals is to introduce a whole new level of consistency when handling cargo, and at reduced carbon emissions compared to manually operated terminals. In automated terminals most of the equipment uses electric power sources, which are more efficient and reduce consumption, emissions and noise. Likewise, from an environmental point of view, the better use of available space minimises the required area for handling a

hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	specific traffic flow. This in turn postpones the construction of extensions which consume material and energetic resources and produce environmental impacts related to the occupancy of the sea front by port infrastructure that affect the landscape and deprive society of using such spaces for other purposes.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	Automated port container terminals have some features that confer them the ability to reach a much higher level of systematisation than other types of freight terminals such as: • the standardisation of the means of transport - containers; • the standardisation of the manner in which freight is handled; • the high level of interchanges taking place; • the high impact of technology on the profitability of terminals. This level of standardisation and specialisation is what allows for a high degree of automation of equipment and processes in this type of port facilities.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	-
Main requirements for the successful transferability of the best practice	
In terms of **national/local strategies & policies** to be already in place	Set up a strong project-governance and communication plan—and execute with discipline. Automation projects require a wide variety of capabilities in areas such as terminal operations, technical engineering, software engineering, and systems integration. A collaborative project environment is essential, and so is early input from stakeholders such as customers, shareholders, labor representatives, operations leaders, the technical team, vendors, and external experts.
In terms of **legal and/or contractual requirements** to be already covered	
In terms of **infrastructure (hard & soft)** to be already in place	Considering the challenge of larger ships, taller cranes and bigger call sizes that the container terminals are facing, four success factors of an automated terminal can be identified: • Efficient STS cranes;

	• Intelligent automatic stacking cranes (ASC); • Automated handling equipment in yard; • Integration of terminal equipment from ship to gate; • Remote operations from a control room. Futhermore, keys to effective implementation of an automated system from an IT perspective are: • Interface early and often with terminal operator to determine their operational arrangement and requirements (i.e. Mobile Control); Interface with terminal engineering team to locate required infrastructure (conduits for fiber, poles for cameras, facilities for wireless, pavement transponders etc…); • Plan for the future by including the additional expandable facilities that fit the projects budgets; • Develop and maintain a change management plan for the inevitable changes that will occur; • Determine integration requirements with existing systems early in the process. Data silos and a lack of data standards are basic problems in automation. In fact the lack of a structured, transparent data pool makes it hard to monitor and diagnose the operations and performance of equipment quickly. Data-infrastructure applications have huge potential. They can help to predict and forecast demand and the arrival-and-departure patterns of container ships. They can schedule the maintenance of equipment for optimal availability, allocate equipment and frontline staff, and adjust the allocation in real time. They can also use machine intelligence to make plans ever more accurate. Standardizing data so that they can be used in these ways will help to make ports and terminals more efficient.
In terms of **specific port-hinterland corridor characteristics** to be covered	-
In terms of **technical and/or organisational capabilities** to be already in place	The technical and organizational capabilities can be summarized in the following points: • Finding the specialized technical positions required. It is generally necessary for up to five years to train; • Acquire the necessary skills, especially in planning and implementation.
In terms of **stakeholder engagement & cooperation** to be already in place	Automation becomes a strategy to attract customers in a competitive environment with the reduction of costs and time. The basic principle of automation is process orientation, which requires integration across the end-to-end terminal process chain and important interfaces. Automated ports, unlike conventional ones, can't contain

	problems at individual functions or process steps. They must therefore ensure close collaboration among activities ranging from marine operations to crane movements to the control of yards and gates.
In terms of **financing for the implementation & operation** to be already available	-

Best practice overview						
Best practice title	BP 08: Accompanied combined (sea-rail) transport service connecting Greece - Ancona seaport – Southern Germany.					
Best practice mission	Developing a more environment friendly end-to-end system					
Bottleneck categories addressed	Market	☐	Infrastructural	☐	Operational	☒
	Institutional	☐	Innovation	☐		
Initiator of the best practice	Port Authority	☒	Terminal Operator	☒	Rail Operator	☒
	Regional Authority	☐	Shipper	☒	Other	☐
Other organisations directly involved	Port Authority	☒	Terminal Operator	☒	Rail Operator	☒
	Regional Authority	☒	Shipper	☐	Other *(Infrastructure developers)*	☒
Information source	• SYNTHESIS Case study • https://www.porto.ancona.it/en/ports/port-of-ancona • http://www.interportomarche.it/					
Reporting partner	Sibenik PA					

Best practice description

This example will provide the illustration of a more intense use of Ancona Port for cargo traffic to Northern European destinations. The main goal of the "SYNTHESIS" common learning action is to help stakeholders to overcome a wide range of stakes, change basic attitudes towards mobility and establish an environment in which investment in the rail sector and sea shipping is forthcoming. The transfer of full-loaded trucks on rail from Ancona seaport to Northern Italy and Northern Europe was a service and whose innovation was given by the use of the rail transport service for trucks. As matter of fact, the combined transport is said to be "accompanied" because the driver of a complete freight carrying road vehicle is accompanying that vehicle, while it is being transported using rail transport.

At the time, around 90% of goods on transit via the Ancona seaport was shipped from Greece and loaded on road vehicles to Germany. The use of road transport has a severe environment and road safety impact for the Ancona territory: 1.Rise of road congestion, in particular, affecting Torrette di Ancona road junction; 2.Rise of road accident rate;3. Rise of toxic emission level (CO2, PM10); 4.Rise of noise pollution level.

The main application of the SYTHESIS project was to provide truck drivers with a scheduled accompanied combined (sea-rail) transport service connecting Greece, Ancona seaport, Munich and Southern Germany. The accompanied combined transport service could cover 46 weeks per year with 5 round trips per week. Each train would have 22 wagons equal to 22 full-load truck capacity. Approximately, this could have resulted in 10120 long-distance trucks per year being removed from road.

Benefits of this practice would be visible in a few ways: It would reduce road congestion as a fewer number of trucks would have to ship at the same time from a port; It would affect environment and noise pollution reduction, which is something larger ports have to deal with all the time. By transferring part of the operation on rail traffic, a lot of road traffic congestion will be mitigated. Finally, this method is a lot safer for truck drivers and a lot less tedious.

The above service can be implemented by any seaport with a good level of cargo turnover, a good level of infrastructure and, above all, an adequate rail junction linked to the national rail network. Should the combined transport be “unaccompanied” (UCT), the running cost of the service will be more competitive if compared with the accompanied combined transport. The cost of the 5 round trips per week of UCT service will be very close to the cost truck/Km. In this case the train will be made up of 12 wagons, each wagon will be equal to the loading capacity of 2 trailers: a total reduction of 11,040 trucks per year.

Best practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	As mentioned above, this practice would enable a significant increase in efficiency per year. Should the combined transport be “unaccompanied” (UCT), the running cost of the service will be more competitive if compared with the accompanied combined transport. The cost of the 5 round trips per week of UCT service will be very close to the cost truck/Km. In this case the train will be made up of 12 wagons, each wagon will be equal to the loading capacity of 2 trailers: a total reduction of 11,040 trucks per year.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	Switching from road transport to rail transport means that the environmental sustainability will increase as the millage covered by the rail will increase. Furthermore, this practice will reduce the loading times effecting the waiting time negative emissions.

on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	-
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	In this case, the main obstacle to the implementation of the service is given by the land formation (the small size of Cattolica tunnel) and the domestic financial policy (the Combined Sea-Rail Transport needs Government subsidies).
Main requirements for the successful transferability of the best practice	
In terms of **national/local strategies & policies** to be already in place	National and local policies should support and develop new practices that revolve around greener mobility. In that regard, it's important to have a developed rail road strategy and vision.
In terms of **legal and/or contractual requirements** to be already covered	-
In terms of **infrastructure (hard & soft)** to be already in place	The above service can be implemented by any seaport with a good level of cargo turnover, a good level of infrastructure and, above all, an adequate rail junction linked to the national rail network
In terms of **specific port-hinterland corridor characteristics** to be covered	Good railway infrastructure is a necessity.
In terms of **technical and/or organisational capabilities** to be already in place	The port should have enough data on shipment and delivery destinations to make a new logistics scenario that will fully use this idea without any setbacks.
In terms of **stakeholder engagement &**	This engagement requires a mutual agreement between many stakeholders: transport companies, forwarding companies, shipping

cooperation to be already in place	agencies and shipping companies. Furthermore, it might need support from government, be it local authority or national one.
In terms of **financing for the implementation & operation** to be already available	-

Best practice overview					
Best practice title	BP 9: ICT system for barge cargo consolidation & transportation to the hinterland				
Best practice mission	To consolidate the volumes of different logistics operators and to offer most suitable intermodal solution by making use of existing connections and service providers in market.				
Bottleneck categories addressed	Market	☐	Infrastructural	☒	Operational ☒
	Institutional	☐	Innovation	☒	
Initiator of the best practice	Port Authority	☒	Terminal Operator	☐	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☐
Other organisations directly involved	Port Authority	☐	Terminal Operator	☐	Rail Operator ☒
	Regional Authority	☐	Shipper	☒	Other ☒ *Freight forwarders*
Information source	• P.De Langen, M.Turro, M.Fontanet, J.Caballe, *Port investment study 2018,* ESPO, Brussels, BE, 2018. • Anwerp Port Authority, Annual Report, Anwerp • *http://www.portofantwerp.com/en/news/central-booking-platform-intermodal-solution* • https://www.portofantwerp.com				
Reporting partner	Port of Bar				
Best practice description					
The Port Authority began trials on 1 March 2011 for the introduction of an Automatic Identification System (AIS) for barges in the Antwerp port area. During the test phase barges with AIS enjoyed operational advantages: they were able to register in advance for lock passage and were put ahead of the queue, resulting in shorter waiting times and lower fuel consumption. Nine months later, on 1 January 2012, the system was made obligatory.					

AIS automatically sends information regarding the name, position and direction of travel of the barge. Its use will mainly benefit safety and traffic control within the port area. A similar system has long been in use for seagoing ships.

The use of BTS 3.0 became obligatory in September 2012 for all barge and terminal operators who carry or handle containers in the port of Antwerp.

Work on the new 3.0 version of the Barge Traffic System (BTS) began in 2012, with the BTS workgroup made up of representatives of terminal operators, barge operators and the Port Authority being frequently called upon. BTS is a free internet application developed by the Port Authority which aims at positioning barge transport more effectively within the overall flow of freight, both commercially and in the use of facilities. It has been operating for more than six years as a unique reporting and monitoring platform for container barge traffic in the port of Antwerp. Use of the system was made obligatory on 3 September 2012 for all barge and terminal operators that carry or transport barges in the port of Antwerp. With BTS barge operators are able to give advance notice of their arrival at a terminal, request a time slot or pass on other information to the terminal operator. A uniform, port-wide procedure has been introduced for this, to replace bilateral agreements. This not only permits better planning of loading and unloading operations by terminal operators but also affords shorter waiting times for the barges and more efficient management of sailing schedules. Overall it makes traffic management in the port of Antwerp much smoother.In the longer term it is planned to extend the system to other sectors of the barge industry.

The Central Booking Platform has been up and running since April 2016. and it is a neutral service that enables the Flemish logistics operators to consolidate their consignments for transport by barge and rail. The main aim of the platform is to consolidate the volumes of different logistics operators and so to offer the most suitable intermodal solution by making use of existing connections and service providers in the market. The impetus for setting up the Central Booking Platform CBP came from the observation that on the one hand more than 40% of the empty containers are moving back and forth between ports and inland terminals and that on the other hand logistics service providers exploit the possibilities offered by barge and rail transport to a very low extend.

The bundling of transport volume helps to achieve a higher economies of scale. Transport chains among various transport modes can much easily be compared and combined. Roads can be relieved from forecasted growing container volume in hinterland transport of Antwerp. Due to less heavy trucks emissions can decrease significantly and the risk of road accidents can be reduced. CBP builds intermodal expertise and actively seek out opportunities to consolidate consignments.

the relevant transport modes and supply chain elements:

- rail
- inland waterway
- transport, transshipment

Main actors involved:

- Forwarder association
- Rail, barge stakeholders
- Port authority
- IT service providers

Best practice impact

on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	Ideal utilisation of ICT infrastructure: • Competitive logistics and transport system • Increased efficiency / productivity of logistics processes • Increased quality • Image • Reduced emissions, Conservation of resources
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	ICT platforms are made to encourage the logistics operators to make greater use of barge and rail transport which is contributing to lower CO2 emissions by using rail instead of road. Rail and barge already account for 51% of all freight transport passing through the port, and the target is to increase this to 60% by 2030. Also these services offer non-paper actions that also reduce the environmental impact of port operations.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	As a proactive, customer-oriented supply chain partner, Antwerp Port Authority and its Barge Master Plan are creating the right conditions for inland navigation to develop into an even smarter, more efficient mode. In short, the Port of Antwerp is a priority partner that reinforces logistics chain. Previously terminal operators prepared their operations schedules independently of each other. Central booking the operations and schedules to be coordinated, with increased communication between the terminal operators.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	The Port of Antwerp and the barge sector are partners who together ensure that the port remains a key engine of the European economy. Strong collaboration between all parties results in innovative projects to achieve smooth, reliable and sustainable handling of barge transport. Improved nautical coordination and efficient container handling and intra-port distribution make Antwerp the inland navigation port in Europe. Good collaboration on IT solutions and great response from actors involved make easier to implement all ICT platforms and solutions.
Main requirements for the successful transferability of the best practice	
In terms of **national/local**	

strategies & policies to be already in place	
In terms of **legal and/or contractual requirements** to be already covered	
In terms of **infrastructure (hard & soft)** to be already in place	
In terms of **specific port-hinterland corridor characteristics** to be covered	The implementation of platforms in the Port of Antwerp anticipate a well-established hinterland network of terminals and services and then offering multiple choices of modes and routes to the hinterland. These platforms' main goal is assessing and combining the elements of the hinterland network in order to help main transport actors to plan more efficient routes and to ensure easier transport flows.
In terms of **technical and/or organisational capabilities** to be already in place	Availability of technical capabilities for the development, implementation and maintenance (software and data update) of the platforms.
In terms of **stakeholder engagement &cooperation** to be already in place	
In terms of **financing for the implementation & operation** to be already available	

Best practice overview					
Best practice title	BP 10: Dedicated port-hinterland freight line				
Best practice mission	To avoid congestions, ensure flows				
Bottleneck categories addressed	Market	☐	Infrastructural	☒	Operational ☒
	Institutional	☐	Innovation	☒	
Initiator of the best practice	Port Authority	☒	Terminal Operator	☐	Rail Operator ☒
	Regional Authority	☐	Shipper	☐	Other ☐

Other organisations directly involved	Port Authority ☒	Terminal Operator ☐	Rail Operator ☒
	Regional Authority ☐	Shipper ☐	Other ☐
Information source	• https://www.portstrategy.com/news101/port-operations/planning-and-design/port-rail-interface-article • https://www.greenport.com/news101/europe/modal-shift-the-role-of-rail • https://www.portofamsterdam.com • https://www.transportenvironment.org/news/betuwe-and-lbt-tale-two-infrastructure-projects		
Reporting partner	Port of Bar		

Best practice description

The Ports of Amsterdam and Rotterdam decided to invest (15% and 35% respectively) with Prorail (50%) in a dedicated high speed rail freight route – The Betuwe Line. This provides more efficient links from West to East for the growing international container shuttle services and improve the ports competitive position into the European hinterlands. Through modal shift the ports would also achieve air quality benefits.

The Betuwe Line opened in 2007 and is now fully operational. The Port of Amsterdam has had a direct link to the Betuwe line since 2010, at Meteren/Geldermalsen. Growth has come mainly from a shift from the standard route but there have also been gains from traditional haulage companies seeking cost efficiencies where intermodal rail transport is more advantageous.

Dutch rail companies ProRail and Keyrail combined their operations as of 1 July 2015. Formerly, there were two companies charged with coordinating railway transport: one to manage and operate the Betuwe line freight railway tracks (Keyrail) and one to manage the Dutch railway network, which accommodates both passenger transport and freight transport (ProRail). As of 1 July 2015, Keyrail merged its operations with ProRail, and the latter currently serves as a single point of contact for freight transport companies and shippers. They can contact the company to request additional capacity for freight transport and negotiate operating fees for the track sections they use as part of the Dutch railway network as a whole.

The Port of Amsterdam is well served with multiple rail connections, ensuring accessibility to the European hinterland. From the port region 4 mil. tonnes of cargo is transported by train each year. The cargo varies from coke, coal, steel and recycling products to containers carrying cocoa. The port has its own marshalling yards and connections to main liner services.

Port of Amsterdam helps stimulate modal shift and achieve competitive advantage. One example is through the provision of hinterland rail services and investment in supporting infrastructure such as the Betuwe Line. 70% of all freight trains travelling between Netherlands and Germany currently use the Betuwe line - a number that is only set to increase in the future. By 2023 total of 160 trains will use the new third track to cross the border into Germany.

Best practice impact

on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	The line, which was specially built for transport of goods by rail, is vitally important for [connecting] Dutch ports to the hinterland. Each year, around four million tonnes of goods are transported to and from the Amsterdam port region by rail. The cargos range from coal to steel, cars, chemical products and intermediate products, liquid biofuels and other fuels, cocoa, grains, livestock feed, building materials and containers. Many of the 4,200 trains that stop in the Amsterdam port area travel via the Betuwe line. The trains from and to Tata Steel also make significant use of this route.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	There is not a unanimous opinion on whether Betuwe line is in line with environmental standards or not. Although main actors insist that the modal shift to rail ensure the reduction of CO2 some argue that the environmental impact of Betuwe line is great, not only for using diesel fuelled machines but also for its impact on the local landscape.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	Dutch rail companies ProRail and Keyrail combined their operations as of 1 July 2015. Formerly, there were two companies charged with coordinating railway transport: one to manage and operate the Betuwe line freight railway tracks (Keyrail) and one to manage the Dutch railway network, which accommodates both passenger transport and freight transport (ProRail).As of 1 July 2015, Keyrail merged its operations with ProRail, and the latter currently serves as a single point of contact for freight transport companies and shippers. They can contact the company to request additional capacity for freight transport and negotiate operating fees for the track sections they use as part of the Dutch railway network as a whole. Following the Keyrail-ProRail merger, Port of Amsterdam, Port of Rotterdam and ProRail set out to launch a rail freight transport partnership, in which the partners work together on developing efficient, competitive, reliable and flexible railway freight services. ProRail and the two port authorities regard each other as partners when it comes to boosting the growth of rail freight transport in the Netherlands. The objective of the partnership is to carry out projects that contribute to effective rail freight transport products, facilitate and stimulate growth, and in doing so, strengthen the positions

	of the ports, the railway transport sector and the Dutch business community.
Main requirements for the successful transferability of the best practice	
In terms of **national/local strategies & policies** to be already in place	-
In terms of **legal and/or contractual requirements** to be already covered	-
In terms of **infrastructure (hard & soft)** to be already in place	-
In terms of **specific port-hinterland corridor characteristics** to be covered	After the opening in 2007, the new track was initially only used by a limited number of trains. Once a sufficient number of locomotives equipped with the new ERTMS security system had been brought onto the market, the use of the Betuwe line rose exponentially. The Betuwe line forms part of international corridors and offers a direct connection to terminals and businesses situated in the European hinterland.
In terms of **technical and/or organisational capabilities** to be already in place	-
In terms of **stakeholder engagement &cooperation** to be already in place	Keyrail-ProRail merger, Port of Amsterdam, Port of Rotterdam and ProRail are developing a rail freight transport partnership, in which the partners work together on developing efficient, competitive, reliable and flexible railway freight services.
In terms of **financing for the implementation & operation** to be already available	Even at the original budget of 2.3 billion euro, there was much discussion about economic viability. Hopes in attracting more private investors.

Best practice overview					
Best practice title	BP 11: Automated rail entrance/exit to/from the port				
Best practice mission	Improve the competitiveness of combined transport by speeding up the train checking process				
Bottleneck categories addressed	Market	☐	Infrastructural	☐	Operational ☒
	Institutional	☐	Innovation	☒	

Initiator of the best practice	Port Authority	☐	Terminal Operator	☒	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☐
Other organisations directly involved	Port Authority	☒	Terminal Operator	☐	Rail Operator ☒
	Regional Authority	☐	Shipper	☒	Other ☐
Information source	• http://www.hupac.com/EN/OCR-rail-portals-9bb2e400?MasterId=g1_3743				
Reporting partner	TPA				

Best practice description

In the Busto Arsizio-Gallarate Terminal, the OCR (Optical Character Recognition) rail portals are in operation and provide a solution for automated train inspection, identification and inventory – an important feature that helps to handle the growing traffic volume.

Thanks to an advanced camera and a sophisticated software system, the OCR portals allow remote visual inspection of information about incoming containers and wagons, thus speeding up the train checking process.

The two portals from Camco Technologies were installed in November 2017 at the north and south entrances of the terminal. They have been tested by the rail control operators of Busto Arsizio terminal over the last months.

Today the OCR system reads the following data:

- position of the loading unit on the wagon
- wagon number
- unit number
- ISO code
- seal presence.

OCR portals will also be installed in the check-in area of Terminal Busto Arsizio-Gallarate in the coming months. This allows simplified procedures and a faster registration of the incoming and outgoing trucks.

An OCR rail portal project has also been launched for the HTA Hupac Terminal Antwerp. Currently it is in the analysis phase, while installation is planned for the next year. Other Hupac terminals will follow, according to the Hupac digitalization strategy.

Through a dedicated software, the operators can process every train passage. The recorded images can be used to correct possible operational or input mistakes. Once all data have been validated and confirmed, the OCR software communicates everything to the WOLF system, Hupac's platform to manage all phases of combined transport, making it a truly integrated system that adds value by facilitating a fast, accurate and safe rail handling.

The system is provided in advance with a list of all loaded trains and containers issued by the departure terminal. This list is compared with the data read by the cameras on the portal, thus allowing to link a precise passage under the portal to a specific train number and to return the exact position of every container on an identified wagon.

All captured high-definition images of each container's left, right and top side are available inside the Visit Retrieval application. This is a web-based application that allows to search for a specific train, load unit or wagon, and to download all relevant images. These pictures can be used as evidence material in case of damage claims made by a customer or in case of irregular procedures.	
Best practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	OCR gate automation results in less time needed for handling rail traffic as well as a reduced risk of errors linked to manual data entry, thus positively affecting the overall efficiency of rail transport, from both a physical and administrative point of view.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	As it aims to reduce time needed for checking trains, the use of OCR rail portals contributes to the modal shift from road to rail and therefore fosters environmentally-friendly transport.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	Such solution entails the employment of advanced cameras and software systems enabling the remote visual inspection of containers and wagons.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	The use of OCR rail portals increases the level of cooperation between the hub actors, shippers/logistics operators and public authorities e.g. customs through the sharing of information and the promotion of multimodal services. With regard to the coordination level of the port-hinterland corridor, the information provided through the platform (e.g. position of loading units on the train) can allow shippers and logistics operators to improve the alignment of their operations.

Main requirements for the successful transferability of the best practice	
In terms of **national/local strategies & policies** to be already in place	There are no specific national/local strategies & policies required.
In terms of **legal and/or contractual requirements** to be already covered	There are no specific legal and/or contractual requirements.
In terms of **infrastructure (hard & soft)** to be already in place	No requirements additional to the software and hardware required for the operation of an electronic platform.
In terms of **specific port-hinterland corridor characteristics** to be covered	There are no specific port-hinterland corridor characteristics required.
In terms of **technical and/or organisational capabilities** to be already in place	Availability of technical capabilities for the development, implementation and maintenance (software and data update) of the platform.
In terms of **stakeholder engagement & cooperation** to be already in place	Cooperation of operators involved in the rail transport process is recommended especially in what concerns technical standards and formats for sharing relevant data.
In terms of **financing for the implementation & operation** to be already available	Financing capacity for the development, implementation and maintenance of the platform and the required data.

Best practice overview					
Best practice title	BP 12: Blockchain-facilitated secure trade data sharing				
Best practice mission	Increase the quality and security of the exchange of data across the whole supply chain				
Bottleneck categories addressed	Market	☐	Infrastructural	☐	Operational ☒
	Institutional	☐	Innovation	☒	
Initiator of the best practice	Port Authority	☐	Terminal Operator	☐	Rail Operator ☐
	Regional Authority	☐	Shipper	☒	Other ☒ *IT company*

Other organisations directly involved	Port Authority ☐ Regional Authority ☐	Terminal Operator ☒ Shipper ☐	Rail Operator ☐ Other ☒ *(Customs authorities, Freight forwarders, Logistics operators)*
Information source	• https://www.ibm.com/blogs/blockchain/2018/01/digitizing-global-trade-maersk-ibm/ • https://www.maersk.com/en/news/2018/06/29/maersk-and-ibm-introduce-tradelens-blockchain-shipping-solution • https://www.tradelens.com/ • https://www.ibm.com/blockchain		
Reporting partner	TPA		

Best practice description

In August 2018, A.P. Moller–Maersk and IBM announced the creation of TradeLens. Jointly developed by the two companies TradeLens is a blockchain-enabled shipping solution designed to promote more efficient and secure global trade, bringing together various parties to support information sharing and transparency, and spur industry-wide innovation.

The platform is being built on an open technology stack and is underpinned by blockchain technology. The two main capabilities at launch will address current visibility and documentation challenges:

- Provide end-to-end supply chain visibility that enables all actors involved in a global shipping transaction to securely and seamlessly exchange shipment events in real time.
- Digitize and automate paperwork filings for the import and export of goods by enabling end users to securely submit, stamp and approve documents across national and organizational boundaries.

As part of the TradeLens early adopter program, IBM and Maersk also announced that 94 organizations are actively involved, or have agreed to participate on the TradeLens platform built on open standards. The TradeLens ecosystem currently includes:

- More than 20 port and terminal operators across the globe, including PSA Singapore, International Container Terminal Services Inc, Patrick Terminals, Modern Terminals in Hong Kong, Port of Halifax, Port of Rotterdam, Port of Bilbao, PortConnect, PortBase, and terminal operators Holt Logistics at the Port of Philadelphia, join the global APM Terminals' network in piloting the solution. This accounts for approximately 234 marine gateways worldwide that have or will be actively participating on TradeLens.
- Pacific International Lines (PIL) have joined Maersk Line and Hamburg Süd as global container carriers participating in the solution.
- Customs authorities in the Netherlands, Saudi Arabia, Singapore, Australia and Peru are participating, along with customs brokers Ransa and Güler & Dinamik.
- Participation among beneficial cargo owners (BCOs) has grown to include Torre Blanca / Camposol and Umit Bisiklet.

- Freight forwarders, transportation and logistics companies including Agility, CEVA Logistics, DAMCO, Kotahi, PLH Trucking Company, Ancotrans and WorldWide Alliance are also currently participating.

TradeLens uses IBM Blockchain technology as the foundation for digital supply chains, empowering multiple trading partners to collaborate by establishing a single shared view of a transaction without compromising details, privacy or confidentiality. Shippers, shipping lines, freight forwarders, port and terminal operators, inland transportation and customs authorities can interact more efficiently through real-time access to shipping data and shipping documents, including IoT and sensor data ranging from temperature control to container weight.

Using blockchain smart contracts, TradeLens enables digital collaboration across the multiple parties involved in international trade. The trade document module enables importers/exporters, customs brokers, trusted third parties such as Customs, other government agencies, and NGOs to collaborate in cross-organizational business processes and information exchanges, all backed by a secure, non-repudiable audit trail.

During the 12-month trial, Maersk and IBM worked with dozens of ecosystem partners to identify opportunities to prevent delays caused by documentation errors, information delays, and other impediments. One example demonstrated how TradeLens can reduce the transit time of a shipment of packaging materials to a production line in the United States by 40 percent, avoiding thousands of dollars in cost. Through better visibility and more efficient means of communicating, some supply chain participants estimate they could reduce the steps taken to answer basic operational questions such as "where is my container" from 10 steps and five people to, with TradeLens, one step and one person.

More than 154 million shipping events have been captured on the platform, including data such as arrival times of vessels and container "gate-in", and documents such as customs releases, commercial invoices and bills of lading. This data is growing at a rate of close to one million events per day. Traditionally, some of this data can be shared through the EDI systems commonly used in the supply chain industry but these systems are inflexible, complex, and can't share data in real-time. Too often, companies must still share documents via email attachment, fax and courier. TradeLens can track critical data about every shipment in a supply chain, and offers an immutable record among all parties involved.

Best practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	The solution has huge potential as to the reduction of both transit times and documentation errors.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the	Aiming to the complete digitization and automation of the supply chain, the platform can also contribute to indirectly minimizing the environmental impact of logistics activities.

hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	Blockchain-based solutions such as TradeLens have the potential to immensely simplify information sharing and accessibility, at the same time pushing towards the introduction of a range of standard documents whereas typically unstructured documents are in use today.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	By its very nature, the platform greatly improves the level of cooperation and coordination of the several actors involved in the global supply chain.
Main requirements for the successful transferability of the best practice	
In terms of **national/local strategies & policies** to be already in place	There are no specific national/local strategies & policies required.
In terms of **legal and/or contractual requirements** to be already covered	As far as the Smart Contract feature is concerned, applicable law and conditions for the contract to be legally binding and enforceable for all parties involved in the transaction is to be carefully and thoroughly taken into consideration. Such aspects may vary according to the legislation and pose a number of questions as to how such contracts are designed and eventually how they can be used when disputes arise between the parties.
In terms of **infrastructure (hard & soft)** to be already in place	No requirements additional to the software and hardware required for the operation of an electronic platform.
In terms of **specific port-hinterland corridor characteristics** to be covered	There are no specific port-hinterland corridor characteristics to be covered.

In terms of **technical and/or organisational capabilities** to be already in place	Availability of technical capabilities for the development, implementation and maintenance (software and data update) of the platform.
In terms of **stakeholder engagement &cooperation** to be already in place	The true force of solutions like TradeLens lying in the wider possible number of actors involved, a strong engagement and cooperation of stakeholders represents a crucial factor in terms of its cost-effectiveness.
In terms of **financing for the implementation & operation** to be already available	Financing capacity for the development, implementation and maintenance of the platform and the required data.

Best practice overview					
Best practice title	BP 13: Clustering as a collaborative platform for promoting port-hinterland innovation				
Best practice mission	Logistics in Wallonia, the Competitive Cluster of Transportation and Logistics in Wallonia, has a network of over 300 members and aims at strengthening and sustaining the logistics attractiveness of Wallonia. Its target in particular is to stimulate innovation by fostering R&D projects. It engages actors in innovation processes and activates the resources needed to create value and activities. Mission of the cluster is therefore to improve the image of the sector and of the region, helping Walloon actors to go international.				
Bottleneck categories addressed	Market	☐	Infrastructural	☐	Operational ☒
	Institutional	☐	Innovation	☒	
Initiator of the best practice	Port Authority	☐	Terminal Operator	☐	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☒ *(The cluster is composed of innovation and supply chain experts and managers)*
Other organisations directly involved	Port Authority	☐	Terminal Operator	☐	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☒ *(Technology solution providers; logistics providers; distribution*

			centres; freight carriers; training and education centres)
Information source	• https://www.logisticsinwallonia.be • https://www.clustercollaboration.eu/cluster-organisations/logistics-wallonia • http://www.openenlocc.net/files/european_review_of_regional_logistics_2-2019.pdf • http://www.wallonia.it/sites/default/files/Expert_Logitsics_Files_-_2_-_Innovation.pdf		
Reporting partner	ITL		

Best practice description

Established in January 2006, Logistics in Wallonia is a non-profit organization based in the province of Liège, region of Wallonia, Belgium. The cluster is member of four European Strategic Clusters (SPACE2ID, MOVE, SPACE2IDGO and FoodNet) and three more networks/partnerships (Open ENLOCC, ALICE, European Railway Cluster Initiative). The cluster is composed by 326 members, 232 of which are SMEs, 36 are larger companies, 37 are research organizations/universities/technology centres, and 21 are other actors. The Airport and the Port of Liege are within the major players.

As for its strategy, the Cluster has developed five strategic axes:

1) INNOVATION: stimulating competitiveness and contributing towards the economic, technological and scientific development of Wallonia
2) BUSINESS COMMUNITY: developing and strengthening partnerships between members and stimulating integration into the economic, technological and scientific landscape in Wallonia and beyond
3) MANAGEMENT AND DEVELOPMENT OF HUMAN CAPITAL: anticipating needs and skills and providing responses in collaboration with the training sectors and innovators
4) INTERNATIONAL: stimulating competitiveness by pooling Walloon skills and resources with international partners
5) MARKETING AND COMMUNICATION: improving the image and awareness of Wallonia through targeted actions circulating concrete information on its assets in terms of logistics and innovation in mobility.

The Cluster provides specific support services, e.g. in accessing public support (regional/national programs, innovation vouchers, etc.). It also provides direct advisory services, services of facilitation of collaboration between members and of cross-sectoral cooperation, and support services in periodic information dissemination.

The Cluster is already very active in the international and trans-national cooperation (the main countries targeted by the cluster are China, India, Malaysia, Canada, France, Germany, Luxembourg, Netherlands and Poland).

As an example of collaboration with China, in 2018 Cainiao, the logistic arm of Alibaba announced the creation of a global logistic network that would have served domestic China in 24 hours and the whole world in 72 hours. Within the cities involved, there was also Liege, and in October 2018, the first block train with containers left Liège in the direction of Zhengzhou in the Henan province placing Liège, Wallonia and Belgium in the “Belt and Road Strategy”. This new

connection came to life with the will of the company ZIH, the freight rail operator of the Henan province to add a new destination in Europe besides Hamburg and Munich. Today, two trains per week are connecting Liege and Zhengzhou and a third one will be added by the end of 2019. Within the innovative projects carried out by Logistics in Wallonia, "Translogistics" had the objective of enabling part of the information and communications technologies to play a role in the development of a total combined transport system, integrating road, rail and waterways in Wallonia. Therefore, the project brings an IT contribution to total combined transport system in the region.	
Best practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	The Cluster Logistics in Wallonia carries out many innovation projects aimed at fostering the region and strengthening its logistic system while increasing also its efficiency. The project "Translogistics", for instance, developed a combined transport system integrating rail, road and waterways.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	Sustainability is one of the main topics to pay attention to when it comes to innovation. One of the projects carried out by the cluster, "Greenrail", focused on the electrical energy consumption of convoys to be reduced through the driving behaviors of train drivers. Main objective of the project was indeed to make Belgian rail transport more ecological, and it involved developing a driving simulation program which enabled train drivers to adapt their driving style at all times in order to reduce the electrical energy consumption of their convoy.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	Innovation is at the very core of the Cluster, as its mission is actually stimulating innovation through R&D projects. Some projects developed for instance new technologies such as products identification and communication technologies, some other enabled the collection of data to be automated, and these data to be combined with other data from the vehicle for the management of vehicle fleet.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance	Facilitation of collaboration between members and facilitation of cross-sectoral cooperation are some of the services offered by the cluster. Companies of different sizes, research organizations, technology centres and other relevant actors are involved in the Cluster, they cover different and relevant roles in the logistic system and the Cluster helps maintaining a high level of cooperation between them.

actors, between the port and the city, among port-hinterland corridors of the wider region)	
Main requirements for the successful transferability of the best practice	
In terms of **national/local strategies & policies** to be already in place	In order to become a member of the Cluster, the players must share a common strategy and policy. When building up a project, a local or regional strategy must also be put in place and shared with partners involved
In terms of **legal and/or contractual requirements** to be already covered	A legal framework must always be considered when developing a project, it would be either local/regional/national/European depending on the scope of action.
In terms of **infrastructure (hard & soft)** to be already in place	Infrastructures may be foreseen or not depending on the project. The Cluster itself is a collaborative platform and as such, it does not specifically foresee new infrastructures, but it works on existing ones.
In terms of **specific port-hinterland corridor characteristics** to be covered	Each project fostered covers a specific characteristic/need. These characteristics must be identified before, than synergies between members are activated for working on the issue/overcoming the problem identified.
In terms of **technical and/or organisational capabilities** to be already in place	The projects developed by the Cluster are often large scale, high technology, complex projects that require a high level of technical and organisational capabilities from all the actors involved in their implementation.
In terms of **stakeholder engagement &cooperation** to be already in place	The complexity of the projects developed within the Cluster and the high level of innovation make the engagement and cooperation of stakeholders necessary, to be established both at an early stage and throughout the project.
In terms of **financing for the implementation & operation** to be already available	The Cluster facilitates the access to public support, such as programs, vouchers and others. This will help the cluster members to get into programs and thus find some fundings, necessary for developing the R&D projects.

Best practice overview	
Best practice title	BP 14: Clustering as a collaborative platform for promoting port-centric intermodal services
Best practice mission	Main aim of ER.I.C. is to develop collaborative activities and to promote the Emilia-Romagna Region's system of intermodal platforms on the national and international stage. Indeed, ER.I.C. aims at increasing the direct rail connections between Emilia-Romagna and Europe while acting as feeding satellite node. Thanks to the internationalisation of

	the cluster on the European market, Emilia-Romagna will become a final railway destination for international traffic with new intermodal transport services, in particular to/from Central Europe. In the same time, ER.I.C. will expand the intermodal network also to southern Italy and the East Mediterranean.					
Bottleneck categories addressed	Market	☐	Infrastructural	☐	Operational	☒
	Institutional	☐	Innovation	☒		
Initiator of the best practice	Port Authority	☐	Terminal Operator	☐	Rail Operator	☐
	Regional Authority	☒	Shipper	☐	Other	☐
Other organisations directly involved	Port Authority	☒	Terminal Operator	☐	Rail Operator	☒
	Regional Authority	☐	Shipper	☒	Other	☒
Information source	• https://www.ericintermodal.it • PPT presentation of the cluster					
Reporting partner	ITL					

Best practice description

ER.I.C. was founded in 2018 following a cooperation agreement "Agreement for the increase of the regional intermodal system" signed between 8 of the main transport and logistic platforms involved in ensuring intermodal services in this area. The members of Emilia-Romagna Intermodal Cluster are the main intermodal actors at the regional level, representing Ravenna's port authority, freight villages, railway stops, intermodal platforms, and inland terminals. These are CePIM (Parma freight village), Dinazzano Po SpA (company specialized in rail freight transportation), Interporto Bologna SpA (one of the most important Italian logistic hub), Lotras Srl (company specialized in Europe intermodal Transport), Terminali Italia (a member of the Ferrovie dello Stato Italiane Group), Terminal Piacenza Intermodale Srl (TPI) (manages the terminal of Piacenza), Terminal Rubiera srl (manages a inland terminal located in Rubiera-Reggio Emilia), Port of Ravenna.

ER.I.C members are fully committed to supporting the strengthening of a freight transport system that is environmentally and economically sustainable and involves the least possible impact on the local area.

In order to shift the balance in favor of sustainable modes of transport and to reduce the proportion of road transport, ER.I.C works to support the internationalization of companies in the European transport market and thereby strengthen the position of the Emilia-Romagna Region as a logistics gateway for southern Italy and the East Mediterranean.
ER.I.C. pursues the development of integrated intermodal services at the national and European levels with the aim of improving the competitiveness and accessibility of this area, crossed by three Trans-European Transport Network (TEN-T) corridors: the "Scandinavian-Mediterranean", "Baltic-Adriatic" and "Mediterranean". Strengthening the competitiveness of regional intermodal services providers by obtaining new opportunities on the European market to connect up one of Italy's most dynamic regional economies, in terms of the growth rate of industrial production and export services.

Therefore, purposes of the cluster are the following:

1. Supporting the internationalisation of the cluster on the European market, offering Emilia-Romagna as a final railway destination for international traffic while increasing new intermodal transport services, in particular to/from Central Europe;
2. Promoting Emilia-Romagna as an integrated intermodal platform and an efficient gateway to southern Italy and East Med, enlarging the regional catchment area;
3. Improving the technical competences of the sector by creating various trajectories of continuing education, both for technical-managerial professionals (Hub manager), specialized in particular in attracting international traffic, and for more operationally focused technical figures specialized in railway operations (Terminal manager);
4. Sustaining the intermodal transport system through collaborative projects in strategic areas and supporting the networking between key stakeholders of the economic sector and regional bodies.

ER.I.C. took part to the Transport Logistic 2019 edition, reference fair event for all Europe for the logistics, mobility, IT and supply chain sectors. On Wednesday, June 5 2019 ER.I.C organized a workshop dedicated to the presentation of the cluster members and to the project Ravenna Port Hub. The event took place at the Transport Logistic fair of Munich and it hosted European intermodal operators, various railway companies, MTOs and freight forwarders, highlighting how ER.I.C will expand the European intermodal network to the hubs of Emilia-Romagna, southern Italy and the East Med.

Best practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	Main purpose of the cluster is to develop integrated intermodal services at the national and European level for improving accessibility and competitiveness of the area, which is crossed by three TEN-T corridors. These new intermodal services will make the port-hinterland corridor more efficient.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	At the core of the cluster initiative, there is the idea of shifting transportation to sustainable modes, thus reducing the proportion of road transport. Road transport is the most polluting and the most used; ER.I.C. aims at increasing the regional intermodal system in order to be less polluting, more sustainable.
on the **innovation embeddedness** of the port-hinterland corridor	The agreement has been signed by the main intermodal actors at the regional level with the aim of increasing the regional intermodal system, environmentally and economically sustainable and with the least possible impact on the area. For these reasons, the cluster represents a

(e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	great innovation and operates indeed for innovating the corridor and making it more efficient.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	The main transport and logistic platforms of the interested area have signed the agreement and became member of the cluster, and by being members they all collaborate with the same commitment and support. The intermodal transport system is sustained also through collaborative projects in strategic areas and by supporting the networking between key stakeholders of the economic sector and regional bodies.
Main requirements for the successful transferability of the best practice	
In terms of **national/local strategies & policies** to be already in place	In order to become a member of the Cluster, the players must share a common strategy and commitment. When building up a project, a local or regional strategy must also be put in place and shared with partners involved
In terms of **legal and/or contractual requirements** to be already covered	The cluster was created through an understanding protocol signed by the President of the region, the regional council member to Mobility and infrastructures and the companies/intermodal actors of the region. In order to set common objectives, a protocol must be written and signed as to legitimize the creation of the cluster.
In terms of **infrastructure (hard & soft)** to be already in place	Infrastructures may be foreseen or not depending on the project developed for sustaining the intermodal transport system. The Cluster itself is a collaborative platform and as such, it does not specifically foresee new infrastructures, but it works on existing ones.
In terms of **specific port-hinterland corridor characteristics** to be covered	The cluster acts on a specific area crossed by three TEN-T corridors. Each corridor may have specific characteristics and each collaborative project may act on specific ones. These characteristics must be identified before, then synergies between members are activated for working on the issue/overcoming the problem identified.
In terms of **technical and/or organisational capabilities** to be already in place	The members of ER.I.C. represent the main intermodal actors of the region and as such their technical and organizational capabilities are really high, as they are the main actors on the territory working on intermodal transportation.
In terms of **stakeholder engagement &cooperation** to be already in place	The intermodal transport system can be sustained only by involving key stakeholders of the economic sector and the regional bodies. Their involvement is necessary also for developing collaborative projects in strategic areas, thus it must be foreseen and set at an early stage.

In terms of **financing for the implementation & operation** to be already available	The Emilia-Romagna Region funded the organization in charge of the technical support of the cluster for its creation and identification of the strategic areas. The members are not required to pay any participation fee to the cluster.

Best practice overview					
Best practice title	BP 15: Customs clearance at sea for speeding up port-hinterland transportation				
Best practice mission	Customs clearance at sea is an experimental procedure aiming at speeding up the process of bringing goods out of the Port. This best practice represent an ICT solution adopted by the Port of Ravenna for overcoming some bottlenecks, such as costs and time of the logistic process due to custom procedures. By exchanging messages among the Authorities involved, the process is faster, less expensive and better coordinated.				
Bottleneck categories addressed	Market	☐	Infrastructural	☐	Operational ☒
	Institutional	☐	Innovation	☐	
Initiator of the best practice	Port Authority	☒	Terminal Operator	☒	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☐
Other organisations directly involved	Port Authority	☐	Terminal Operator	☒	Rail Operator ☐
	Regional Authority	☐	Shipper	☒	Other ☒ *(Terminal Operators, Port Facility Security Officers, Public bodies, Port operators in general)*
Information source	Report delivered by the Adrion project ADRIPASS (REPORT ON THE TRANSNATIONAL BEST PRACTICES CONCERNING ICT TOOLS FOR IMPROVING MULTIMODAL TRANSPORT IN PORTS AND AT BCPS KNOW-HOW TRANSFER)				
Reporting partner	ITL				

Best practice description

Customs clearance at sea is an experimental procedure with which the Customs can authorize the Freight Forwarder to submit the import declaration before the goods are physically into the terminal. Once unloaded, all the goods cleared at the sea can exit the port immediately.

The Port of Ravenna has already in place an ICT based Port Community System (PCS). The PCS, named PCS-Ravenna, is composed by the following modules:

- Customs procedures and formalities

- Port call process (management of informations about port calls and processes related to)
- Goods management
- Gate-in/Gate-out
- Submission of formalities to the Port Authority

The PCS provides a function with which all the involved actors can exchange the relevant messages and monitor the process from the submission of the request for the authorization to the arrival of the vessel. The procedure, initially reserved to goods transported in containers, has been recently extended to new vehicles, and a pilot for the extension to the bulk goods is underway.

Main objectives of the procedure are:

- Moving up of Customs controls for the import of containerized goods or new vehicles in order to speed up the exit of the goods from the port area.
- More efficient use of available area at ports where containers or new vehicles stay less longer period (with decrease of cost)
- Improvement of the import process mainly for the perishable goods and for all the goods that need to be moved rapidly to the final destination.

Best practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	Some benefits of the procedure regard time and cost savings generated by the ICT solutions, and reduction of the space occupied by the containers or new vehicles.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	By speeding up the process of bringing goods out of the port, the congestion of the means of transport waiting in the port's area is reduced and therefore the concentration of pollutants emitted is reduced.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	This best practice represents an ICT solution based on the use of the PCS, another ICT tool already in place. Therefore, this new experimental procedure uses existing advanced tools for exchanging information and messages among the involved actors, who can monitor the entire process using technology.

on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	Cooperation among authorities is the key as only by exchanging messages between them the process can be coordinated and speeded.
Main requirements for the successful transferability of the best practice	
In terms of **national/local strategies & policies** to be already in place	There are no specific strategies or policies required. The best practice is organized and managed within the Port and the authorities involved.
In terms of **legal and/or contractual requirements** to be already covered	NA
In terms of **infrastructure (hard & soft)** to be already in place	This process happens through a function of the PCS with which all the actors involved can exchange the relevant messages and follow the process from the submission of the request for the authorization to the arrival of the vessel. Thus, a Port should have a PCS already in place.
In terms of **specific port-hinterland corridor characteristics** to be covered	The experimental procedure was initially reserved to goods transported in containers, but could be extended to the bulk cargoes and general cargoes that can be identified unambiguously (e.g. coils).
In terms of **technical and/or organisational capabilities** to be already in place	Use of the PCS
In terms of **stakeholder engagement &cooperation** to be already in place	Some communications among the involved actors (Public and Private) are mandatory to obtain the authorization as well as the monitoring of the route followed by the vessel.
In terms of **financing for the implementation & operation** to be already available	There are no implementation or maintenance costs

Practice overview

Practice title	BP 16: Fast Road Corridor (Port of Ravenna)		
Practice mission	The Fast Road Corridor is an experimental procedure authorized by the Customs Agency. A fully digitalized logistic chain allows the transit of containers, by road, from Ravenna to Bologna, where the Customs formalities and controls take place.		
Bottleneck categories addressed	Market ☐ Institutional ☐	Infrastructural ☐ Innovation ☐	Operational ☒
Initiator of the practice	Port Authority ☒ Regional Authority ☐	Terminal Operator ☒ Shipper ☐	Rail Operator ☐ Other ☐
Other organisations directly involved	Port Authority ☒ Regional Authority ☐	Terminal Operator ☒ Shipper ☐	Rail Operator ☐ Other ☒ *(Customs Agency, Truck Companies, National Logistic Platform, Freight forwarders)*
Information source	• Report delivered by the Adrion project ADRIPASS (REPORT ON THE TRANSNATIONAL BEST PRACTICES CONCERNING ICT TOOLS FOR IMPROVING MULTIMODAL TRANSPORT IN PORTS AND AT BCPS KNOW-HOW TRANSFER) • PRIT 2025 (Regional Transport Integrated Plan)		
Reporting partner	ITL		

Practice description

The “fast corridor” is a process of bureaucratic simplification and streamlining of customs procedures foreseen by the National strategic plan of Ports and Logistics and has been activated between 2015 and 2016. The Customs Agency signed an agreement with the National Logistic Platform for realizing a real-time monitoring of the logistic chain allowing an optimization of the goods flow, the use of the available areas, with a greater operational efficiency and reduced logistic costs, and the control of the commercial viability.

The corridors controlled by the National Logistic Platform allow the authorized parties to request electronic customs clearance in domiciled procedure for incoming goods by sea, and the transfer of containers to be subjected to physical verification to authorized places outside the port area, due to the greater safety guaranteed by the monitoring of the vehicles on which the goods travel.

Even though the current practice concerns the transportation of goods by road, there are plans for the expansion of the system to rail transportation in the near future, thus the description of the system covers the future fast rail corridor system as well.

For the road fast corridors, the National Logistic Platform notifies to the interested parties of the vehicle/container monitoring the deviation of the vehicle from the corridor, the crossing of points of interest, the problems encountered along the way (such as traffic congestion) and the travel times exceeding the established maximums. The use of fast corridors will therefore allow:

- Decongestion of port areas
- Reduction of containers permanence times in the port areas
- Reduction of travel time
- Greater security, thanks to a mix of documents checks and physical monitoring of the goods flow
- Process digitalization
- Possibility for companies to use the National Logistic Platform for their own corporate obligations.

The road fast corridor implemented by the Port of Ravenna is an intraregional corridor and connects the Port of Ravenna with the Bologna freight village. It was activated in December 2015 and is still active.

The main objectives of this corridor are:

- Optimization of goods flow
- More efficient use of available area at ports where container stay less longer period (with decrease of cost)
- More security due to the combination of monitoring of flows and checks

The actors involved are the Customs Agency, Port Authority, Terminal operators (port and dry port), Truck Companies, National Logistic Platform, and Freight forwarders.

Practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	Thanks to the digitalized logistic chain, the flow of goods is optimized as well as the use of the port's area, where containers stay for shorter periods thus decreasing the costs.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative	The optimization of the goods flow and the decongestion of the port areas means less congestion and less pollution emitted by traffic.

fuels, renewable energy, etc.)	
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	The fully digitalized logistic chain allows the combination of monitoring and check of goods flow
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	The National Logistic Platform is in constant communication with the authorized interested parties for the real-time monitoring of the vehicles traveling on the fast corridor.
Main requirements for the successful transferability of the practice	
In terms of **national/local strategies & policies** to be already in place	The fast corridor is a procedure foreseen by the National strategic plan of Ports and Logistics.
In terms of **legal and/or contractual requirements** to be already covered	The fast corridors can be activated through an agreement signed between the Customs Agency and the National Logistic Platform.
In terms of **infrastructure (hard & soft)** to be already in place	Good technological equipment for allowing a completely digitalized process.
In terms of **specific port-hinterland corridor characteristics** to be covered	Not specifically.
In terms of **technical and/or organisational capabilities** to be already in place	Given the degree of digitalization of the procedure, there should be an adequate technological equipment in place.

In terms of **stakeholder engagement &cooperation** to be already in place	All the actors involved in the logistic chain of the goods traveling along the corridor should be involved (Customs Agency, Port Authority, Terminal operators (port and dry port), Truck Companies, National Logistic Platform, Freight forwarders…).
In terms of **financing for the implementation & operation** to be already available	There are no implementation or maintenance costs.

Best practice overview					
Best practice title	BP 17: Port alliance for joint development of port-hinterland services				
Best practice mission	To jointly tackle mutual developmental priorities in order to raise competitiveness				
Bottleneck categories addressed	Market	☒	Infrastructural	☒	Operational ☒
	Institutional	☒	Innovation	☐	
Initiator of the best practice	Port Authority	☒	Terminal Operator	☐	Rail Operator ☐
	Regional Authority	☒	Shipper	☐	Other ☐
Other organisations directly involved	Port Authority	☒	Terminal Operator	☒	Rail Operator ☒
	Regional Authority	☒	Shipper	☐	Other *(Infrastructure developers)* ☐
Information source	• http://www.acta.org/about/history.asp • http://hanshinport.co.jp/en/ • Realities and challenges of port alliance in Japan—Ports of Kobe and Osaka Satoshi Inoue • Office of Inspector General Audit report – Review of Alameda Corridor project • Callahan et alt: Leadership and Strategy: A comparison of the outcomes and institutional designs of the Alameda Corridor and Alameda Corridor East projects				
Reporting partner	Sibenik PA				

Best practice description

Port alliances are meant to tackle mutual problems affecting the ports. According to Satoshi Inoue, main motivations for these port alliances are „common threat" and "common need". Common threat is shared among neighbouring two or more ports of the same region or bay area, typically, when facing a loss of combined market share and the emergence of a common competitor. Common need is also shared among them, but when facing identical requirements, internal and external, such as improvement of hinterland access, community relations and port

environment. We'll exemplify the benefits of port alliance as a best practice following case studies of alliance between Kobe and Osaka port and Los Angeles and Long Beach port.

In response to common treat, the ports of Los Angeles and Long Beach, the US 1st and 2nd gateway ports located in the San Pedro Bay, California, jointly set up the Alameda Corridor Transportation Authority (ACTA) in 1989.In 1997. The composition of ACTA Governing Board was changed to seven members: two representatives from each of the two ports; a representative of the Long Beach City Council; a representative of the Los Angeles City Council, and a representative of the Los Angeles County Metropolitan Transportation Authority. The same year, the construction of improving the Alameda corridor has begun. The project was a $2.4 billion, 20-mile, high-capacity rail corridor project that has consolidated rail traffic between the Ports of Los Angeles and Long Beach and the rail yards near downtown Los Angeles. The Alameda Corridor was funded through a unique blend of public and private sources. Revenues from user fees paid by the railroads are used to retire nearly $2 billion in bond debt. Railroads initially paid $15.00 for each loaded 20-foot equivalent unit (TEU) container; $4.00 for each empty container and $8 for other types of loaded rail cars such as tankers and coal carriers. Over a 30-year period, fees will increase between 1.5 percent and 4.5 percent per year, depending on inflation. These Ports together represent the third largest shipping container complex in the world. Its mission was to develop an efficient rail corridor of sufficient capacity for the two rapidly growing ports without aggravating urban traffic and environment of the Los Angeles metropolitan area. Furthermore, in 2006, the same two ports took a joint initiative called the San Pedro Bay Ports Clean Air Action Program (CAAP). This was the pioneering landmark of comprehensive strategy to cut port-related air pollution and reduce health risks (Ports of Los Angeles & Long Beach, 2006). The two port authorities were fully aware of the critical need for the nation's largest port complex to operate environmentally friendly for their sustainable development in the years to come.

At the start, the effects of this solution, according to Callahan, Pisano and Linder, were threefold: 1. No longer would truck and automobile traffic be stuck at street intersections waiting for countless freight cars to pass 2. A grade separated railway could move at speed of 40 mp/h compared to existing 10 mp/h average and 3. Environmental benefits could reduce traffic congestion and mitigate existing environmental damage. Those were the main reasons that started the ACTA, but the project has been beneficial even more years later, as the ports import capacity increased so rail road needed to be used to its full potential.

This port alliance thus proved beneficial in both public and private sector. The alliance is made in the form of ACTA, with equal distribution of representatives from both Ports, as well as governances that hold public interest represented. In this way, both ports achieved interest and raised their competitiveness by sharing resources and agreeing upon a single strategy with regards to improving hinterland connectivity.

Port alliance between Kobe and Osaka is categorized as those formed up by two competing ports, and triggered by a common threat to their core business. As Japan heavily depends upon port trade and has fallen behind in following the global shipment trends especially in regards to container transport, issue of improving ports competiveness was of national importance. This alliance started with this in mind, and due to the fact that ports are governed by local authorities a solution needed to arise that will satisfy both Osaka and Kobe port. The idea for this alliance started in 2005.when the ports created a joint advisory group. In 2010. They have formally sent their developmental proposal to the government, which in turn resulted in Kobe-Osaka International Port Corporation (KOIP), a new company made from merging parts of both ports administrative departments.

S. Inoue states that the government policy to set up a bay-wide port management company intended to (1) effectively develop terminals without (2) respond more flexibly to market needs and changes, (3) strengthen bargaining powers to shipping lines, and (4) provide more choices of port services with shippers. We can see that the KOIP deals with multiple issues that regard port business, and a number of savings has been made just due to economy of scale, which leads to less cost in mutual upkeep of the services and infrastructure. But in regards to hinterland connection, priority was made to support the development of feeder services between Kobe-Osaka and local ports. Furthermore, “To encourage coastal shipping lines to open up new services and/or increase their service frequency, the KOIP started to provide financial incentives in October 2014, which are mutually funded by the company, the two cities and the national government. As a result, the number of calls made by coastal feeders at Kobe-Osaka increased by 45% to 99 calls/week in February 2017 from68 calls/week in April 2014. Ports connecting to Kobe-Osaka also increased in number from 24 to 27 during the same period. Also helping logistics providers and manufacturers develop their terminals in both ports is one of the three pillar

strategies. Both the national and two city governments provide financial support and tax discount to development of logistics facilities".

To conclude, port alliances can be made due to common threat (as in competition) or common need (as in developmental plans overlapping). In this regard, when the complete merger of partner port authorities is not feasible, politically or socially, setting up a strategic alliance company while retaining the port authorities would be a practical and workable solution. The alliance should be made by mutual effort from both port representatives and in its organizational structure ensure that interests of both ports are represented. Alliance can be made on the basis of strategies, projects or common investment, but the main priority to ensure the successfulness of this practice is equal representation and a common issue that needs to be resolved. In this regard, port alliances can be made between ports or port authorities willing to invest into a certain issue. Although port alliances like these mentioned above can be made between ports with bigger distance among themselves, developmental priorities regarding the hinterland connection are usually shared among ports in close proximity. This practice enables tackling developmental problems together, without losing the port autonomy.

Best practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	As the approach on improving the port-hinterland connection can vary depending on the context. This is due to nature of the alliance and the specific cases it approaches, which in themselves are understood as in need to be flexible and responsive to the situation of both ports. Approaching to a developmental problem jointly raises efficiency in multitude of ways: it enlarges the scope of the investment so it's beneficial for both parties; it reduces the costs of overlapping on the same research, preparation and final investment and finally it gives more incentive power to influence administrative setbacks. The last one is especially important for smaller ports, as

	jointly they can tackle common issues to keep up with competitiveness of the larger ports.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	Jointly tackling a port-hinterland connection problem with two ports means that the scale of the transportation improved is larger than it would be by just one port. This is not just due to the enlarged scope of investment, but it also affects sustainability of the investment. As seen in the LA-LB ports alliance, corridors that were congested by both ports traffic were released from the traffic pressure which has been economically justifiable for the ports and welcomed by the general public. Finally, jointly tackling a single issue means that investments won't overlap and will efficiently reduce negative impacts on environment.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	This sort of alliances party mean redistribution of employment among ports, but it also creates new jobs. Even if the administrative top has to be involved in the port's operation from before, any innovative start demands the creation of new job opportunities as response to the new needs.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	Jointly tackling an issue gives more bargaining power to both ports, as well as it includes a wider scope of actors that might benefit from the alliance. In that regard, it's easier to commit to an investment and as the market scope enlarges so do the opportunities for both ports.
Main requirements for the successful transferability of the best practice	
In terms of **national/local strategies & policies** to be already in place	Depending on port organization, alliances can be fostered by national governance, local authorities or just common interest. As seen in the Japan case, enhancing ports was of national interest so a huge amount of support came from that source.
In terms of **legal and/or contractual requirements** to be already covered	Both parties have to have a firm outline of their priorities and the ways to do it. Port alliance and the developed new administrative body must have interest of both ports in mind, and it cannot be biased on just one side.
In terms of **infrastructure (hard & soft)** to be already in place	Both ports have to be on pair with the infrastructure to fully benefit from the alliance. Ports can have similar infrastructure or they can be compatible in a way they cover the infrastructural needs of one another to make the best use of the port-hinterland investment.
In terms of **specific port-hinterland corridor**	Port alliances are basically a response to specific needs of a single port-hinterland territory.

characteristics to be covered	
In terms of **technical and/or organisational capabilities** to be already in place	Ports should have administrative power to spare in case of forming a new administrative body. Furthermore, they should have the human capacity to implement the future recommendations and initiatives.
In terms of **stakeholder engagement & cooperation** to be already in place	Stakeholders must see the potential in the alliance investments, and must see an opportunity in supporting the port-hinterland connections as it envelopes more stakeholders and opportunities.
In terms of **financing for the implementation & operation** to be already available	-

3 Other interesting practices

Practice overview					
Practice title	OP 01: Ro-Ro Line Messina-Salerno				
Practice mission	Creation of sustainable intermodal lines, which enables regular transhipping of heavy vehicles from Sicily to Campania through the ports of Messina and Salerno. The mission is to capture road traffic components by absorbing them on maritime navigation, favouring the expansion of the catchment area of the ports on the back lands.				
Bottleneck categories addressed	Market	☒	Infrastructural	☐	Operational ☒
	Institutional	☐	Innovation	☐	
Initiator of the practice	Port Authority	☒	Terminal Operator	☒	Rail Operator ☐
	Regional Authority	☐	Shipper	☒	Other ☐
Other organisations directly involved	Port Authority	☐	Terminal Operator	☐	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☐
Information source	• Torrieri V., Gattuso D. (2004). A before-after study of Mediterranean Sea motorway between Sicily and Central and Northern Italy. Proceedings of International Logistics Congress 2004: "Developing Value Network through Logistics and Transport". Dokuz Eylul Publications. Izmir (Turkey). • Gattuso D., Polimeni A. (2003). Theoretical models and operational procedures for feasibility studies of new cabotage lines. Riv.Trasporti Europei Issue 24/IX, pp 15-23. ISSN 1825-3997 • https://carontetourist.it				
Reporting partner	UNIMED				
Practice description					
The Caronte & Tourist company in 2002/2003 decided to start a Ro-Ro service on the route Messina-Salerno. The port of Salerno (in Campania region) was chosen since it is well linked to the extraurban and motorway roads and it is therefore able to avoid traffic congestion (unlike the port of Naples whose moorings are situated just close to the urban centre). The port of Messina was the Sicilian port in the right position because it was not very far from Salerno and this enables to complete the whole cycle (travel times and in port times) in the 24 hours band. Once checked the suitability and availability of the above mentioned port terminals, a series of hypotheses have been proposed about the organization of the maritime service to be started.					

Among the different alternatives the most convenient seemed that regarding the sea link along the Tyrrhenian route, more or less parallel to the Salerno-Reggio Calabria motorway (which is now being renewing for some years).

This feature, together with the traffic typology which the service is addressed to (mainly trucks with driver), leads to the consideration of this cabotage line as the first "sea motorway" carried out in Italy (Fig. 1).

Once organized the marine service, it has been searched for the right ship whose characteristics (speed, tonnage, etc.) had to cope with chosen line.

With this aim the ship Cartour (a Ro-Ro type) has been chosen. It has a capacity of 2.040 lane metres distributed on four levels: two of them are devoted to the "accompanied" commercial vehicles (that means tractor plus the driver), one to the "not accompanied" vehicles and the last level to the transport of cars (about 100). The ship has also 76 seat passengers cabins (4 places/cabin), 225 chair seats and 200 deck seats. There is a bar and a restaurant lounge too in order to grant a good and comfortable service to the costumers.

Fig. 1 - The Motorway Sea Messina-Salerno (285 km) and the Cartour ship

The Cartour is a last generation ship, able to travel at a speed of 25 knots, and this speed is just the winning card of the line service. In fact it was necessary to use a ship with a cruising speed of 25 knots in order to complete the whole cycle into 24 hours. The first 12 hours (half a cycle) include 7 hours of journey (one way) and 5 hours for the loading, the unloading, the necessary customs controls and the piloting activities.

The ship operates daily on the route Messina – Salerno, 7 days week. Unlike other sea links (Palermo-Genova, Palermo-Napoli, etc.) this service aimed to transport heavy vehicles (with drivers) and to attract business customers, mainly fruit and vegetables carriers coming from eastern Sicily and going to the central-northern markets of Italy. The fares supplied are the following (Tab.1).

Tab. 1 – Cartour fares (Euro)

Cars	78,00
Motorcycles	22,00
Commercial vehicles (trucks)	28,20 Euro /m
Roulottes/Campers	21,00 Euro/m

Buses	24,00 Euro/m
Passengers – deck seat	19,00
Passengers – 2^class seat - 1^class seat	22,00

The line, after some initial predictable difficulties, has seen an increasing number of transported vehicles. In 2002, first year of activity, it has transported 36.000 commercial vehicles, 13.000 cars and 70.000 passengers; in 2003 it has transported 48.600 freights vehicles. From these data it can be deduced that the line is able to attract a significant part (10%) of the whole potential traffic at the present time travelling through the Messina Straits, estimated in about 500.000 veh/year (traffic generated by regions not too far and not too close the Sicily). In Fig.3 it has been reported the monthly distribution of the vehicles transported in years 2002 and 2003. It can be noticed that most of the vehicles transporting goods are "accompanied" units (86% of the vehicles with tractor and driver). From the monthly distribution of the traffic in 2003 it can be inferred that: the served traffic referring to commercial vehicles regards about 4.000 means per month (500 of which are trucks without tractor and 3.500 trucks with tractor) or 130 units/day; in the month of august it is evident a sharp reduction of the commercial traffic that reaches its lowest value (about 2.000 vehicles); on the contrary the car traffic has its average value of 550 cars per month in winter and of 3.000 cars per month in summer, with a peak of about 5.500 vehicles in the month of August only.

The same analysis of the demand permitted to evaluate the rate of occupation of the ship; it has been seen that while the demand in the leaving from Salerno is rather low (the average occupation rate of the ship is about 60%), but sufficiently constant, the demand in the leaving from Messina is higher (70% on average), but with ups and downs (between 26% and 100%). The reason for this, probably depends on the fact that the route Salerno Vs Messina is made during the daytime (leaving from Salerno at 13.30 and arriving at Messina at 20.30); this is not as attractive for the haulage contractor as in the opposite direction that is covered in the night time (leaving from Messina at 1.30 and arriving at Salerno at 8.30).

Today on the Ro-Ro line Messina Salerno operate 2 ships that guarantee 600 runs/year (equivalent to 100,000 miles/year) for a volume of business that exceeds 25 million euros.

From the activation of the line the catchment of Messina port is notably increased (Figure 2) and today includes the provinces of Messina, Catania, Siracusa, Ragusa, Enna and Reggio Calabria.

Fig. 2 – Catchment Area of Messina port

Practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	The Ro-Ro line between Messina-Salerno has the advantage of guaranteeing: • door-to-door transport via efficient ports; • cheaper than road haulage; • reliability and punctuality; • environmentally friendly; • higher load factor in the round-trip; • fits with transport/logistic requirements of specific goods; • higher security than in road transport.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative	The Ro-Ro line supports the general objectives of sustaining mobility with reduced congestion, reduced environmental impact and enhanced safety while creating added value for users in terms of operational and depreciation costs.

fuels, renewable energy, etc.)	
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	-
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	on the **cooperation & coordination level it is highlighted:** • an integration and cooperation of stakeholders; • a constructive approach of all involved companies.
Main requirements for the successful transferability of the practice	
In terms of **national/local strategies & policies** to be already in place	Service planning at national and local level.
In terms of **legal and/or contractual requirements** to be already covered	To develop a Ro-Ro maritime service, it is necessary framework agreement between port authority and interested operators must be signed
In terms of **infrastructure (hard & soft)** to be already in place	Implementation/adaptation (if necessary) of docks, parking areas and access areas to accommodate the Ro-Ro maritime service
In terms of **specific port-hinterland corridor characteristics** to be covered	Specific policies relating to road tolls in order to ensure better access to the port from the surrounding areas.
In terms of **technical and/or organisational capabilities** to be already in place	Realization of Feasibility Study.

In terms of **stakeholder engagement &cooperation** to be already in place	Cooperation agreement between interested stakeholders.
In terms of **financing for the implementation & operation** to be already available	Awareness on the part of maritime companies that the financial burden of the service is their responsibility, except for any grants.

Practice overview					
Practice title	OP 02: Digitalization of Identification and transport documents processing at Combinant (Combined Terminal Antwerp)				
Practice mission	Digitalization of identification and transport documents processing, optimization and cost cutting, increased efficiency				
Bottleneck categories addressed	Market ☐ Institutional ☐		Infrastructural ☒ Innovation ☒		Operational ☒
Initiator of the practice	Port Authority ☐ Regional Authority ☐		Terminal Operator ☒ Shipper ☐		Rail Operator ☐ Other ☐
Other organisations directly involved	Port Authority ☐ Regional Authority ☐		Terminal Operator ☒ Shipper ☐		Rail Operator ☐ Other ☒ *(Road transport operators and drivers)*
Information source	• https://www.combinant.be/				
Reporting partner	CCIS				
Practice description					
• Location / hinterland routes Port of Antwerp, east side					

- Year when the best practice was introduced / Duration of it being operational

2008 / operational for 11 years

- Aim of the best practice

Introduction of digital technology for identification of road vehicles and drivers, digitalization of documents, digitalization of process of queuing and movement of trucks through the terminal

- Actors involved

Combinant (Combined Terminal Antwerp), Port of Antwerp, Antwerp, road transport operators and drivers

- Operational description of the best practice

Terminal basic information - 5 rail tracks, 3 rail mounted gantries (RMG's), 10 till 12 trains per day, 300 trucks per day, 150,000 units on a yearly base, 30-40 jobs

- Current state of the best practice initiative

Operational

- Description

The process of truck entering (right to left):

1. Truck approaching the gate (black tunnel) and by passing through it being scanned. All marks which are on any of 5 sides of vehicle (upper, left, right, front and back side) are scanned or pictured and entered in database by optical character recognizing system (OCR). Data includes vehicle registration plate and container serial number. Some of additional marks can be recognized such are dangerous goods codes ADR – UN numbers;
2. The truck is parked in front of office main building and driver wait for confirmation. Confirmation is done by terminal's staff by hand-held device where captured and pre-announced data can be found;
3. Driver entering office building where entering data by scanning of paper documents and/or manual entering. Data has being processed. Driver gets visitor number and instruction where to park and/or at which position he needs to take the container for unloading, and when;
4. At defined time, the driver approaching the second terminal gate, where wirelessly identify himself by reading ID or passport;
5. Driver is positioning the vehicle at given position for unloading and assisting the crane operator for precise container grip and efficient unloading.

Practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	Highly improved efficiency through facilitation and acceleration of container, vehicle and driver identification as well as data and transport documents processing by applying new technologies: - Reading container serial number and vehicle registration plates by OCR and automatic entering in database at entrance (terminal gate) - Identification of driver by wireless ID card reading - Self-entering and scanning of documents by driver, without presence of terminal's staff - Automatic determination of parking lot, time and location of unloading the container from road vehicle

on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	Reduced unnecessary movement of the vehicle through terminal by accurate guidance of the vehicle to parking and unloading position. Consequently, fuel consumption and exhaust emission is reduced.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	Best practice example have highest impact in this area. Data capturing is automatically completed by cameras and scanners with OCR system built in at entrance (terminal gate) and wireless reading of driver's ID. Captured data are confirmed manually by using of hand-held device. Documentation can be scanned and recognized by OCR and/or manually entered in database by driver himself. Captured and entered data are automatically processed according to container handling plan and train schedule. Based on processed data, driver automatically receives printed visitor number, parking lot mark and loading/unloading position mark.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	
Main requirements for the successful transferability of the practice	
In terms of **national/local strategies & policies** to be already in place	
In terms of **legal and/or contractual requirements** to be already covered	Digital documentation identification, processing and archive legal framework. Data recording and processing standards.

In terms of **infrastructure (hard & soft)** to be already in place	Equipment and software for digitalization (OCR) and database management. Equipment and software for data entering (Multilanguage).
In terms of **specific port-hinterland corridor characteristics** to be covered	
In terms of **technical and/or organisational capabilities** to be already in place	Necessary equipment and software, automated access control and controlled gates, trained terminal's staff.
In terms of **stakeholder engagement &cooperation** to be already in place	Standardized container and vehicle identification. Road transport operators' and driver's education and training. An earlier announcement of trains and trucks arrival and data sharing before physical arrive of containers or empty transport capacities (road and rail).
In terms of **financing for the implementation & operation** to be already available	Funds for equipment and software implementation and maintenance.

Practice overview					
Practice title	OP 03: Intelligent information exchange to increase the quality and efficiency of the port as an important link in the supply chain				
Practice mission	The best practice mission is to optimize both traffic and logistics operations in order to allow larger quantities of goods to be transhipped in the port area.				
Bottleneck categories addressed	Market	☐	Infrastructural	☐	Operational ☒
	Institutional	☐	Innovation	☒	
Initiator of the practice	Port Authority	☒	Terminal Operator	☐	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☒
Other organisations directly involved	Port Authority	☐	Terminal Operator	☐	Rail Operator ☐

	Regional Authority ☐	Shipper ☐	Other ☒
Information source	• www.hamburg-port-authority.de • www.bestfact.net		
Reporting partner	Port of Bar		

Practice description

The Hamburg Port Authority (HPA), Deutsche Telekom and SAP have jointly started a logistics IT solution designed to link up port-based companies, partners, and customers more closely. The "Smart Port Logistics" pilot project has resulted in a comprehensive IT platform that incorporates mobile applications (Apps) and thus makes it possible for traffic information and port-related services to be accessed from mobile devices such as tablets and smartphones.

The objective of the project is to optimize both traffic and logistics operations in order to allow larger quantities of goods to be transshipped in the port area.

Main actors involved are: Hamburg Port Authority (HPA), SAP for HANA Cloud, Deutsche Telekom for TelematicOne, ADAC (largest German automobile club) for traffic information and consulting, Hoyer Unternehmensgruppe for petrol station management.

Smart Port Logistics is based on a combination of the TelematicOne solution from Deutsche Telekom, the SAP HANA Cloud platform from SAP and various concepts for Web-based service marketplaces. TelematicOne is a central control portal for logistics services suppliers that consolidates freight information from various telematics systems in a single application, where it is then actionable. SAP HANA Cloud platform provides the mobile, cloud-based platform on which the IT-assisted logistics services and processes, such as TelematicOne, reside. There are also plans to provide business networks based on SAP HANA Cloud platform to offer port related information and services.

During the three-month test phase, 30 trucks were fitted with tablets and linked up to the Smart Port Logistics system. This system supplied the truck drivers with real-time traffic information from HPA's Port Road Management System and details of available parking space in the form of current, personalized messages about the traffic situation in and around the port area. The participating freight forwarding companies were also able to track their transport orders in real time.

SmartPort Logistics will soon be able to deliver real-time recommendations for dispatchers and drivers (based on predictive analytics) and automatically plan routes for individual vehicles. Intelligent apps such as Eco Drive will help truckers conserve resources by adopting an environmentally friendly driving style. SmartPort Logistics is delivered as a service from the cloud. The platform comprises SAP software (SAP Connected Logistics), based on an in-memory database (SAP HANA), vehicle-specific real-time services, elements from T-Systems' Connected Car portfolio, and an app for mobile devices. It can access traffic and infrastructure data from third parties, including break-down recovery services, such as the German ADAC.

The smartPORT logistics initiative primarily focuses on increasing the economic efficiency of Hamburg's port as an important link in the global supply chain. In order to create the conditions that enable the optimisation of traffic and trade flows, the Hamburg Port Authority (HPA) is currently developing an intelligent infrastructure: the latest IT megatrend technologies will be deployed to collect, analyse and process data so as to ensure transparency at all stages of the supply chain and enable early intervention.

Practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	- improves communication between driver and trip planner - data is easy to access and use - helps to have important information at the right time at the right place - no registration necessary. A central portal and mobile applications support seamless communications, enabling port managers, terminal staff, freight carriers and parking slot coordinators to exchange information with each other and with drivers and vehicles. Rapid insight into the current traffic situation and entire port infrastructure enables faster responses, ultimately saving time and money.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	HPA is adopting a pioneering role in Germany on the issue of a turnaround in energy policy. At the centre of this is the efficient use and expansion of the existing networks, and above all options for generating renewable energies. They are currently reviewing wind and solar power and even bioenergy, because after all large quantities of biomass also accumulate in and around the harbour area. Also, thanks to smartPORT, less congestion around the port benefits drivers and the environment.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	Smart Port Logistics is based on a combination of the TelematicOne solution from Deutsche Telekom, the SAP HANA Cloud platform from SAP and various concepts for Web-based service marketplaces. TelematicOne is a central control portal for logistics services suppliers that consolidates freight information from various telematics systems in a single application, where it is then actionable. SAP HANA Cloud platform provides the mobile, cloud-based platform on which the IT-assisted logistics services and processes, such as TelematicOne, reside. There are also plans to provide business networks based on SAP HANA Cloud platform to offer port related information and services.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	• improves communication between driver and trip planner • data is easy to access and use • helps to have important information at the right time at the right place • no registration necessary
Main requirements for the successful transferability of the practice	

In terms of **national/local strategies & policies** to be already in place	There are no specific national/local strategies & policies required.
In terms of **legal and/or contractual requirements** to be already covered	There are no specific legal and/or contractual requirements.
In terms of **infrastructure (hard & soft)** to be already in place	-
In terms of **specific port-hinterland corridor characteristics** to be covered	-
In terms of **technical and/or organisational capabilities** to be already in place	-
In terms of **stakeholder engagement & cooperation** to be already in place	-
In terms of **financing for the implementation & operation** to be already available	-

Practice overview					
Practice title	OP 04: Special Economic Zone (SEZ) of Shenzhen				
Practice mission	To develop a regulatory framework, infrastructure and investment to support the establishment of an integrated port-hinterland system				
Bottleneck categories addressed	Market	☒	Infrastructural	☐	Operational ☒
	Institutional	☒	Innovation	☐	
Initiator of the practice	Port Authority	☐	Terminal Operator	☐	Rail Operator ☐

	Regional Authority	☒	Shipper	☐	Other ☐
Other organisations directly involved	Port Authority	☐	Terminal Operator	☐	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☐
Information source	• Economic and social commission for Asia and the Pacific – Unitend Nations ESCAP and Korea Maritime Institute (2005). Free Trade Zone and Port Hinterland Development. United Nations publication. ISBN: 92-1-120434-8 ST/ESCAP/2377. • Lavissière A., Rodrigue J.P. (2017). Free ports: towards a network of trade Gateways. Journal of Shipping and Trade 2:7. • The World Bank Group (2008). Special economic ZoneS performance, lessons learned, and implications for Zone development. • The World Bank Group (2017). Special Economic Zones. *An Operational Review of Their Impacts*. • Yeung Y., Lee J., Kee G. (2009). China's Special Economic Zones at 30. Eurasian Geography and Economics, 2009, 50, No. 2, pp. 222–240. DOI: 10.2747/1539-7216.50.2.222.				
Reporting partner	UNIMED				

Practice description

The World Bank (2008) provided one of the first attempts to define the variety of free zones that have emerged in recent decades (Figure 1):

- Free trade zones (FTZ) are considered to be enclosed duty-free areas for the purpose of providing warehousing and distribution facilities supporting trade, particularly re-exports. They are commonly near a point of entry, such as a port, an airport or a land border.
- Export processing zones (EPZ) are offering incentives for manufacturing and related activities with a particular focus on exports, although several such zones allow non-exporting activities.
- Special economic zones (SEZ) are a free port paradigm that has been particularly applied to the Chinese context as a tool to promote foreign direct investments in well defined areas.
- Free ports are considered to be the broader term of a free zone as they include a rather large area and can cover a wide range of activities and incentives to promote economic development and trade.

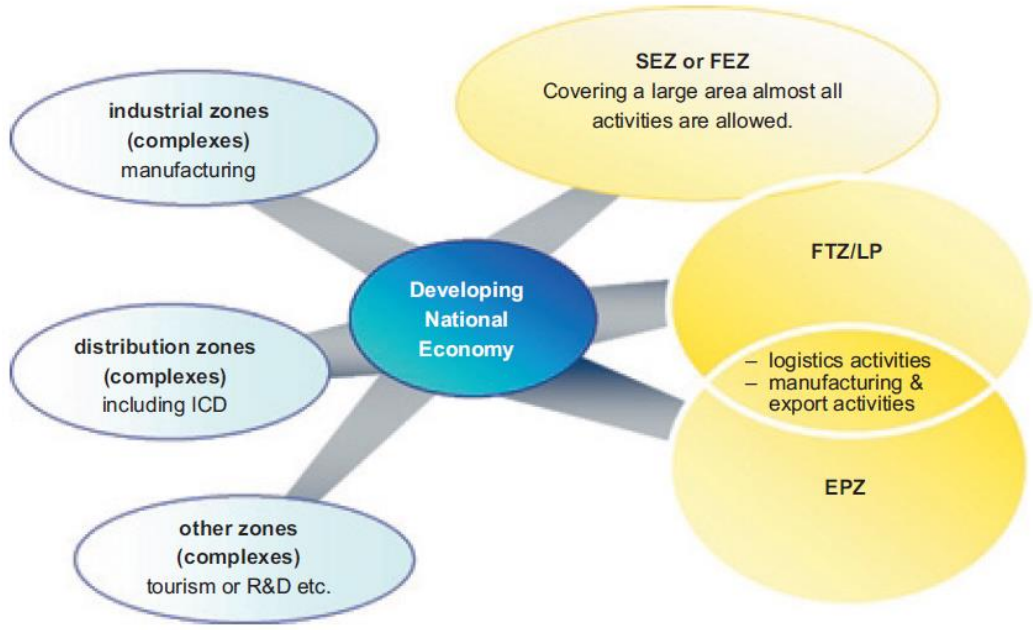


Fig. 1: Several Special zone as alternative policies for economic development (World Bank, 2008)

Literature on SEZs generally emphasizes four critical characteristics:

- SEZs occupy geographically delimited areas
- SEZs contain multiple companies
- SEZs have a zone management facility or administration.
- SEZs have a government land policy

These characteristics also clarify how SEZs may be different in their operations from other similar types of agglomeration or industrial parks. The economic benefits from SEZ development are both static and dynamic (Table 1). The impact of static benefits is obviously amplified in poorer countries where jobs and foreign exchange earnings and government resources are scarce. The dynamic benefits are much harder to measure, but are far more important to the long-term contributions from SEZ development.

Tab. 1: Potential Benefits derived from SEZs

	Direct	Indirect
Foreign exchange earnings	X	
FDI	X	
Employment generation	X	
Government revenue	X	
Export growth	X	
Skills upgrading		X
Testing field for wider economic reform		X
Technology transfer		X

Demonstration effect		X
Export diversification		X
Enchanting trade efficiency of domestic firms		X

China has a number of Special Economic Zones, but its best known is Shenzhen, established at the beginning of Deng Xiaoping's Reform and Opening Up policy in 1979. Since then the zone has expanded, and Shenzhen now covers nearly 2,000 square kilometres. Shenzhen is an important transportation hub in the coastal areas of South China, playing a significant role in China's high-technology industries, financial services, foreign trade, and maritime transportation.

Located in the Pearl River Delta, Shenzhen functions as a link and a bridge between Hong Kong, China, and mainland China (Figure 2). The Shenzhen Special Economic Zone (SEZ) was the first such zone created during the early period of modern China's economic reforms. Shenzhen's SEZ has been serving as China's "window to the world" and "an experimentation field" ever since the nation's opening up.

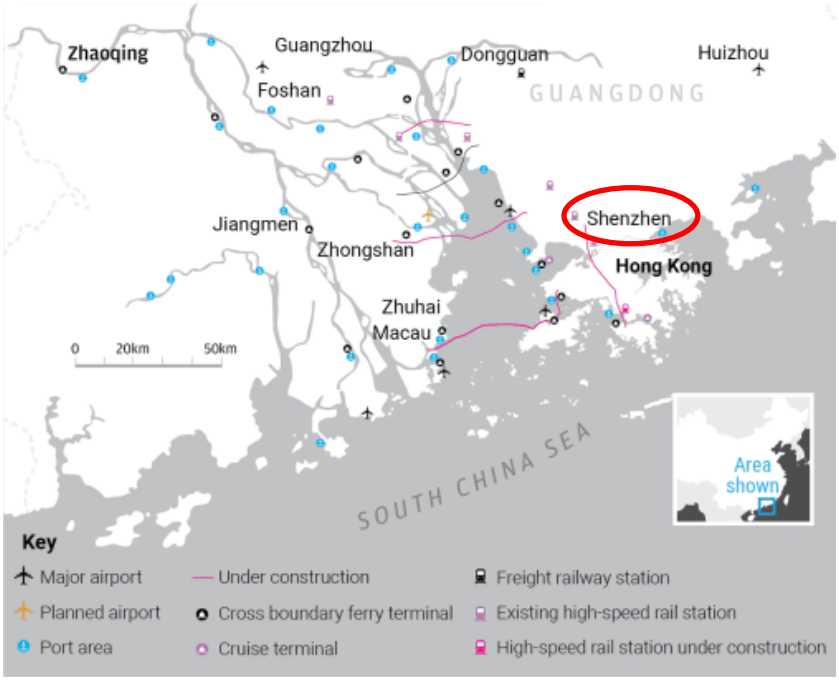


Fig. 2: Shenzhen Location

The economic environment of Shenzhen consists of four pillar industries: high-tech, modern logistics, financial services and the cultural industry. It is noteworthy that Shenzhen is home to the Shenzhen Stock Exchange.

Firms operating within Shenzhen enjoyed substantial benefits compared to the surrounding areas:

- company tax rate of 15 per cent, compared to the 30 per cent tax rate of private companies in the rest of China;
- corporate income tax holidays for agriculture, industry, and transportation;
- duty free exports and imports;
- wages set by the market – free from the rigid Chinese centralised wage-setting system;

- reduce bureaucracy and red tape.

Since its establishment Shenzhen has gone from a relatively small fishing village to a thriving metropolis. It has been China's fastest growing city for nearly three decades. Between 2001 and 2005 its economy grew by an average of 16.3 percent annually.

As the most prominent and comprehensive SEZ located adjacent to Hong Kong, Shenzhen's rapid rise from the outset has provided a demonstration effect for China's efforts to overcome poverty and underdevelopment. While some of the initial policies and measures utilized in Shenzhen were common to all SEZs, Shenzhen independently adopted many of the bold and creative measures that made it stand out from the rest. Among the SEZs, it has consistently been at the cutting edge of reform; eschewing undue reliance on limited-term government incentives, Shenzhen instead focused on private sector–led sustainable self-renewal and technological upscaling to improve its competitive position.

A principle guiding Shenzhen's development was "learning by doing," a striving for continued improvement with a view toward the future. Shenzhen's forward and backward linkages have encompassed a large number of foreign and domestically funded enterprises capable of synergistic learning.

One of the factors underlying Shenzhen's success has been its ability to attract FDI (Foreign Direct Investment) by providing a favorable environment for foreign investment. Measures designed to attract FDI included streamlined administrative control, relative independence for local planning authorities, direct access by foreign entrepreneurs to provincial- and central-level planning units, tax breaks, reduced duties on imported equipment and production materials, free or low-rent business accommodation, flexibility in hiring and firing workers, depreciation allowances, negotiated limited access to the domestic Chinese market for goods produced within the SEZ, and residence and work permits and income tax exemption for foreigners working within the SEZ. This package of measures consistently attracted more FDI to Shenzhen. Shenzhen's success in attracting FDI also is reflected in its importance as a source of Chinese exports. Shenzhen account for about 14 percent of China's total exports, Shenzhen export data was reported at 23.021 USD bn in Sep 2018. This records an increase from the previous number of 19.795 USD bn for Aug 2018.

From 2010 to 2015, Shenzhen's GDP grew at a rate of 79 per cent, easily surpassing the 29 per cent and 44 per cent growth rates of San Francisco-Oakland-Hayward and San Jose-Sunnyvale-Santa Clara metropolitan areas respectively. Shenzhen's GDP is estimated to be 2.32 trillion yuan, narrowly beating out a GDP of 2.28 trillion yuan projected for Hong Kong in 2018.

Shenzhen has become one of China's most productive cities, with the highest per capita income of 183,544,000 RMB in 2017 (from RMB 606 in 1979), and has topped all China's cities for the past 16 years in international trade; its international container port has ranked third globally in 2017.

The total cargo throughput was about 237.6 million tons in 2017, with a year-to-year growth rate of 10.98% from 2016, and an average annual growth rate of 0.66% from 2012. Regarding container throughput, the port handled over 25 million TEUs in 2017, with a year-to-year growth rate of 4.59% from 2016 and an average annual growth rate of 1.82% from 2012.

Shenzhen has also developed into an important transport hub on China's southern coast and is considered an important economic base for high-tech industries, financial services, exports, and maritime transport services.

After 40 years of development, Shenzhen has become one of China's most important high-tech research and development and manufacturing bases. It is now the world's fourth-largest container port, has the fourth-largest airport in China, and draws the fourth-largest number of tourists among Chinese cities.

The presence of the SEZ in Shenzhen guaranteed:

• a rapid Economic Growth and Industrialization; • a development of an export-oriented economy; • foreign direct investment that has contributed to Shenzhen's industrialization • a development of high-tech industries, after establishment of its SEZ, Shenzhen began its expansion mainly through processing, trade, and assembly activities.	
Practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	The presence of a special economic zone in or near the port attracts value-added activities to the port and this is both beneficial for the port region and optimal from a supply chain perspective. In Shenzhen, the combination of port and hinterland benefited from the establishment of the SEZ. The port of Shenzhen acted as a major port for facilitating imports and exports, and it grew rapidly. With regards to stakeholders, internal stakeholders (e.g., terminal operating companies) and market players (e.g., logistics service providers) enjoyed economic benefits at large as reflected by financial gains of enterprises.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	Sustainability issues have emerged as Shenzhen grows. Marine pollution and exhaust gas emissions pose a threat to residents who live near the port, causing adverse social and ecological impacts. The conditions of traffic and human congestion have deteriorated.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	SEZ is a place where testing experimental policies and market institutions and attracting foreign capital and technologies. Thus, in Shenzhen SEZ represented an essential seed for the creation of a path to technological upgrade and innovation through the importation of foreign technologies and their diffusion in the surrounding areas. SEZ essentially contributed to foster innovation activities and generate spillovers that surrounding regions have exploited.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the	One of the positive impacts expected from the development of SEZ is the coordination and cooperation between the central government and private operators that allows the development of a network of relationships, the development of skills and guarantees the success of the SEZ.

port and the city, among port-hinterland corridors of the wider region)	
Main requirements for the successful transferability of the practice	
In terms of **national/local strategies & policies** to be already in place	To a great extent, SEZ initiatives determine their own destiny from the start, with the establishment of policy frameworks, incentive packages, and various other provisions and bureaucratic procedures. Several main policy issues commonly related to sub-optimal zone performance include: • uncompetitive fiscal incentive; • restrictive controls on zone activity and cumbersome regulations; • exclusion of merchandise processed in zones from entry under bilateral and regional trade agreements. To help minimize situations that present conflicts of interest, particularly in the context of an increasing number of private zones, it is critical that zone authorities remain engaged in purely regulatory functions, and do not own, develop, or operate zones. Finally, the success of zones is critically linked to the way in which they are located, developed, and man-aged. Management of zones is enhanced when they are operated on a cost-recovery rather than subsidized basis, and are market-oriented and customer focused enterprises. This is often accomplished when zone development and operation are undertaken by private sector groups on a commercial basis.
In terms of **legal and/or contractual requirements** to be already covered	Develop an appropriate legal, regulatory, and institutional framework to ensure adequate regulation and facilitation, requiring greater administrative facilities within host governments. The key elements of a good-practice policy frame-work for SEZs are: • concept of extra-territoriality: outside domestic customs territory; eligible for national certificates of origin; eligible to participate in national trade agreements and arrangements • eligibility for benefits: No minimum export requirement; manufacturers and services; foreign and local firms; expansions of existing enterprises; private developers of zones. Foreign and local ownership No limitations; equal treatment • private zone development: Clearly defined in legislation; specific zone designation criteria; eligible for full benefits; competition from government-run zones on a level playing field. • sales to the domestic market: liberalized, provided on a blanket basis rather than case by case; treated as import into domestic market; subject to payment of import duties and taxes. • purchases from domestic market: treated as exports from domestic market; enterprises eligible for indirect exporter benefits.

	• labour policies: full consistency with International labour organization labor standards; specialized dispute settlement mechanism. SEZ legislation must increasingly incorporates features to increase program transparency and automation. Customs procedures must simplified by the use of single forms, automated systems, and other technologies.
In terms of **infrastructure (hard & soft)** to be already in place	The development of hinterland connectivity in the sense of maximizing the economic benefits of connectivity and port includes many areas where policy makers or public–private partners must act, with hard and soft infrastructure interventions, such as connecting infrastructure to existing economic growth poles and setting up export-oriented industrial and logistics facilities by using special economic zones. It is necessary to enhance the construction of inland and sea corridors, and to focus on improving shipping infrastructures and the service standard.
In terms of **specific port-hinterland corridor characteristics** to be covered	-
In terms of **technical and/or organisational capabilities** to be already in place	The technical and organizational capabilities necessary for the SEZ development can be summarized in the following points: • commercially-oriented ICT organization, • strong functional skills: marketing, asset management and financial management; • robust and dedicated funding sources.
In terms of **stakeholder engagement &cooperation** to be already in place	It is necessary an adequate coordination and the effective partnerships between private zone developers and governments.
In terms of **financing for the implementation & operation** to be already available	Government grants and private participation are needed to ensure the development of the SEZ and its success.

Practice overview	
Practice title	OP 05 - Duisport Integrated Truck Guidance system
Practice mission	Enhance efficiency of transport and logistics processes, improve the use of available resources

Bottleneck categories addressed	Market ☐ Institutional ☐		Infrastructural ☒ Innovation ☐		Operational ☒
Initiator of the practice	Port Authority ☐ Regional Authority ☐		Terminal Operator ☒ Shipper ☐		Rail Operator ☐ Other *(Specify)* ☐
Other organisations directly involved	Port Authority ☐ Regional Authority ☐		Terminal Operator ☐ Shipper ☒		Rail Operator ☐ Other *Logistics operator* ☒
Information source	• https://www.siemens.com/press/pool/de/feature/2015/mobility/2015-05-duisport/brochure-duisburg-e.pdf • https://www.duisport.de/hafeninformation/strassenservice-leitsystem/?lang=en				
Reporting partner	TPA				

Practice description

Traffic management and/or itinerary planning support systems in multimodal transport provide information that can be used by operators or by decision makers to develop measures or make adjustments/improvements to the transport system. Actors involved range from public transport and traffic management, to logistics operators and shippers.

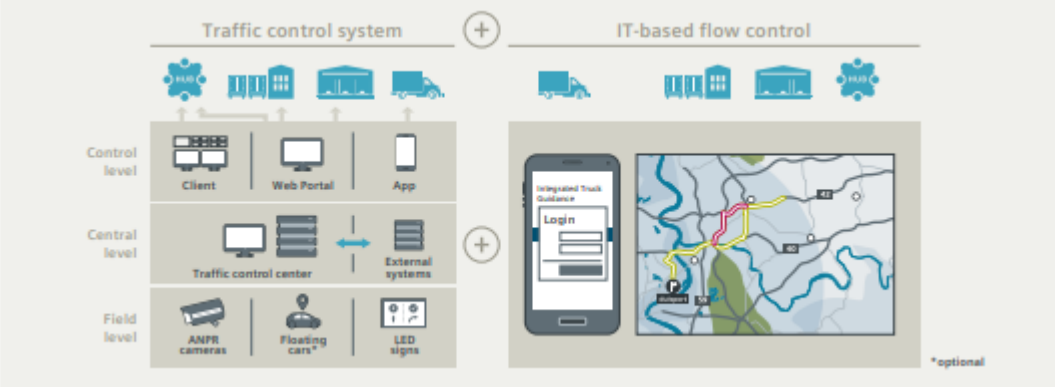
These systems provide to transportation planners information on the appropriate routes to follow, as well as key directions concerning distance, time, costs or emissions related to alternative modes of transport.

The main advantages of the such planning support systems are as follows:

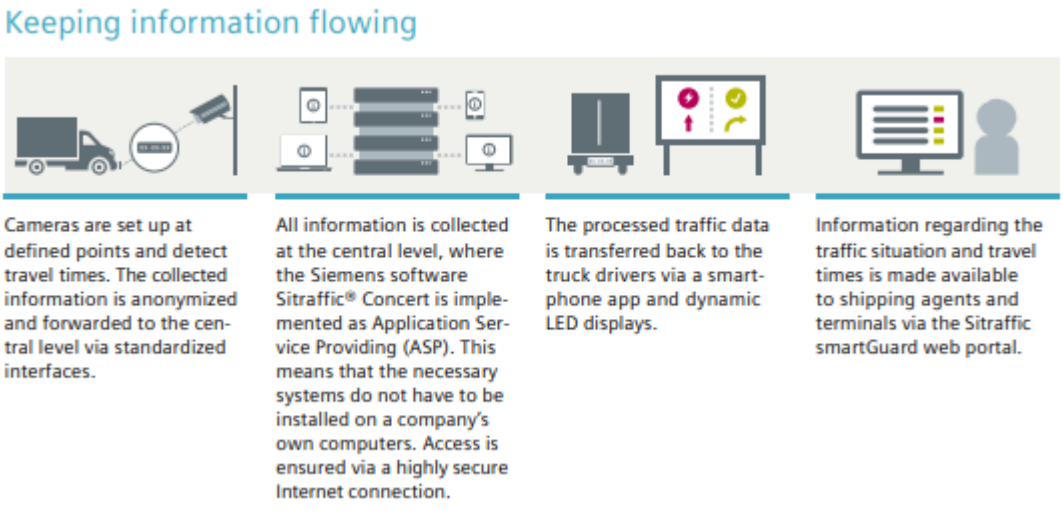
- for hauliers: reduction of waiting and travel times, reduced congestion, faster handling and loading of goods, less stressful management of driving and resting periods;
- for shippers: higher number of daily trips, improved use of vehicles, decrease in the consumption of fuel, consistency between goods management, their shipping and reporting;
- for logistics service providers: reduction of waiting times, greater use of loading platforms, higher productive capacity and performance, improved planning of resources;
- for hub operators: improvement in the pollutant balance and local traffic flows, as well as in the quality of existing infrastructure and general traffic safety.

Since 2015, Duisport has been working with Siemens to develop an intelligent flow control system that makes the current traffic situation and the flow of freight traffic transparent to all involved parties.

The system collects all truck data, anonymizes and bundles them with available traffic data such as travel time, traffic situation and congestions before forwarding it to mobile devices and LED signs. Arriving truck drivers receive all relevant traffic information as they approach and are quickly routed to the next available loading area or terminal in a coordinated fashion.



Truck drivers use a smartphone app to log into the system. GPS is used to determine their positions. Drivers, logistics providers, and terminal operators know at a glance whether the planned and estimated times of arrival match up. If they do, the driver can continue his planned route. Everyone knows what is going on, and everything flows smoothly. If delays occur, the logistics provider and terminal operator are informed and can make new arrangements. At the same time, the truck driver is given the next possible slot. This helps to avoid congestion and reduce waiting times. If a new slot is not immediately available – resulting in a delay – the app automatically informs the driver about available parking spaces. The driver is assigned a new destination slot and can continue on.



Practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between	This system reduces unproductive work processes at loading ramps and terminals, helps to minimize congestion, waiting and travel times, and provides for a better overall utilization of existing resources (e.g. loading areas and parking spaces).

modes, in administrative/customs processes to the hinterland)	
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	As the Integrated Truck Guidance system aims to minimize congestion, it helps mitigate the environmental impact of the terminal operations.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	The system is based on the use of GPS for collecting data that are then anonymized, bundled and made available to drivers and logistics operators that can access them via a smartphone app.
on the **cooperation & coordination level** of the port-hinterland corridor. (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	The Integrated Truck Guidance system increases the level of cooperation between the port/hub actors and shippers/logistics operators through the sharing of information and the promotion of multimodal services. With regard to the coordination level of the port-hinterland corridor, the information provided through the platform (e.g. transit times) can allow shippers and logistics operators to improve the alignment of their operations.
Main requirements for the successful transferability of the practice	
In terms of **national/local strategies & policies** to be already in place	There are no specific national/local strategies & policies required.
In terms of **legal and/or contractual requirements** to be already covered	There are no specific legal and/or contractual requirements.

In terms of **infrastructure (hard & soft)** to be already in place	No requirements additional to the software and hardware required for the operation of an electronic platform.
In terms of **specific port-hinterland corridor characteristics** to be covered	There are no specific port-hinterland corridor characteristics required.
In terms of **technical and/or organisational capabilities** to be already in place	Availability of technical capabilities for the development, implementation and maintenance (software and data update) of the platform.
In terms of **stakeholder engagement &cooperation** to be already in place	N/A
In terms of **financing for the implementation & operation** to be already available	Financing capacity for the development, implementation and maintenance of the platform and the required data.

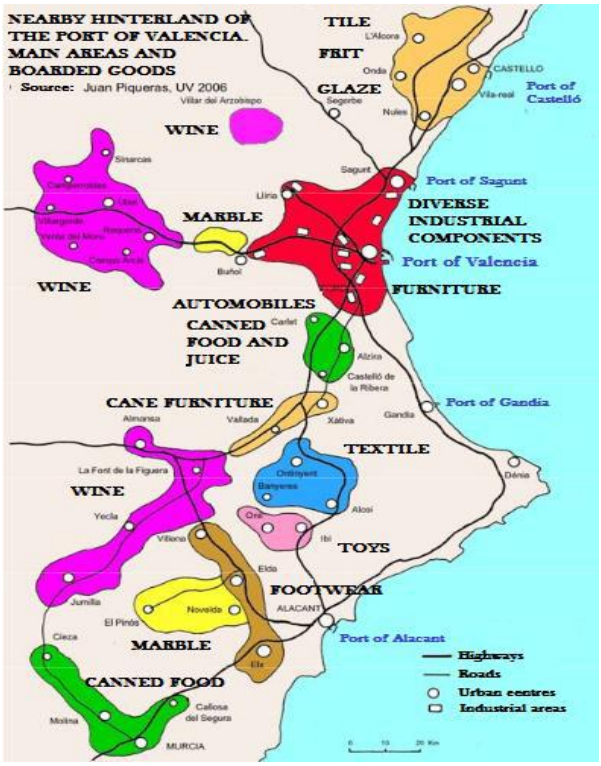
Practice overview					
Practice title	OP 06: Port Authority of Valencia				
Practice mission	The relationship between Valencia port and the intermodal hinterland challenges				
Bottleneck categories addressed	Market	☐	Infrastructural	☐	Operational ☒
	Institutional	☐	Innovation	☐	
Initiator of the practice	Port Authority	☒	Terminal Operator	☒	Rail Operator ☒
	Regional Authority	☐	Shipper	☒	Other ☐
Other organisations directly involved	Port Authority	☒	Terminal Operator	☒	Rail Operator ☒
	Regional Authority	☒	Shipper	☐	Other ☒ *(Infrastructure developers)*

Information source	• Global ports for regional economic development: The Port of Valencia, Mario Sánchez Brox (2014); Radboud Universiteit Nijmegen (s4246845) – Blekinge Tekniska Högskola MSc European Spatial Planning, Environmental Policy and Regional Development • Notteboom, T.E., Rodrigue, J.P. (2007) "Re-assessing Port-Hinterland Relationships in the Context of Global Supply Chains", in Wang et al. (eds) "Inserting Port-Cities in Global Supply Chains". Ashgate, London. • Notteboom, T.E. (2009) "Port competition and hinterland connections".Transport Research Centre, Round Table 143. • XVIII Congreso Panamericano de Ingeniería de Tránsito, Transporte y Logística (PANAM 2014). Analysis of the inland port regionalization process in Spain, Corresponding author: Ana Martínez-Pardoa, Lorena Garcia-Alonsob. • https://core.ac.uk/download/pdf/81215872.pdf • Valenciaport 2013 • Europa Press 2013 • https://www.valenciaport.com/en/ • https://www.valenciaport.com/wp-content/uploads/Memoria_Sostenibilidad_ingles_2014.pdf
Reporting partner	Sibenik PA

Practice description

Thanks to strategic location and dynamic area of influence, the Port of Valencia is a key player in Spain's foreign trade. The Port Authority of Valencia (PAV), trades under the name VALENCIAPORT, is public enterprise acting under private law following business criteria. The PAV also manages the smaller nearby ports of Sagunto and Gandia which represent less than a 10% of the PAV's traded tonnes. The Port Authority of Valencia (PAV) has laid out a Strategic Plan for 2020 under which the new challenges posed by the current economic scenario will be met. The PAV reached the objectives set out in its Strategic Plan 2015 ahead of time. In recent years, growth at the PAV has surpassed the figures set out in the 2015 Strategic Plan, in 2010 4.2 million TEUs were handled, thus exceeding the strategic growth objective for container throughput. The Port of Valencia is specialised on container traffic (85% of port traffic by tonnes) as both an interoceanic hub –a platform for international transhipment- and gateway –a platform allowing for importation and exportation of goods and switching transport modes. A port's hinterland closely related to its geographic position. Port connectivity to its hinterland deals with the infrastructure for transporting freight from the port to the final consumer in the region under the economic influence of the port, namely logistics areas, road and rail connections to final market and intermodality. PAV is geographically located at the centre of the Region of Valencia, with more than 5 million citizens (consumers), and it is the closest sea access to the Region of Madrid, with more than 6.4 million inhabitants. It is located along the Mediterranean route connecting Europe with South and East Asia trade and North American East coast with Europe and Asia. The hinterland of Valenciaport covers 350 km of Spanish territory which allows it to channel 40% of the total import- export containers of the Spanish port system and more than a 51% of the Spanish GDP and 56% of the state active population. Because of this privileged connectivity, the economic network on the port has largely benefited from such a competitive advantage. Its proximity to

the Spanish capital, combined with its excellent road and rail connections (toll-free motorway to Madrid) and the latest port and shipping infrastructure, make it the natural port for Madrid and central Spain. It is also one of the key hubs for other economic regions in the country such as Castile-La Mancha, Aragón, Murcia and Eastern Andalusia.The rail connection with the Madrid region in central Spain, the center of gravity of economic activity in the country, is quite competitive since 30% of cargo volumes with the Madrid area as origin/destination is moved by rail. Notably, the Port of Valencia supplies with the 70% of containers to the dry port of Madrid, the other 30% being split between the ports of Barcelona, Bilbao and Algeciras. Altogether, a hinterland encompassing both economic regions turns Valencia into one of the most attractive ports for shipping companies scaling in the Spanish market. The quasi-island configuration of the Port of Valencia's hinterland increases the number of potential competitor ports. Several institutional factors have consolidated Valencia as the main gate for the centre of the peninsula, which constitutes the contested hinterland among several peninsular ports. This competitive advantage for global shipping companies is built the port location, providing with the shortest distances to Madrid than from any other port. The PAV also promotes and regulates commercial activities in the port and coordinates sea-port and port-hinterland traffic (Royal Legislative Decree 2/2011).



Map 3. Main economic areas and boarded goods

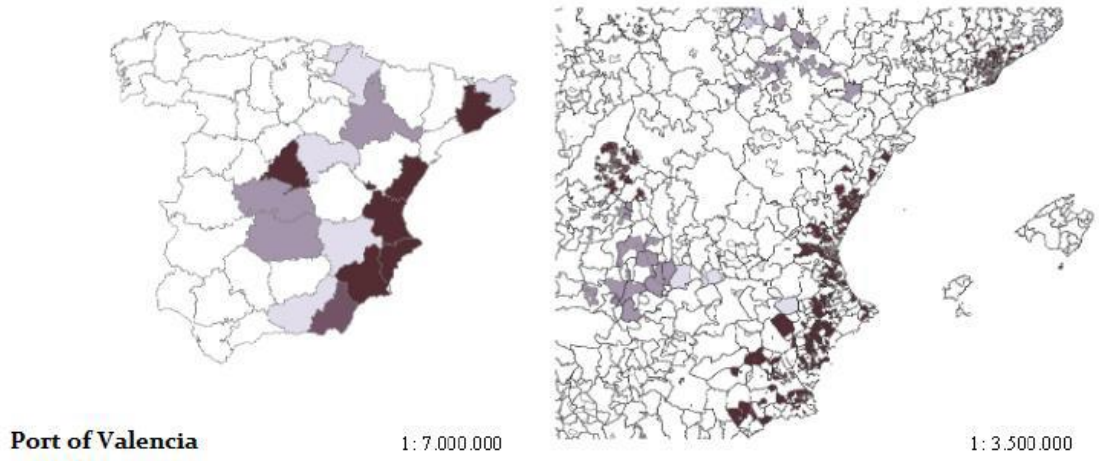
The rail connection from Valencia ensures access to any manufacturing area on the Iberian Peninsula and Europe. The rail links from the Port of Valencia are as follows:

- Valencia - Barcelona - Port Bou
- Valencia - Saragossa - Basque Country
- Valencia - Cuenca – Madrid
- Valencia - Albacete - Madrid.

From Madrid, there are links to Extremadura and Portugal, as well as the north and northwest areas of Spain.

Valencia - La Encina - Alicante, which provides connections to go on to other destinations from Alcazar de San Juan (Andalusia) and Alicante (Murcia).

The hinterland of Valencia port has experienced the best evolution over the last decade in comparison with the other main Spanish container ports (Martínez-Pardo and Garcia-Alonso, 2014; Garcia-Alonso et al, 2016). Previous research reveals that the development of the hinterland of the main Spanish container ports during the last decade depended mainly on the traffic generated in nearby provinces. Valencia grew its hinterland and decreased the spatial concentration of its traffic. Elements of the evolution of port hinterlands were port accessibility, the road and rail network available, and the existence of inland terminals and logistics platforms. The Port Authority of Valencia has port and intermodal infrastructure that make port activities and goods transport highly efficient and with competitive charges and tariffs.



Map 5. Port of Valencia hinterland for container traffic. Martínez Pardo et al. 2012

In February 2010, the Port Authority of Valencia took on the capacity allocation and traffic management of its internal rail network. This has improved the use of this facility and has contributed to making rail freight operators more competitive. The PAV shares and participates

in the policies advocated by the European Union for rail freight to take on a more important role in international goods transport. Along these lines, activities in 2014 included the development of a common strategy by the Valencian and Aragonese governments, the Chamber of Commerce and the PAV to improve the Sagunto-Teruel-Saragossa train line, which is essential to connect the hinterland and develop territorial policy. The hinterland of the port of Valencia has experienced a broader and better balanced inland development than the rest of ports in Spain analysed from 2000 to 2010.	
Practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	In accordance with growth model, the Port of Valencia expansion, with an initial phase (Breakwater Works for the Expansion of the Port of Valencia), will specialise in interoceanic container traffic and cruises. This expansion, which is being carried out in two phases, so that capacity increases according to demands, will allow the port to continue to provide first-rate services to the economy and maintain its profile as an interoceanic port, thus ensuring its hinterland remains firmly connected to world´s markets. Valenciaport builds its leadership on its privileged location, the strength of its hinterland that is made up of more than 40,000 companies experiencing its performance.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	Valenciaport has become a reference at European level in port environmental management. PAV has been a pioneer in verifying its Carbon Footprint under ISO 14,064-1:2012 by Lloyds. It has reduced the Carbon Footprint of the whole port area with 17.31% since 2008, when it was first measured, down to 2.58 kg CO2 equivalent per cargo ton in 2014, in a period in which cargo volumes grew more than 14%. The commitment with environmental sustainability has also allowed Valenciaport to a 25% energy efficiency improvement in the six-year period mentioned above, moving down from 8.76 to 6.60 kWh per cargo ton, which has allowed recently to get our energy management system ISO-50,001 certified.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	"Decarbonization, digitalization and logistics – around 2050", the Innovation Plan of Valenciaport developed by the Foundation Valenciaport in collaboration with the PAV and the Valencian innovation agency (VIA). this plan has been based on the analysis of I+D+I developed by the main European ports and other leading global operators and has allowed analysing the contribution of the key players of the Valencian port cluster in matters such as environment, energy, and safety; digitalization and automation; and new logistic business models. Based on this analysis, 44 innovation trends have been identified and grouped into 7 categories of the logistic-port chain: port infrastructures, terminals, port operations, maritime transport, ships, land transport and logistics.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors,	The port of Valencia has reinforced its position among the Spanish peninsular ports over the last decade (2000 - 2010 data) in the inland side. the development of the hinterland of the port of Valencia is a direct consequence of the nature of its traffic, mainly generated in

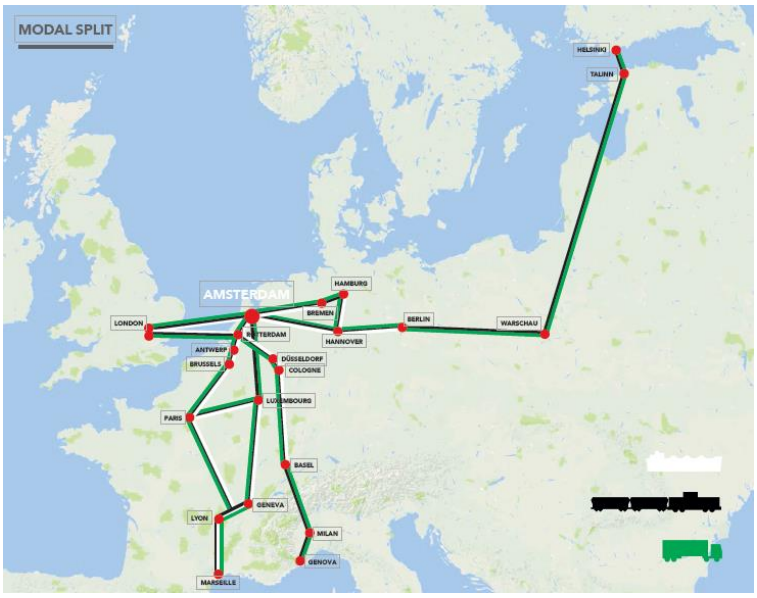
among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	provinces located in its surroundings, whose flows are so important that they influence the evolution of the whole of the national flows.
Main requirements for the successful transferability of the practice	
In terms of **national/local strategies & policies** to be already in place	The employment generated directly by Valenciaport is distributed throughout its hinterland but is created, fundamentally, in the environment closest to the port facilities. Specifically, the inhabitants of the maritime towns of Valencia (Cabanyal, Nazaret, etc) would currently benefit from a quarter of the employment generated by the port of Valencia. Specifically, 24.2% of total jobs (Marítim) and Camins al Grau, 22.1%.
In terms of **legal and/or contractual requirements** to be already covered	The quality of the hinterland access depends among others on the behaviour of a large variety of actors, such as shipping lines, terminal operators, forwarders, the port authority and the national/regional government. Therefore, effective hinterland access is at least partially an organisational challenge.
In terms of **infrastructure (hard & soft)** to be already in place	The high-quality connectivity in PAV through intermodal services to the hinterland make PAV attractive location for logistic activities. Thus, PAV can develop logistic zones and manufacturing zones in direct proximity to (container) terminals. As for maritime terminals, logistics and manufacturing require land and associated utilities.
In terms of **specific port-hinterland corridor characteristics** to be covered	• Development of an information exchange system for the integration of the railway operator in the Port Authority Community system. • Efficiency improvement of the intermodal corridor. • Sustainable development of the transport corridor.
In terms of **technical and/or organisational capabilities** to be already in place	There is a need for integrated data transfer from seaport (terminal) to hinterland, thus enabling better and faster interconnectivity when selecting a hinterland transport mode. Hinterland connectivity, important for converting Valencia in the main distribution and logistics platform of the peninsula is of essential importance, and it is deemed be determining competitiveness, although the rail infrastructure needs to be improved.
In terms of **stakeholder engagement & cooperation** to be already in place	The effort towards collaboration and cooperation, not just among economic, social and public stakeholders, but also among port stakeholders - terminal operators, stevedores, lines, hinterland transport operators, port authority etc
In terms of **financing for the implementation & operation** to be already available	There is a need for further improving the efficiency of the transport chain with a special focus on hinterland connections. This is viewed in the light of a forecast increase in freight volumes together with high transhipment costs when cargo shifts from one carrier to another.

Practice overview			
Practice title	OP 07: Port of Amsterdam		
Practice mission	Intermodal transport: efficiently and sustainable		
Bottleneck categories addressed	Market ☐ Institutional ☐	Infrastructural ☐ Innovation ☐	Operational ☒
Initiator of the practice	Port Authority ☒ Regional Authority ☐	Terminal Operator ☒ Shipper ☒	Rail Operator ☒ Other ☐
Other organisations directly involved	Port Authority ☒ Regional Authority ☒	Terminal Operator ☒ Shipper ☐	Rail Operator ☒ Other ☒ *(Infrastructure developers)*
Information source	• https://www.portofamsterdam.com/en • https://www.portofamsterdam.com/sites/poa/files/media/pdf-en/annual_report_2017_final-online.pdf • Klink, H.A. van (1995) Towards the Borderless Mainport Rotterdam – an analysis of functional, spatial and administrative dynamics in port systems, Amsterdam • Port of Amsterdam - Annual Report 2017 • https://www.portofamsterdam.com/sites/poa/files/media/pdf-en/annual_report_2017_final-online.pdf		
Reporting partner	Sibenik PA		

Practice description

The Amsterdam port region is a key logistics hub on a global level. Handling 100 million tonnes of cargo transhipment a year, the Port of Amsterdam is Western Europe's fourthlargest port. Its strategic and central location in Europe make the port easily accessible and ensures excellent connections to all major European markets. The Amsterdam port region includes the seaports of Amsterdam, Beverwijk, Zaandam and Velsen/IJmuiden. A total of 4,200 5 freight trains transported nearly four million tonnes of freight into and from the Amsterdam area (2016). The European hinterland is easily accessible by rail from the Port of Amsterdam. The Port is home to a number of shunting yards and main railway lines. At Geldermalsen, Amsterdam is linked to the Betuwelijn freight transport line. The Betuwelijn line runs from the port of Rotterdam right up to the German border (near Zevenaar) and offers rail freight transporters a direct, nonstop link to the European hinterland. Inland shipping accounts for more than 43% of all freight transport to

and from the Amsterdam port region. The Port of Amsterdam is located close to the River Rhine, making it easy to reach industrial and consumer markets in the Netherlands, Germany, Austria and Switzerland quickly and efficiently. Through the Port of Amsterdam's excellent inland shipping links petroleum products, coal, agricultural products, steel, sand and gravel, recycling materials and containers carrying foodstuffs and consumer products, all arrive safely at their destinations. Port of Amsterdam is well equipped for rail transport with multiple connections, including to the Betuwelijn and ensuring efficient accessibility to the European hinterland. The modal split ratio at the port of Amsterdam is 60.5% for inland navigation, 3.7% for rail and 35.8% for road transport. Port of Amsterdam is well connected to the Rhine and actively invests for further inland shipping improvements. Port of Amsterdam is well equipped for rail transport with multiple connections, including to the Betuwelijn and ensuring efficient accessibility to the European hinterland. As one of the world's key international logistics hub, the port of Amsterdam offers many intermodal connections to efficiently and sustainable transit freight supplied by deep sea or air from the port into the hinterland or vice versa. The new rail link is in addition to six times weekly train services connecting Melzo and Rotterdam, which will maintain their frequency in order to coordinate with shortsea services connecting to UK ports (Tilbury, Hull and Grangemouth), Ireland, Norway, Scandinavia and the Baltic States. Connecting the Port of Amsterdam with rail services to/from Italy three times a week puts a new pillar in place to support fast, cost-efficient and reliable multimodal services between the Continent and the UK. With nine trains weekly between Italy and the Netherlands, Samskip's commitment to the multimodal transport of 45ft containers, reefers, flat racks and tank containers is now unrivalle and the addition of Amsterdam also brought in a hinterland and on-shipment opportunities that were very distinct from Rotterdam.



Map 6. Port of Amsterdam connections

The new Amsterdam link would also provide greater service resilience for the Netherlands-Italy rail option. Connections to Amsterdam and Rotterdam will run along different routes, allowing flexibility in responding to any rail- or port-related delays. The railway link is a perfect opportunity to provide logistics customers access to a massive hinterland. The connection is faster than by ship and more affordable than by airplane. This connection will provide permanent access to a vast and remote hinterland. From 2018, Port of Amsterdam is the part of a modern incarnation of the historical Silk Route. A direct railway connection is constructed between the Chinese city of Yiwu (Shanghai region) and Amsterdam. The new railway connection once again links Europe to Eastern Asia through a Central Asian route. Nunner Logistics and Austrian-based

Rail Cargo Group, the second-largest railway transport company in Europe, are working in association with the TMA terminal and are using this terminal for the storage and transhipment of all types of cargo, including steel to be transported to the hinterland by rail, barge and truck. Amsterdam has traditionally maintained strong short sea connections to Scandinavia and Great Britain, on a weekly basis. The Port of Amsterdam started out as a timber-processing port and receives its timber from Scandinavia. The short sea container line service with Great Britain transports various types of freight between the British East Coast and Amsterdam. The goods are stored in the area or, alternatively, used or further transported to the hinterland. Poland, the Baltic States and Russia are easily accessible from Amsterdam by short sea. From March 2018, the Port of Amsterdam will be part of a modern version of the historical silk route. A direct rail link has been created between the Chinese city of Yiwu (in the Shanghai region) and Amsterdam via Germany (Neuss). TMA Logistics, the operator of the ACT terminal at the port, will be operating the rail link in conjunction with Nunner Logistics. Many short sea line services ship their freight through the ACT terminal. With three departures per week, the rail link will give logistics customers access to East Asia. The connection is faster than by ship and cheaper than by air. This valuable expansion confirms its strong position as a European logistics hub. The silk route will also strengthen the short sea routes to Britain and Scandinavia.	
Practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	Samskip Netherlands-Italy rail service launch brings multimodal benefits to Amsterdam and the connection trains depart from Melzo east of Milan three times a week, to be ready for unloading along 750m intermodal rail tracks inside TMA Logistics' Holland Cargo Terminal (HCT), Amsterdam 24 hours later. As well as avoiding the driver delays increasingly affecting European road transport, arrivals in Amsterdam coincide with Samskip shortsea departures to Hull, creating a seamless multimodal option to minimise post-Brexit border control issues. The "Train Lanes" sub-project focuses on a partnership in the logistics chain in order to manage the pooling of goods flows transported by rail. Removing barriers improves the competitiveness of rail transport to the hinterland. This fits in completely with the port's sustainability mission: more water and rail transport and less road transport.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	From March 2018, Port of Amsterdam is the part of a modern incarnation of the historical Silk Route. A direct railway connection is constructed between the Chinese city of Yiwu (Shanghai region) and Amsterdam. The new railway connection once again links Europe to Eastern Asia through a Central Asian route. The new route, which spans a total of length of 11,000 kilometres of railroad, runs from the Chinese mainland to Europe, traversing Mongolia and Russia. The Silk Route is part of China's 'One Belt, One Road' programme. The train journey takes 16 to 18 days – almost twice as fast as by ship. Carbon emissions are 20 times lower than those produced by air cargo. The terminals in the port of Amsterdam region is optimally connected to the intermodal network of rail, road and inland waterways. This enables easy, congestion free and quick door-to-door transport into the Netherlands and the rest of Europe. Port of Amsterdam encourages the sustainable and energy efficient intermodal transport via water and rail and supports (international) projects to advance these modalities.
on the **innovation embeddedness** of the	Port of Amsterdam launches online search engine that shows intermodal connections between 800 terminals in 45 countries. This digital

port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	transport planner provides current information on intermodal line connections via short sea, inland navigation, rail and road. The platform shows the range of transport possibilities available in Europe via the Amsterdam region. The related aim is to enable even more efficient and easy planning and to increase cargo flows through the Amsterdam port region. The port of Amsterdam promotes the greening of the chain by improving train links and inland navigation, by installing shore power for inland navigation vessels and by introducing incentives for cleaner engines. The port also invests in an increasing sustainable energy production and in locating sustainable businesses in the port area.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	The corporatized port of Amsterdam is able to address market developments because it can respond more quickly. This reflects the fact that, at the present, the port is less dependent on political decision-making. In addition, the port of Amsterdam can, as a result of the corporatisation, promote regional cooperation, divide the benefits and burdens of the port in a more balanced manner within the region and promote more sustainable water and rail mobility. The corporatized port of Amsterdam also expressly opts to take on the role of partner and this is included in the motto: port of partnerships. By continually seeking out partnerships, it can achieve major steps with its partners that are designed to make the business development climate more attractive. Logistics companies, government agencies, knowledge institutes work together within the context of the 'seamless connections' programme to realise innovations aimed at speed, pooling and removing barriers within the logistics sector. The port interconnects international logistics, regional industry and urban services. This is only possible when there are strong relationships with residents, regional and international partners, clients, municipalities, organisations and other seaports and ports in the Netherlands and Europe.
Main requirements for the successful transferability of the practice	
In terms of **national/local strategies & policies** to be already in place	The quality of the hinterland access depends among others on the behaviour of a large variety of actors, such as shipping lines, terminal operators, forwarders, the port authority and the national/regional government. Therefore, effective hinterland access is at least partially an organisational challenge.
In terms of **legal and/or contractual requirements** to be already covered	The Amsterdam port region want to improve position in short sea and hinterland activities. The APR encourages this ambition through a focus on rail and inland shipping. The connection to the new silk route is an example of this ambition. This step will help APR to become the premier logistics hub in the region for the transport of containers from north-west Europe to Asia.
In terms of **infrastructure (hard & soft)** to be already in place	Imminent number of bottlenecks on the railway network connecting the capital towards the hinterland.
In terms of **specific port-hinterland corridor**	The aim of the port of Amsterdam is to further promote and stimulate transport by water and rail. It does this by actively developing rail shuttles, such as the Berlin and Milan shuttles, in association with its

characteristics to be covered	partners and by pooling goods flows. In addition, it is committed to expanding the existing capacity of water and rail in order to enable growth in transhipment to 125 million tonnes.
In terms of **technical and/or organisational capabilities** to be already in place	There are huge challenges to increase productivity of container terminals to remain competitive and to handle the anticipated growth to reduce the spatial pressure and to improve their hinterland accessibility. These challenges support the idea to consider port concept aimed at a different access regarding hinterland transport operations. This operating approach assumes that the 'port entry' is shifted to an inland location. This location should act as a regional collection and distribution point for trucking operations, but should also be equipped to provide a rapid transfer to and from the port, to support a fast movement of containers through the port, and to avoid long storage in the port.
In terms of **stakeholder engagement & cooperation** to be already in place	Increase visibility in the public arena. Establish more contact with relevant stakeholders to acquire feedback and points for improvement.
In terms of **financing for the implementation & operation** to be already available	New Inland shipping cooperation project to create Amsterdam-Utrecht-Rotterdam corridor.

Practice overview					
Practice title	OP 08: Port of Esbjerg				
Practice mission	Intermodal transport: efficiently and sustainable				
Bottleneck categories addressed	Market	☐	Infrastructural	☐	Operational ☒
	Institutional	☐	Innovation	☐	
Initiator of the practice	Port Authority	☒	Terminal Operator	☒	Rail Operator ☒
	Regional Authority	☐	Shipper	☒	Other ☐
Other organisations directly involved	Port Authority	☒	Terminal Operator	☒	Rail Operator ☒
	Regional Authority	☒	Shipper	☐	Other ☒ *(Infrastructure developers)*

Information source	• Kirkegaard J., Sørensen K.D., Vrist C., Ydesen P., Expansion of Port Infrastructures (2018), PIANC-World Congress Panama City, Panama 2018. • https://www.conference-service.com/pianc-panama/documents/agenda/data/full_papers/full_paper_286.pdf • http://archive.northsearegion.eu/files/repository/20141201193116_LO-PINODbrochure_0513_web.pdf
Reporting partner	Sibenik PA

Practice description

Located on the west coast of Denmark facing the UK, Norway, the Faroe Islands, Iceland and Greenland as well as the Western part of continental Europe, the Port of Esbjerg is the international port of Western Denmark. Due to the port's efficient hinterland connections, Sweden and the Baltic countries are also within easy reach. Over the years, the Port of Esbjerg has demonstrated firm determination to further develop the port's infrastructure and its capability of attracting new liner services. Port of Esbjerg is a hub for cargo flows between the Nordic countries, the Baltic area and Europe. In addition, the Port of Esbjerg serves the oil and gas industry as well as the ever-growing offshore wind farm industry in the North Sea. The Port of Esbjerg has established a unique position as one of the world's leading ports for the provision of offshore services and support. PE expands with 1 million m2 and has potential for further expansion with a large space for a dry port. Infrastructure is developed by Esbjerg Municipality and the Port of Esbjerg for over 65 million euro - there's highway and railway all the way to the port area. The construction of the bridges across the Great Belt and the Sound meant a substantial extension of the hinterland of the Port of Esbjerg. the direct railroad connections to Sweden, the Baltic States and Germany have reduced transit times considerably. Since the start of the Danish off shore activities in the North Sea, the Port of Esbjerg has - thanks to both the port's excellent infrastructure and the constantly developing local business community - established a unique position as one of the world's leading ports for the provision of off shore services and support. Currently, 80% of the Danish off shore industry is based in Esbjerg. The railroad was electrified

from the railway station and a new railway terminal has been located on the port area.

Map 6. Road and railroad connections to Port of Esbjerg

Back in 2000, the Port of Esbjerg was a State port i.e. it was not run commercially and figured in the Finance Act. But then Esbjerg Municipality was given the right of disposal over the port. That meant money had to be earned.

Practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	Port's new masterplan in 2004 defined a strategy The strategy was implemented, and when the financial crisis hit the whole world in 2007, it hit the transport industry particularly hard. Yet at the port, the new strategy was bearing fruit. While other ports and transport in general were in serious decline, the Port of Esbjerg was forging ahead. Soon afterwards, the management at the port decided to invest more. With its freedom as a port under autonomous municipal control came the willingness to take risks. The money was earmarked for investments in quay facilities, terminals for a range of goods, hinterland areas, cranes and other infrastructure.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	It is worth mentioning that the combi terminal in PE is in use. Converting to transporting goods by rail and ships is vital for solving road congestion and meeting Port of Esbjerg ambitions of reducing CO2 in the transport sector.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	-
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	In 2000, the ownership of the port was transferred from the Danish State to the local Municipality and gave rise to a closer interaction between the city and the port.
Main requirements for the successful transferability of the practice	
In terms of **national/local**	An ongoing revision of a public masterplan is essential, so customers, the local community, etc. are made aware of possibilities and

strategies & policies to be already in place	intentions. Environmental Impact Assessment shall be based on a project close in design to the final layout.
In terms of **legal and/or contractual requirements** to be already covered	There are no specific legal and/or contractual requirements.
In terms of **infrastructure (hard & soft)** to be already in place	The expansion possibilities for the Port of Esbjerg are limited, while the port is surrounded by environmentally sensitive areas such as NATURA 2000, a National Park in the Wadden Sea, which is designated as an UNESCO heritage site since 2014. These environmental restrictions must be taken care of when planning for expansion or change in the activities on land and at sea.
In terms of **specific port-hinterland corridor characteristics** to be covered	The Port of Esbjerg's capability of attracting new liner services make it a dynamic hub for cargo flows between the Nordic countries, the Baltic area and the rest of Europe. With 80 per cent of the Danish offshore wind farm industry in Esbjerg, it is a leading port for the provision of offshore services and support.
In terms of **technical and/or organisational capabilities** to be already in place	-
In terms of **stakeholder engagement & cooperation** to be already in place	This engagement understands a mutual agreement between many stakeholders: transport companies, forwarding companies, shipping agencies and shipping companies. Furthermore, it might need support from government, be it local authority or national one.
In terms of **financing for the implementation & operation** to be already available	It is difficult to make transport of freight on railroad economically attractive. For environmental reasons the Danish State has decided to improve conditions for transport by rail. However, the size of the country and the flexibility of trucking by road makes railway transport less competitive. This situation may change in the future by introduction of new charges and fees for trucking.

Practice overview					
Practice title	OP 09: Port of Zeebrugge				
Practice mission	Multimodal platform				
Bottleneck categories addressed	Market	☐	Infrastructural	☐	Operational ☒
	Institutional	☐	Innovation	☐	
Initiator of the practice	Port Authority	☒	Terminal Operator	☒	Rail Operator ☒

	Regional Authority	☐	Shipper	☒	Other ☐
Other organisations directly involved	Port Authority	☒	Terminal Operator	☒	Rail Operator ☒
	Regional Authority	☒	Shipper	☐	Other ☒ *(Infrastructure developers)*
Information source	• https://www.portofzeebrugge.be/sites/default/files/2018-07/Port%20of%20Zeebrugge%20-%20Food%20port%282%29.pdf • Port of Zeebrugge. (2016). Rail Connections - Situation February 2016. • Dutch Ministry of Infrastructure and the Environment (2013), Progress-Report 2012 Executive Board Rail Freight Corridor 1: Zeebrugge-Antwerp/Rotterdam- Duisburg- Basel- Milan-Genoa.				
Reporting partner	Sibenik PA				

Practice description

Located on the northeastern coast of Belgium, Zeebrugge is a deep sea container port with connections to all continents. When it comes to short sea shipping, Zeebrugge is an important roll-on/roll-off port for Great Britain, the Iberian Peninsula and Scandinavia. It's also accessible at any time, even to the largest container ships in the world. The port of Zeebrugge plays an active role in creating hinterland products by bringing together cargo from different operators to create sufficient volumes. Connection with the hinterland is established by rail, by estuary barge and by road. The frequent rail connections and the dry ports of Duisburg, Ludwigshafen, Milan and Verona ensure reliable service to your customers in the Benelux, Germany, France, Italy and beyond. All terminals in the port are rail connected & daily block trains depart & arrive from main intermodal platforms in Europe. Estuary & inland barges are deployed to connect the Port of Zeebrugge with Europe's dense inland navigation network. The Port of Zeebrugge has excellent hinterland connections and is located in close proximity to end markets. As a 'clean port', it is essential to the transport of food in Europe. Businesses can also take advantage of the port's custom distribution and investment options. Zeebrugge attracts the newest generation of Ultra Large Container Carriers (ULCCs) and is the world leading logistics port for new cars, as well as a leading hub for liquefied natural gas and paper pulp. In 2019 American carmaker Tesla will be transporting its Model 3 e-vehicles to Europe through the Port of Zeebrugge, one of Flanders' four international seaports and the world's biggest car-handling port. At Zeebrugge, thousands of Tesla Model 3 cars will be arriving from the US and redistributed directly to customers across the European continent. The e-vehicles will be prepared on-site at the port prior to delivery.

Map 7. Port of Zeebrugge – Rail connection

Since 2017, the private rail operator Lineas provides daily rail links between 3 terminals in the Port of Zeebrugge and the European Green Xpress Network. This optimized Zeebrugge rail link enables the port and Lineas to work together towards the further implementation of modal shift to rail.

Zeebrugge offers daily Ro/Ro connections with the UK, Ireland and Scandinavia. Fast and frequent shuttle services ensure efficient access to the European hinterland. The port is easily accessible from Antwerp as well as from France, the Ruhr region in Germany and Italy via rail, inland and estuary shipping. Each week, dozens of container ships set sail for the Middle and Far East. Zeebrugge has developed a strong orientation on rail shuttles.

***Brexit**: Port of Zeebrugge, which does 45% of its trade with the UK, is growing concern about the impact of the worst-case scenario – no deal, and the resumption of WTO tariffs. In the run up to Brexit, the port of Zeebrugge has presented 2 tools to allow a fluent flow of cargo to and from the UK, despite extra customs administrations which will be implemented after the Brexit deadline. The development of the RX/SeaPort data sharing platform is an initiative of the Zeebrugge port authority and APZI, the Association of Port of Zeebrugge interests. It is a platform, which offers a digital connection between all links in the logistical chain. The platform will ensures a minimization of the Brexit impact, by improving the operational efficiency and creating more transparency in the logistical chain. The port of Zeebrugge is thé centre of excellence for British distribution in Northwestern Europe. Every week more than 70 regular shipping services connect Zeebrugge to UK regions.*

Practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs	The Seaport of Bruges (Zeebrugge) is located at a strategic location in Europe. Many goods have to find their way from the port to the European hinterland, in countries such as Italy, Switzerland, Germany, France, etc. To relieve pressure and to meet the different demands on the market, goods transport by road must shift to transport by rail. That is why Lineas and the Port of Zeebrugge have joined forces to coordinate better the rail offering between the port and the most important European destinations and to turn Zeebrugge into a real rail hub. Thanks to these new connections, Zeebrugge is now linked with Switzerland

processes to the hinterland)	(Basel), Austria (Vienna, Graz/Welz), Slovakia (Bratislava), Germany (Köln, Ludwigshafen/Mannheim), Italy (Milano), Spain (Madrid, Tarragona, Hendaye, Granollers), Czech Republic (Lovosice), Sweden (Malmö) and the ports of Rotterdam and Le Havre.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	Port of Zeebrugge is still need to work on promoting the better environmental performance of hinterland transport and do active work in sustainable hinterland strategies and adopt a real environmental role and function.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	APZI (Association of Port of Zeebrugge Interests) and Port of Zeebrugge have joined forces to develop a new innovative data platform "Rx/Seaport". Representatives of the many sectors in the Zeebrugge port community gathered together to map the possibilities and benefits of a central new digital data platform Using the available data in a smart and efficient way will make it possible to merge the logistic processes of port players, to the benefit of all. Cooperation between all parties will lead to economy of scale and efficiency gains.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	Because the Port of Zeebrugge is directly connected to the Green Xpress Network – a network of direct, frequent rail connections between European economic centres, cargo from Zeebrugge can reach its European destination (and vice-versa) with the shortest transit times. In this way, goods transport via rail becomes more attractive and more cost-effective than by road.
Main requirements for the successful transferability of the practice	
In terms of **national/local strategies & policies** to be already in place	A new governance perspective on port–hinterland linkages and related port impacts is developing.
In terms of **legal and/or contractual requirements** to be already covered	A new rail connection between the port of Zeebrugge and Dourges in northern France is opened on February 2019. It links port to the multimodal terminal Delta 3 in the French hub.

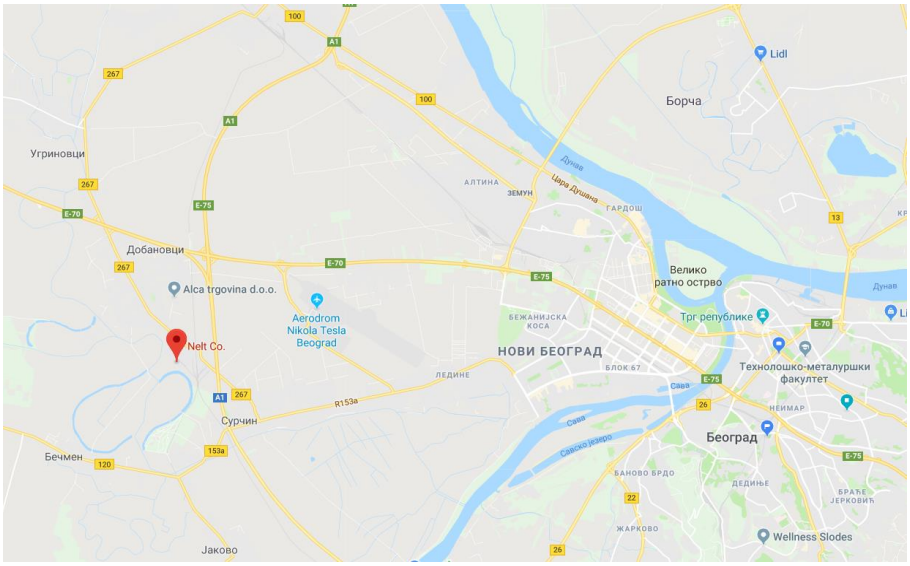
In terms of **infrastructure (hard & soft)** to be already in place	The wide variety of frequent short sea, deep-sea and hinterland links ensures the connection to the markets of Continental Europe and the UK. Just over 250 million consumers live within a 700 km reach.
In terms of **specific port-hinterland corridor characteristics** to be covered	Port of Zeebrugge is non-congested port with excellent hinterland connections. Multimodal hinterland connections by Rail: Direct terminal access, multiple railway operators offering daily departures towards the European rail hubs, part of the TEN-T network, crossroads for the U.K.-Italy corridor. Zeebrugge is also integrated into two main European rail corridors: Rhine/Alpine corridor (RFC1) & North Sea / Mediterranean (RFC2). New investments to increase the rail capacity Zeebrugge: strong rail connectivity is ongoing. The port is now very easily accessible with the bypass that connects the east and west part of the port. A new marshalling yard with 21 tracks is under construction and other smaller initiatives will contribute to an even stronger position of rail within the port in the near future.
In terms of **technical and/or organisational capabilities** to be already in place	-
In terms of **stakeholder engagement & cooperation** to be already in place	Many stakeholders in a port's hinterland demand tangible economic benefits from port activities, as a precondition for supporting port expansion and infrastructural investments. There is a large degree of communication and correlation between the port authority and the various stakeholders. Official policy makes use of formal communication and participation channels, e.g. information and feedback requirements during permit procedures. It also organizes stakeholder meetings throughout the policymaking process to get the local public and private sector involved. One such initiative to facilitate communication and exchange of ideas is the yearly Kustforum event. It gives the opportunity to all parties at the coast to enter into a dialogue with the government, politicians and each other to determine the priorities for the coast. Among the main non-state actors in Zeebrugge harbour are commercial companies from different sectors. These private sector interests are represented by the Association Port of Zeebrugge Interests (APZI. APZI is a private sector association in the Port of Zeebrugge. In the port community, APZI fulfils a double task: the representation of the Zeebrugge private sector and the promotion of the port. Some 160 companies in the Port of Zeebrugge are affiliated to APZI: stevedores, shipping companies and shipping agents, forwarding agents, transport companies (road, rail and inland navigation) and companies engaged in port activities (trade, industry and services). APZI acts as the representative and mouthpiece of the Port of Zeebrugge private sector.
In terms of **financing for the implementation & operation** to be already available	Flanders (northern part of Belgium) has the ambition to become "the logistics hub of Europe". Despite the planned and already implemented infrastructural interventions, there are a number of factors that threaten the status of "Flanders as the logistics hub of Europe". The Flemish seaports are also suffering from this and are looking for new and innovative impulses that should make the transport of goods to and from

	the hinterland more smoothly and efficiently. The Flemish government and the port authorities would like to support such incentives financially and launch a call for projects that improve the efficiency of existing and new maritime cargo flows from, to and in the port and realize a modal shift from road transport to rail or inland shipping, with a positive effect on greening and sustainability.

Practice overview					
Practice title	OP 10: Market opportunity initiating private investment				
Practice mission	Positioning at the market in the conditions of low container flows and re-opening the intermodal transport market				
Bottleneck categories addressed	Market	☒	Infrastructural	☒	Operational ☒
	Institutional	☒	Innovation	☐	
Initiator of the practice	Port Authority	☐	Terminal Operator	☒	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☐
Other organisations directly involved	Port Authority	☐	Terminal Operator	☒	Rail Operator ☐
	Regional Authority	☐	Shipper	☒	Other ☐
Information source	• https://www.neltlsp.com				
Reporting partner	CCIS				

Practice description

Nelt container terminal (Rail-Road) is located 25 km to the north from Belgrade in Dobanovci. It's about 6,5 km from international airport "Nikola Tesla" and about 1 km from main Road/Rail Corridor in Serbia (Paneuropean Corridor X or Branch of TEN-T Mediterranean corridor linked to Orient/East-Med). Location is on the main route of container flows from north-Adriatic ports to Serbia and further to East and on the main route from south Adriatic and Ionian ports to Central Europe.



Terminal is opened in march 2017 and is operational for over two years.

Due to infrastructural works in the city of Belgrade from 2016, the only operational container terminal in Serbia "ZIT" was closed in 2015. At the same time, Chinese shipping company COSCO started their operations in Port of Piraeus aiming to reach Central European countries without additional costs of sailing to north-Adriatic ports. The need for container terminal practically aroused thanks to COSCO shipping demand for at least two block-trains a week.

Having in mind that before that moment container terminal ŽIT was operational and closed and moved due to construction works. COSCO Shipping and NELT recognized the opportunity for cooperation which pushed the Nelt to invest in first container terminal.

Even the intermodal transport market in Serbia is very small (throughput of containers in Serbia is less than 100.000 containers annually coming mainly by road as a last mile operation, from north Adriatic ports and in small portion from other sea ports),

Main actors involved in the work of Container terminal are:

- COSCO Shipping as a client
- Serbian Railway cargo operator "Srbija Cargo, operating transport of container block-trains from North Macedonia border to terminal in Dobanovci without shunting and delays
- Serbian railway infrastructure manager, enabling infrastructure connection from public railway network to industrial tracks of Nelt Company as well as infrastructure and connections needed for customs
- Customs, accepting terminal operations and enabling customs procedure to be completed at the terminal
- Local road transport operators, transporting containers to unloading destinations in Serbia or in the region

In terms of operations and equipment of Nelt container terminal, it is very modest and reasonable. The length of terminal is enough to accept a half of block-train composition, so it is necessary to shunt the composition half by half. Container handling is organized by Reachstackers and there is no crane. Plans for near future development are extension of terminal for additional 200 m and installation of first crane aiming to accept full train composition at once and speed up handling and loading/unloading of containers. The operations, infrastructure and equipment of terminal

are not in the focus of this best practice, but ability to percept, understand the market, change organization behaviour and invest in infrastructure as well as to involve public actors to support the private initiative. Joint initiative of Nelt Co. and COSCO Shipping is successful and operational for over two years, working full capacity and intention for infrastructure extension, even public container terminal ZIT (only competition) is operational and working at different location near Belgrade for over a year.	
Practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	In the moment of COSCO Shipping operations start from Port of Piraeus to Central Europe, there was no installed capacities in Serbia where containers could be reloaded from railway tracks to road vehicles or vice versa. Decision to invest in private container terminal is set when was clear that public container terminal ZIT will be out of order for several months and when trains from Piraeus with Chinese goods transported by COSCO shipping is not possible to be delivered in Serbia.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	Environmental aspects of new private terminal are not in the focus, but as every intermodal transport solution general characteristics of intermodality are always described as a “greener” way of transport
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	Nothing innovative was implemented at this stage.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the	Cooperation and coordination was established between several different actors, public and private – Port of Pireaus, COSCO Shipping and their representatives in Greece and Serbia, railway companies in Greece, North Macedonia and Serbia, Nelt Terminal, Customs and border police. Cooperation on commercial basis is clear, but cooperation and coordination aiming to block-train’s flows are smoothly operated from Port of Pireaus to Nelt terminal in Serbia requires strong cooperation between all actors involved.

port and the city, among port-hinterland corridors of the wider region)	Main impact is visible in coordination between public and private actors who enables exchange of information and readiness to cooperate on one objective – fast and safe transit of trains.
Main requirements for the successful transferability of the practice	
In terms of **national/local strategies & policies** to be already in place	-
In terms of **legal and/or contractual requirements** to be already covered	Contract between COSCO Shipping, its representative in Serbia (Dragonmaritime SEE, Serbia), Terminal Nelt and Serbian railway company Serbia Cargo.
In terms of **infrastructure (hard & soft)** to be already in place	Railway connection of intermodal terminal Nelt, customs facilities dedicated to private terminal, provided by railway operator Joint Stock Company (state owned) Serbia Cargo and Railway Infrastructure of Serbia (infrastructure manager).
In terms of **specific port-hinterland corridor characteristics** to be covered	-
In terms of **technical and/or organisational capabilities** to be already in place	-
In terms of **stakeholder engagement &cooperation** to be already in place	-
In terms of **financing for the implementation & operation** to be already available	Investment in intermodal terminal – infrastructure, equipment and communications.

Practice overview					
Practice title	OP 11: Introduction of co-funding of intermodal and combined transport investments				
Practice mission	To increase the volumes and improve intermodal transport in Serbia.				
Bottleneck categories addressed	Market	☒	Infrastructural	☐	Operational ☐
	Institutional	☒	Innovation	☒	

Initiator of the practice	Port Authority	☐	Terminal Operator	☐	Rail Operator ☐
	Regional Authority	☒	Shipper	☐	Other ☐
Other organisations directly involved	Port Authority	☐	Terminal Operator	☐	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other *(Road transport operators and drivers)* ☒
Information source	• https://www.mgsi.gov.rs/en				
Reporting partner	CCIS				

Practice description

- Location / hinterland routes

Irrelevant for the practice (Belgrade)

- Year when the best practice was introduced / Duration of it being operational

2018/ two years

- Aim of the best practice

To increase combined transport modal share, to support private investments in intermodal transport

- Actors involved

Government, private operators

- Operational description of the best practice

Even national budget of Republic of Serbia is modest as in any developing country and existing transport infrastructure needs to be reconstructed as well as new missing links needs to be constructed, with huge investment needs, Government of Republic of Serbia and Ministry of Construction, Transport and Infrastructure decided to set aside a part of the budget dedicated to support combined transport investments of private sector through grants regulated by newly introduced regulation.

REGULATION on incentive measures for the promotion of combined transport was introduced in 2018 and re-adopted on August 29th 2019.

Funds can be granted for:

- Construction or reconstruction of combined transport terminals (infrastructure) including handling equipment and machinery at terminals
- Equipment for combined transport operations – intermodal transport units and semitrailers for road transport of containers
- Information and communication systems, innovative equipment used by private operators and customs
- Railway rolling stock: locomotives and specialized wagons for combined transport

Maximal amounts to be granted are limited up to:

- 50% of investment costs for construction or reconstruction of combined transport terminals (infrastructure) including handling equipment and machinery at terminals
- 100% of investments costs for equipment for combined transport operations – intermodal transport units and semitrailers for road transport of containers
- 30% investment costs for Information and communication systems, innovative equipment used by private operators and customs
- 30% investment costs for railway rolling stock: locomotives and specialized wagons for combined transport

Total budget is about 1 million euro and maximal amount per one applier is about 167.000 euros.

- Current state of the best practice initiative

Operational.

Practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	Indirect impact of investment support is highlighted through procurement of new equipment and vehicles as well as construction or reconstruction of infrastructure, what consequently will have an indirect impact to the efficiency
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	Increasing of intermodal and combined transport volumes, certainly will have an impact to environment indirectly through promotion and actual support to combined and intermodal transport increased modal shift.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	-

on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	-
Main requirements for the successful transferability of the practice	
In terms of **national/local strategies & policies** to be already in place	Strategic framework (Transport strategy) enabling introduction of such regulation.
In terms of **legal and/or contractual requirements** to be already covered	Regulation or Law on co-funding or funding of intermodal and combined transport investments in infrastructure, equipment and soft solutions with defined criteria for assessment, evaluation and selection of applications to be co-funded
In terms of **infrastructure (hard & soft)** to be already in place	-
In terms of **specific port-hinterland corridor characteristics** to be covered	-
In terms of **technical and/or organisational capabilities** to be already in place	Implementation of such measures requires organizational and technical capabilities of competent authority to assess applications and deliver funds
In terms of **stakeholder engagement &cooperation** to be already in place	-
In terms of **financing for the implementation & operation** to be already available	National budget line or other source of funding approved and funds provided

Practice overview						
Practice title	OP 12: Port of Felixtowe - Logistics park					
Practice mission	Offering users lower transport costs, improved speed to market, reduced environmental impact and better utilisation of transport assets.					
Bottleneck categories addressed	Market	☐	Infrastructural	☐	Operational	☒
	Institutional	☐	Innovation	☐		
Initiator of the practice	Port Authority	☒	Terminal Operator	☐	Rail Operator	☐
	Regional Authority	☐	Shipper	☐	Other	☐
Other organisations directly involved	Port Authority	☐	Terminal Operator	☒	Rail Operator	☐
	Regional Authority	☐	Shipper	☐	Other	☐
Information source	• https://www.portoffelixstowe.co.uk • https://www.bidwells.co.uk/details/4683-cml-port-of-felixstowe-logistics-park • https://www.ipswichstar.co.uk/news/super-sized-warehouse-close-to-port-of-felixstowe-to-take-shape-this-summer-1-4454913 • http://bulkloader.prd.pl.artirix.com.s3.amazonaws.com/5c2a8939-d8c2-4d23-b3d3-8aa35ebcd845_Details.pdf • https://hutchisonports.com/en/					
Reporting partner	Port of Bar					

Practice description

The Port of Felixstowe is Britain's busiest container port and, as far as nationwide distribution is concerned, the most important. The scale of its multi-modal operations dwarfs its competitors. Over 40% of the nation's containerised trade passes through the port which, thanks to its optimal location, provides unrivalled connections to domestic and global markets.

The Port of Felixstowe Logistics Park was launched in 2014. and offers a total of 1,400,000 sq.ft of build-to-suit distribution warehouses on a 68-acre site within the Port of Felixstowe. The logistics park offers the only 21st Century warehouses available at the port, and provides occupiers with a unique opportunity to maximise efficiency at the point where national and international supply chains connect.

Individual units of between 100,000 and 800,000 sq.ft can be accommodated on a site strategically located adjacent to the UK's busiest container terminals and largest intermodal rail facility. The Logistics Park also benefits from direct access to the A14 and the strategic road network providing a range of onward distribution options by sea, road or rail.

Increased transport costs, rising road congestion and the challenges of transporting the largest containers inland are all making port centric logistics more important to cargo owners and their logistics providers. Felixstowe's location, multi-modality and sheer capacity explain why it is the preferred location for port centric logistics in the UK, helping occupiers future proof their supply chains with benefits that include: • Reduced transport costs • Improved speed to market • Reduced environmental impact (helping organisations to remain compliant and supporting their own CSR objectives) • Better capacity utilisation: fully loaded containers that would exceed maximum weights for road transport can be devanned in the port.	
Practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	The logistics park benefits from the same excellent road and rail connections developed to serve Felixstowe, the Port of Britain. The A14 connects the port to the English Midlands via the M6, the north via the M1 and M6 and A1 and via the A12 to London. The port (as simply "Felixstowe") is signed from as far away as M6 junction 1 for Rugby. Each terminal has its own rail terminal which connects to the Felixstowe Branch Line.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	Reduced environmental impact (helping organisations to remain compliant and supporting their own CSR objectives). Port of Felixstowe is constantly reducing CO2 emissions each year.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	The Port of Felixstowe has been at the forefront of the container industry for over 40 years and the development of Berths 8 & 9 – the first phase of the Felixstowe South development – will secure its position long into the future. Berths 8 & 9 are capable of working the largest container ships afloat or on order. The latest generation of ships are almost a quarter of a mile long and can carry 19,000 TEUs (standard containers). When the Felixstowe South development is completed it will be able to accommodate three of these behemoths at once. Located close to the main shipping routes into Northern Europe, berths 8 & 9 added 730 metres of quay to the Port of Felixstowe. The development is equipped with 7 of the largest cranes in the world; with an outreach of 62 metres they can handle ships carrying containers stored 24 wide on deck. Together with the existing Trinity Terminal, the Port of

	Felixstowe will be able to provide over 3 kilometres of deep-water container facilities, with a total capacity in excess of 5 million TEUs per annum.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	-
Main requirements for the successful transferability of the practice	
In terms of **national/local strategies & policies** to be already in place	-
In terms of **legal and/or contractual requirements** to be already covered	-
In terms of **infrastructure (hard & soft)** to be already in place	The Logistics park has seen the development of 1.45 million sq. ft. of warehousing on a 68-acre site, tailored to the needs of its customers. It has the key advantage of being located within the port's perimeter. It is less than 100 metres from Berths 8&9 where the container ships are handeled, and 500 metres from Trinity terminal. Both terminals, with a combined throughput of over 4 million TEUs p.a., can be accessed via internal roads allowing customers to maximise the economics of ocean freight and port-centric logistic.
In terms of **specific port-hinterland corridor characteristics** to be covered	The Port of Felixstowe is connected to the world by 33 shipping lines operating over 90 services a week across all continents – offering unparalleled flexibility and choice to its customers. There are 24 weekly services to Europe, 38 to Asia, 7 to the Middle East, 7 to Africa and 17 to the Americas. The Port of Felixstowe offers the most frequent and widest range of carbon efficient coastal feeder services to other east coast, Scottish and Irish ports. Destinations include: • Teesside • Immingham • Grangemouth • Dublin • South Shields • Belfas
In terms of **technical and/or organisational capabilities** to be already in place	-
In terms of **stakeholder**	-

engagement &cooperation to be already in place	
In terms of **financing for the implementation & operation** to be already available	-

Practice overview					
Practice title	OP 13: Port of Gothenburg's rail shuttle services				
Practice mission	Rail shuttle system linking the logistics of sea and land efficiently and environmentally friendly.				
Bottleneck categories addressed	Market	☐	Infrastructural	☒	Operational ☒
	Institutional	☐	Innovation	☒	
Initiator of the practice	Port Authority	☒	Terminal Operator	☐	Rail Operator ☒
	Regional Authority	☐	Shipper	☐	Other ☐
Other organisations directly involved	Port Authority	☐	Terminal Operator	☒	Rail Operator ☐
	Regional Authority	☐	Shipper	☒	Other ☐
Information source					
Reporting partner	Port of Bar				

Practice description

The Port of Gothenburg is a key hub for Scandinavia, receiving deep sea calls and enjoying a hinterland with 70% of Scandinavian industry within 500 km. The Port has experienced tremendous success with the development of its rail shuttle services in recent years. This success has been built on a number of key factors:

• Ongoing investment in the ports rail infrastructure including an electrification programme

• Good co-operation and collaboration between the main partners including the Port itself, the RailPort terminals, rail operators, goods owners, forwarders, shipping lines and the National Rail Administration.

• Contribution made by Maersk Line. A substantial customer and very pro-rail, 75% of its traffic moves by rail today.

• Development of the daily shuttle service network and more recently the introduction of RailPort Scandinavia.

An important innovation has been the development of the RailPort Scandinavia concept. Through partner co-operation the inland hubs are now operating as full service terminals, bringing the hubs closer to the port through their handling of services including customs clearance, storage, and documentation. This enables the port to offer seamless and efficient rail links from the sea directly inland to its customers. The aim is to add an additional 2 shuttle services per year and continue expansion of capacity on existing routes.

The Port began investing in daily shuttle services to link Gothenburg to Swedish centres of production and consumption. From the first service to Karlstad, established in 1998, the network now supports 26 shuttles, directly connecting 23 centres in Sweden and Norway.

At present the Port of Göteborg has shuttles to Stockholm/Södertälje, Eskilstuna, Norrköping, Gävle, Borlänge, Helsingborg, Västerås (2), Insjön, Nässjö, Göteborg, Karlstad, Åmål, Avesta, Hällefors, Örebro, Motala, Uddevalla, Falköping, Åhus, Halmstad, Vaggeryd and Vännäs (Umeå).

The rail shuttles run straight into the port and the freight can be rapidly loaded on board vessels for export to various world destinations or in reverse, from the vessel onto the rail wagon, which are then taken directly to its inland terminals.

The Port's Rail Services include customer adapted whole train systems transporting steel, paper, oil, cars, bananas and other consumables.

For example, **the shuttle between Stockholm Årsta and the Port of Gothenburg provides companies throughout the Stockholm area with a rapid, environmentally smart link to key import and export markets.** In just six hours, freight is being transported from Årsta to the Port of Gothenburg. On arrival, the freight trucks go straight to the container terminal, APM Terminals. Awaiting them is the most extensive range of services in Scandinavia, both within Europe and to other parts of the world. The Port of Gothenburg is the only port in Sweden with direct container services to China, India, the Middle East and the USA.

The rail shuttle runs five days a week in both directions and operates by TM Rail, which already has a rail shuttle service between Örebro and the Port of Gothenburg. The combi terminal in Årsta is operated by the rapidly growing logistics company Logent, which recently took over the terminal.

The newly started shuttle will become one of 26 shuttles in the nationwide Railport Scandinavia system, a system that is more than just rail shuttles. Several of the terminals in the system can offer services that were previously only carried out at the port. This includes storage, distribution and administration. Some of the terminals can even offer customs clearance of imported goods.

In addition, new Gothenburg intermodal terminal was built in the port area. The terminal became operational in 2017, located next to ro-ro and container terminal. Terminal has a capacity of serving six trains simultaneously. Both trailers and containers are transported to and from a variety of destinations all over Europe and the world. The new terminal consists of 7 new railway tracks.

The Port Line, 10 km railway that links the Port of Gothenburg to the rest of the Swedish rail network, was electrified in 2004. The Port Line is one of the most important rail links in Sweden and allows freight from all over Scandinavia to reach the port in Gothenburg. Some 60-70 freight trains use the line every day.

The current single-track line is being expanded into a double-track system, including an extra bridge across the Göta Älv river. The track comprises five stages and it has been decided to expand four of these with completion scheduled for 2019.

Practice impact

on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	Building an effective system of daily container and trailer shuttles between the port and inland terminal throughout Sweden and Norway. The rail shuttles are a sustainable, cost-efficient, long-term solution that ensures that large volumes of freight can reach end-costumers rapidly and efficiently.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	The environmental benefits of rail transportation are significant amounting to approx. 60,000 tonnes of CO2 per year (2014). This is equivalent to more than 200,000 flights between Gothenburg and Stockholm, or the emissions from 14,000 passenger cars. Together with the efficiency of the services the environmental advantages are expected to drive increasing volumes in the future.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	In instigating the Port of Gothenburg as a hub for the Baltic region, Norway and the Oslo area make up a very important catchment area. A new shuttle to Norway as a result of co-operation between the Port of Gothenburg, Green Cargo and H. Strøm/Rail Terminal Drammen will enable the system to be developed further, with transhipment in Drammen for onward movement by rail to other destinations, including Trondheim.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	The rail shuttle system is based on cooperation between the Port of Gothenburg, the Rail Port terminals, several rail operators, goods owners and the National Rail Administration.
Main requirements for the successful transferability of the practice	
In terms of **national/local strategies & policies** to be already in place	There are no specific national/local strategies & policies required.

In terms of **legal and/or contractual requirements** to be already covered	There are no specific legal and/or contractual requirements.
In terms of **infrastructure (hard & soft)** to be already in place	-
In terms of **specific port-hinterland corridor characteristics** to be covered	-
In terms of **technical and/or organisational capabilities** to be already in place	-
In terms of **stakeholder engagement & cooperation** to be already in place	-
In terms of **financing for the implementation & operation** to be already available	-

Practice overview					
Practice title	OP 14: Port of Antwerp Modal shift to rail				
Practice mission					
Bottleneck categories addressed	Market	☐	Infrastructural	☒	Operational ☐
	Institutional	☐	Innovation	☐	
Initiator of the practice	Port Authority	☒	Terminal Operator	☐	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☐
Other organisations directly involved	Port Authority	☒	Terminal Operator	☐	Rail Operator ☒

	Regional Authority ☐	Shipper ☐	Other ☐
Information source	• https://www.sustainableportofantwerp.com/en/ • https://www.railwaygazette.com/news/infrastructure/single-view/view/antwerpens-liefkenshoek-tunnel-opens.html • https://www.portofantwerp.com/en		
Reporting partner	Port of Bar		

Practice description

With more than 1,000 km of rail track within the port area, Antwerp has always positioned itself as a rail port par excellence (Second-largest rail port in Europe).

To keep pace with the worldwide growth in (container) freight and the always bigger container vessels, it becomes more and more important for a port to offer alternative solutions to road transport for bringing cargo to and from destinations on the European mainland. The Port of Antwerp therefore makes considerable efforts to extend its rail and barge service offer and to guarantee a fast and efficient inland navigation and rail transport to and in the port.

Rail projects are central to a 1.4 million Euros modal shift programme at the Port of Antwerp. The port is investing in sustainable initiatives over the next three years aimed at making freight traffic movement smoother and more efficient. (2017)

Three rail-based initiatives are among seven projects that have been selected for financial support, with the aim of removing some 250,000 truck transports from the roads every year.

Euroports Inland Terminals, part of the Euroports Group, will launch a direct rail link between Antwerp and the southern city of Liège (lle Moslin). The twice-weekly service is designed to offer a rail alternative to an area around Liège which is already well served by barge-transported freight. It's estimated this will lead to 16,200 fewer truck trips annually.

The final rail project is from Slovak Shipping and Ports, a container terminal operator from Bratislava in Slovakia. It will launch a combined train service, with a mixture of intermodal and conventional wagons, twice a week between Antwerp and Bratislava. Frequency will eventually be doubled. The operator estimates that by connecting the Belgian port more efficiently with the eastern Europe hinterland, the service will cut 6,000 truck trips a year.

Antwerp Port Authority said that in addition to this latest funding programme, the Flemish Government would also release a further 1.4 million Euros over the next few months for similar projects designed to deliver sustainable transport solutions around the port. Marc Van Peel, Port President, said: "A modal shift towards more sustainable methods of transport that place less burden our roads or even avoids them altogether is crucial for more efficient mobility, not only at present but also in the future. That's why the port authority will be supporting private sector projects over the next few years that contribute to more efficient truck and other transport in and around the port."

Moreover, trains regularly leave from Antwerp to destinations outside Europe such as Russia, Kazakhstan, Korea and China.

Capacity expansion of rail access

Rail access to the port on the right bank will improve in the coming years with the construction of a fly-over, among other things. This should increase the capacity of the principal access rail by approximately 30% to guarantee the growth of rail transport over time. In the longer term the

aim is to achieve further capacity growth by the construction of a completely new, second rail access. The final design should be agreed upon in the coming years. The Liefkenshoek rail link plays a major role, acting as a logistical gateway for all shippers transporting their goods from the **Port of Antwerp** to the rest of Europe. The Liefkenshoek tunnel is the link ensuring the smooth flow of freight trains between the **left and right banks** of the Port of Antwerp. On the right bank, the rail link connects to the **Antwerp-North marshalling yard**, an important chain for **rail freight** moving daily from, through and to the Port of Antwerp. This way, there is more capacity for loading and unloading containers on the left bank.	
Practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	The port of Antwerp is a centrally located railway junction for the three main rail corridors in Europe: • **Corridor 1** (**Rhine - Alpine Corridor**): Antwerp – Duisburg – Cologne – Basel – Genoa • **Corridor 2** (**North Sea - Mediterranean Corridor**): Antwerp – Luxembourg – Lyon/Strasbourg - Basel • **Corridor 8** (**North Sea - Baltic Corridor**): Antwerp – Duisburg – Poland – Lithuania
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	Thanks to the actions taken to obtain ISO 50001 certification, the Port Authority is onschedule to meet its consumption objectives. The rise in 2016 was mainly due to stricter ventilation requirements, to afford better comfort. As of 2018 the Port Authority aims for a relative reduction in CO2 emissions of 5% by 2020 compared to 2016.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	Port Authority invests actively in a close collaboration with hinterland hubs (Genk, Grobbendonk, Liège, Brussels, Geleen, Duisburg, and so on…). This further enables the grouping of rail volumes from and to consumption, production and distribution centres. These initiatives result in efficient, reliable and sustainable transport alternatives for existing and potential customers.
on the **cooperation & coordination level** of the port-hinterland corridor	A renewed, high-quality rail connection of Antwerp with the German area of Nordrhein-Westphalia via the Iron Rhine route is also on the agenda. This railway line gives the Port of Antwerp a direct and cost efficient connection with the principal German and Central European

(e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	rail networks and regions. Reopening the Iron Rhine would be a perfect supplement to the Montzen route connecting Antwerp and Aachen.
Main requirements for the successful transferability of the practice	
In terms of **national/local strategies & policies** to be already in place	-
In terms of **legal and/or contractual requirements** to be already covered	-
In terms of **infrastructure (hard & soft)** to be already in place	-
In terms of **specific port-hinterland corridor characteristics** to be covered	-
In terms of **technical and/or organisational capabilities** to be already in place	-
In terms of **stakeholder engagement &cooperation** to be already in place	-
In terms of **financing for the implementation & operation** to be already available	-

Practice overview	
Practice title	OP 15: Reconstruction of Quays 1&2 in the Durres Port

Practice mission	The project aims to obtain a water depth in front of both berths up to 11.5m, for the operational possibilities of the larger cargo ship in the quays 1&2 in the Durres Port.				
Bottleneck categories addressed	Market	☒	Infrastructural	☒	Operational ☒
	Institutional	☐	Innovation	☒	
Initiator of the practice	Port Authority	☒	Terminal Operator	☒	Rail Operator ☐
	Regional Authority	☐	Shipper	☐	Other ☐
Other organisations directly involved	Port Authority	☐	Terminal Operator	☐	Rail Operator ☒
	Regional Authority	☒	Shipper	☐	Other ☐
Information source	• Ministry of Transport and Infrastructure • Durres Port Authority • http://infrastruktura.gov.al/wp-content/uploads/2018/07/Monitoring-Report-of-Transport-strategy-and-Action-Plan-2016-2020-1.pdf				
Reporting partner	RCD				

Practice description

The quay no.1 was constructed in 1972 and in 1994 major overhaul of the yards behind the berths 1-4 and 7 and 8 was carried out. During these works the level of the deck has been increased by adding a layer of concrete on top of the, by then, existing deck. The raising of berths and apron areas increase the loads applied to the structures due to the increased deadweight of the structure. This could affect the bearing capacity of the berths and back up areas. This is because the extra weight will reduce the ability of those structures to carry live loads due to cargo handling and cargo storage. It is assumed that these factors have been taken into account and any working restrictions are applied. Since its construction, the quay is not maintained beneath the slabs and beams so the degree of corrosion of the steel bar is very high. A protective layer of concrete does not exist. Hence it is suggested that for safety reason the loading capacity must be reduced.

The quay no. 2was constructed in the period 1949-1951 and fell under the 1994 reconstruction works funded by the Kuwait Fund. Part of the quay structure is a suspended deck on piles. The deck and piles both consist of reinforced concrete. The other part of the quay, near Berth 3, consists of a concrete sheet pile retaining wall combined with a deck on pile structure. The front of the coping beam on top of the sheet piles shows severe signs of disintegration. From approximately 0.3 m below the deck level to the underside of the coping beam concrete coverage of the rebars has disappeared. The pavement behind the quay consists of concrete slab, which is damaged at some places along the crane rails.

The quay No.2 as well as quay No. 1 is in very bad state or repair in particular the elements located beneath the deck i.e. slabs and beams. Since its construction this quay is not maintained under the slabs and beams so the degree of corrosion of the steel bar is very high. A protective layer of concrete does not exist.

There are currently no plans for maintenance or major overhaul of the quay.

The DPA intends to reconstruct the Quays 1&2. The purpose of this project is to obtain a water depth in front of both berths up to 11.5m. For the achievement of this, new dredging activities in the basin of the Durres Port and in the entrance channel will be necessary. For design works, the Durres Port Authority awarded Sellhorn Ingenieurgesellschaft GmbH the Contract for the *"Preparation of Conceptual Design, Final Design and Bill of Quantity for Reconstruction of Quays 1&2"*. The Contract was signed on 19 May 2011.

Targets of the project are new location of Quays 1&2 to bring the waterfront line at the same line with that of the redesigned Quay 4 (eliminating the turn at Quay 3), provision of a bearing capacity 4 tons/m^2 for the new berths; achieving optimum conditions for the 3 phases power supply to the operating ships, protection of the waterfront side of the berths using fenders with energy absorption and reaction force for the ships approach up to 30,000dwt, safeguarding the cranes on the quay during different storms, safeguarding the ships and other operational equipment against fire. During the design process of this project, the storehouse no. 13 has been demolished, the bridge crane has been dismantled and the backyard of Quay 1 has been adjusted by third contractor of DPA.

Future cranes will handle multipurpose operations and will have maximum capacity of 45t and boom length of approx. 40 m. According to Master Plan of 2008, mobiles cranes are foreseen to be used on new Quays 1&2, the new quays will be provided with normal working conditions for handling general cargo such as, among others, operation of 45 tons electric-cranes on rails.

The new quay will be approx. 500ml of length and with an extension 30ml of width and in total of 42ml of width.

The surface of the terminal will be added with 15,000m^2, in total of 10,75ha.

Practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	Benefits of this project in the economical point of view will be as follow: The increased number of cargo ship processed to the country and other countries in the Western Balkan. It will increase the inland and maritime transport in the main port of Albania with this capacity. Strengthen efficiency, safety and environmental performance of maritime transport in order to increase the use capacity of the port.

on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative fuels, renewable energy, etc.)	Deepening of the berths will create the possibilities of some big cargo ship better than a lot of small ones. Likewise, from an environmental point of view, the better use of available space minimises and reduces consumption, emissions and noise. The processed of few ships reduce carbon emissions compared to many more small ones in the same time.
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	This project will increase the national and international traffic, because of the increased volumes and vessels passing through Durres Port in this Terminal.
on the **cooperation & coordination level** of the port-hinterland corridor (e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	Port of Durres is the most important port in Albania and also in the region because it is a transit port which is connected with many other ports in the Adriatic basin. - Safety of life - Safety of navigation - Development of West Terminal - Protection of marine environment - Protection of adjacent communities and infrastructure
Main requirements for the successful transferability of the practice	
In terms of **national/local strategies & policies** to be already in place	Provide connection to Ten-T corridors because Port of Durres is part of Corridor VIII. A collaborative project as such, is essential, and brings together stakeholders such as customers, shareholders, labour representatives, operations leaders, the technical team, vendors, and external experts. This possibility is safety for life, navigation, protected anchorage for the vessels and operational process.
In terms of **legal and/or contractual requirements** to be already covered	The legal and institutional framework of Port Authorities must provide them with the flexibility to form and implement their own investment policy.

In terms of **infrastructure (hard & soft)** to be already in place	It's an existing infrastructure but it is necessary the improvement of the conditions.
In terms of **specific port-hinterland corridor characteristics** to be covered	It improves the efficiency of inter-modality. This project will increase the national and international traffic, because of the increased volumes and vessels passing through Durres Port in this Terminal.
In terms of **technical and/or organisational capabilities** to be already in place	The practice is linked and will meliorate the work in Durres Port, because increasing the number of large tonnage cargo ships will require the improvement of processing of goods. APD is already implementing a project for enhancing of railway lines within west terminal and the main railway station of Durres, part of the Main Project for improvement of Durres Tirane railway lines.
In terms of **stakeholder engagement &cooperation** to be already in place	It creates a better security which brings in a wider connectivity. Port of Durres is the most important port in Albania and also in the region because it is a transit port which is connected with many other ports in the Adriatic basin. At the same time the community around the port, including port authorities, users, agencies, Customs and other business that have an interest will work together and will have more common interests.
In terms of **financing for the implementation & operation** to be already available	The project generates revenues from end users.

Practice overview					
Practice title	OP 16: Rehabilitation of railway Durres- Tirana and construction of the new railway to Rinas Branch.				
Practice mission	The overall objective of the project is to enhance railway transport between Tirana and Durres by improving railway infrastructure and operations and securing safety and interoperability and by constructing a new railway connection with Rinas airport.				
Bottleneck categories addressed	Market	☒	Infrastructural	☒	Operational ☐
	Institutional	☒	Innovation	☐	
Initiator of the practice	Port Authority	☐	Terminal Operator	☐	Rail Operator ☒
	Regional Authority	☐	Shipper	☐	Other ☐
Other organisations directly involved	Port Authority	☒	Terminal Operator	☐	Rail Operator ☒

	Regional Authority ☒	Shipper ☐	Other ☐
Information source	• Ministry of Transport and Infrastructure		
Reporting partner	RCD		

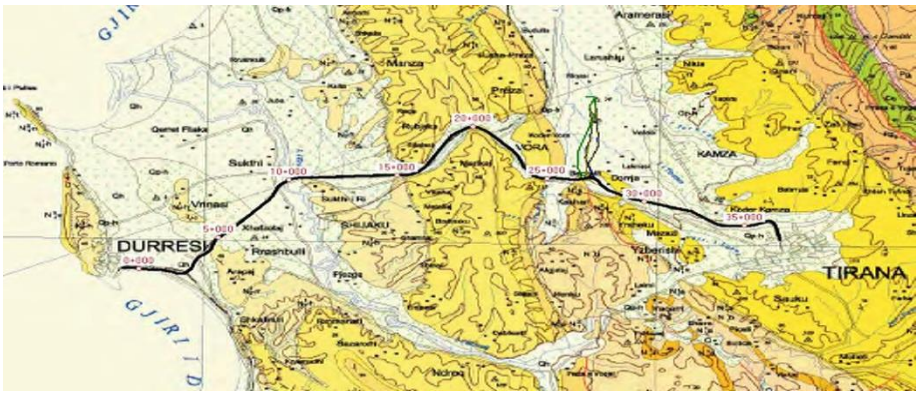
Practice description

1. General context of the project

The project refers to the modernization of the existing Durres-Tirana railway line and to the construction of the new railway line to Rinas Airport (TIA). The modernization of the railway line aims to the upgrade of geometric and operational characteristics of the line according to EU standards set by relevant EU Directives, to increase the effectiveness and safety of railway transport of goods and passengers between Tirana, Durres and Rinas airport and at the same time to contribute significantly to the economic development of the Tirana – Durres regions and of the whole country.

The railway line was examined initially through a feasibility study in December 2009 funded through WBIF and was proposed to be rehabilitated in the context of a 10 year investment program and under a medium development scenario. The proposals included the complete renewal of the of the track system, repairs to many structures / station buildings / platforms and accesses, as well as the installation of a new EU compatible signalling system.

Subsequently, the railway line was studied through a detailed technical and feasibility study, which included the economic/financial evaluation of the whole Albanian railway network, rendering this section as a first priority from the socio-economic point of view. The study also covered the detailed technical study of the section and its connection to Rinas airport, where updated specifications for the rehabilitation / construction of the lines, as well as modern signalling and telecommunication systems were used.



2 Background of the project

The Durres – Tirana railway infrastructure is quite in very poor condition resulting in very slow operating speeds. The line operates under a 60kph speed limit, which is often lowered at sections by poor track condition and frequent unauthorized level crossings. Signalling is almost inexistent or obsolete and the provided railway service is poor and irregular. As a result, the attractiveness of the railway for the connection of the city with the city and the port of Durres is very low, especially after the abolishment of the Tirana Central Railway Station (2013).

According to the national transport planning, an intermodal Public Transport Terminal (PTT) will be developed in the short term at the Mezez Fushe area, at a distance of about 4 km from the city centre, to serve all public transport modes (intercity/suburban railway, maybe tram as in FS, buses, and taxis).

In view of the above, there is a need to provide a frequent, regular service of a high quality that will attract passengers to the railway and reduce road congestion. The rehabilitation of the existing railway line is an absolute priority and the connection with the airport is a critical factor that will contribute to the attractiveness and viability of the railway line.

3 Compliance with national/regional policies

The project is in full compliance with the new Rail Code of Albania, which is currently under institutional and legal adoption by the Government of Albania. The implementation of the project will contribute to the gradual adaptation of Directive 2012/34/ EU of the European Parliament and of the Council, for establishing a single European railway area, as well as for observance of the included therein railway safety and interoperability guidelines.

In addition, the project is in compliance with Directive 2012/34/EU in our new rail code in terms of approval procedures aiming:

- To simplify the regulatory framework in the railway sector through merger,
- Harmonization, clarification and updating of the three directives of the First Railway Package into a single text Recast.
- To ensure adequate funding and pricing of rail infrastructure.
- To guarantee conditions of fair competition between companies.
- To enhance the effectiveness of the future railway regulatory body and railway safety authority.

4. Priority from national/regional authorities

- The project is in compliance with the national policies for railway sector and in particular: The Albanian Government Program, The National Strategy on Development and Integration NSDI II 2015-2020,
- The Annual National Transport Plan, and Sustainable Transport Plan
- The Sectorial Transport Strategy 2016-2020 and the National Strategy for the Development of Railways 2014-2016,
- The long-term vision of the Albanian Government for the railway sector, which is the revitalization, restructuring and the integration of the Albanian Railway network into the regional and European railway network.

The project is also in compliance with the regional priorities for the railway sector as it is:

- part of the tentative extension of TEN-T Core Network to Western Balkans (Podgorica-Durres/Tirana),
- part of the South East Europe Transport Observatory (SEETO) and initiatives of the EU,
- it has a great impact for connectivity for international links through TIA Airport and seaport of Durres in Adriatic-Ionian Corridor connectivity and the cross-border impact between SEETO participants (Albania, FYROM, Montenegro, BiH, Serbia, Kosovo) and via corridor VIII with EU member states (Greece, Bulgaria), Turkey and beyond.
- It is part of the Governmental agreement Albania-Montenegro ratified in December 2012, which protocols are currently for signing in consultation of interagency groups in the

implementation agreement between counterparties meetings invitations endorsed properly by Ministry of transport and Infrastructure of Albania to Ministry of Transport and Maritime affairs of Montenegro.

5. Priorities by the National Investment Committee NIC

As of 21 March 2016 approved by NIC for WBIF co-funding with regard to the highest strategic relevance priority for the country Albania.

6. Previous WBIF operations

The first phase feasibility study of the project financed through WBIF in 2009:

Albanian Railway Network: Infrastructure and Signalling improvement Project TA-ALB-06 (December 2009).

The second phase feasibility and detailed technical design study was funded by WBIF in 2013:

Detailed Design of rehabilitation of Railway line Durres-Public Transport Terminal Tirana (PTT) and a new railway connection to Rinas Airport (TIA) financed through WBIF, contracted on April 2013.

7. Involvement of the Private Sector

The involvement of the private sector is not directly envisaged at this stage, but the private sector will be one of main beneficiaries of this project in the future, as this line will serve as a linkage of the transport gateways to the areas of potential economic growth inside Albania and the wider Region.

Practice impact	
on the **efficiency** of the port-hinterland corridor (e.g. in terms of physical transfer processes between modes, in administrative/customs processes to the hinterland)	The main objectives in terms of outputs are to rehabilitate the existing railway line from the future location of the Tirana Public Transport Terminal (PTT) to Durres port for a length of 34.7km and also to construct a new railway line connecting the main line at the area of Domje with Rinas airport for a total length of 7.4km (4,25 km direct and 3.15 km at the junction area). In terms of outcomes the project is expected to: • Serve almost 1.4 million passengers per year • Over 220,000 tons of commodities by the first year of its operation • In 2030, these figures are expected to develop to over 1.9 million passengers and 320,000 tons respectively.
on the **environmental sustainability** of the port-hinterland corridor (e.g. in terms of environmentally friendly transport to the hinterland, efficient use of natural resources & reduced environmental impact, alternative	The project will promote use of the railroad in the transport of passengers and freight, diverting substantial traffic from the road to the railroad. Related savings in environmental costs (measurable in monetary terms) have been calculated in the CBA, as described in addition in the Environmental considerations in project design and implementation. The expected annual net savings in environmental costs of transport are 2 million Euro in the first year of operation increasing to 4,1 million Euro by the year 2040. This project has the environmental friendly impact in Durres-Tirana regions area as per result-related Sustainability Key Performance Indicators (KIPs) in reducing CO2 And GHG emission / pollutants.

fuels, renewable energy, etc.)	Source of data for these project unit environmental costs – in EUR per train-km and per road vehicle-km – is E.U. sponsored program IMPACT. In this project, they were converted to constant 2014 prices on the basis of the Albanian CPI, as determined by INSTAT. Unit costs of IMPACT are given distinctly for the following types of environmental impacts: a. Air pollution. b. Noise. c. Climate change. d. Up- and- downstream processes (in production of fuel and vehicles, construction of infrastructure etc.). e. Nature and landscape. f. Soil and water pollution. Environmental considerations are taken into account (e.g. the train is environment friendly and measures for reducing noise of train in urban areas and for minimizing cut-off of areas are underway).
on the **innovation embeddedness** of the port-hinterland corridor (e.g. in terms of port-hinterland data capture, information sharing & insight generation, technology employment)	The project has many innovating aspects which could not otherwise be generated. These aspects are realized: - Through ongoing participation of Albanian railways in Shift2Rail Initiative (Albanian Railways is an authorized member of Shift2Rail from our Ministry of Transport and Infrastructure of Albania since 2014 and ongoing) and the possibility for participation in National Calls for Innovation program under EU Horizon 2020. - through implementation of new rail code in Albania in approval procedure by Government of Albania for establishing ERTMS in the rail sector of Albania - through Mid-term legal measures for Approval of the regulation "On the Technical use of Railways in partial compliance with TSIs for operation the railway system"; to be approximated in 2016-2017 in rail transport sector in Albania within National Plan for Integration of Albania to EU 2016-2020 as of 27 January 2016 in Chapter 14 Rail Transport and chapter 21 Trans-European networks. - through future adoption of REG (EU) 2012/757/EC that is to be substituted by adoption of new REG (EU) 2015/995/EC which amended the a/m REG (EU) foreseen in framework of National Plan for Integration of Albania to EU 2016-2020. - through future Regulation of Ministry of Transport and Infrastructure in Albania "On the Interoperability on the railway system" transposing EU Directive 2008/57/EU already involved in new draft code for railways in Albania regarding the Essential Requirements met by the rail system.
on the **cooperation & coordination level** of the port-hinterland corridor	The project is part of the program of the detailed design project for modernization of indicative extension of TEN-T core network by rail and Corridor VIII by rail. It is also the result of finalizing the ongoing investment of consultancy contract of EBRD no. C25990/WBES-2013-03-02 for Albania titled "Detailed design of railway line Durres – Tirana

(e.g. among port-hinterland actors, among operational & public/compliance actors, between the port and the city, among port-hinterland corridors of the wider region)	public transport terminal (PTT) and of the new railway connection to Rinas Airport (TIA) and financial/economic appraisal of the whole Albanian Railway network" between the Ministry of Transport and Infrastructure of Albania and the project's consultant JV Railcon, Greece (05/2015). The project will widen the results of the railway operation at national level, regional and international, as it will provide a new railway connection to port of Durres following Durres train terminal, the intermodal PTT in Tirana and the TIA airport for both suburban and intercity railway trips (transferring to the suburban railway service). Thus, the project will benefit all residents and tourists of Albania.
Main requirements for the successful transferability of the practice	
In terms of **national/local strategies & policies** to be already in place	The project is coherent with WBIF's objective of financing strategic investment projects that improve connectivity in the region, as it connects two major cities of Albania and the port of Durres, as well as the TIA airport. Regarding the IPA priorities 2016: The project has got Technical maturity and Financial maturity, detailed design ready and socio-economic and financial evaluation ready following feasibility study funded by WBIF and EBRD. The project follows the implementation of Connectivity agenda, in the ongoing process of WB6 at highest level of commitment from Albania. Already approved by National Investment Committee NIC on 21.03.2016 The project is included in SPP Single project pipeline package for transport. It is reliant to rail sector strategy 2016-2020 page 52 It is related with implementation of soft measures with regards to rail reform in process in Albania, Willingness for establishing Rail Freight Corridors RFCs in Albania, Establishment of ITS, Involvement in 5yrs Maintenance Plan for Infrastructure, Establishing cross border implementation agreement in Adriatic and Ionian connection.
In terms of **legal and/or contractual requirements** to be already covered	The establishment of a legal framework to regulate the construction will be required.
In terms of **infrastructure (hard & soft)** to be already in place	The project will significantly improve international traffic (freight and passengers) and improve accessibility (Cohesion KIPs) and result in a high quality infrastructure corridor with connected long & short distance and regional / urban traffic flows for population of 1, 077,177 inhabitants in Durres and Tirana regions. (Annual Official INSTAT Data of population for Durres region 276,191 inhabitants in 1/1/2015 and for Tirana region 800,986 inhabitants in 1/1/2015). According to the CBA, the following additional benefits (calculated on the basis of parameters that can be expressed in monetary terms) will accrue from project implementation – measured in terms of ENPVs

	during the 30-year reference period of the analysis 2017-2046, calculated on the basis of SDR equal to 5% (at constant prices): • Savings in road vehicle operating costs: 69.6 million euros. • Savings in cost of time of travel / transport: 55.1 million euros. • Savings in cost of traffic accidents: 30.2 million euros. • Savings in environmental costs: 34.7 million euros. As per the Strategic SEETO/EC Working Action plan 2016 and SEETO Multiannual Plan 2015 and SEETO 2016 Multiannual Plan and WB 6 Western Balkan Ministers meeting in Vienna 27 August 2015, Albania has already participation in connectivity initiative and the project represents exactly its implementation by Albania and in Joint declaration signed by 6 Prime ministers of WB6 and EC in 21 April 2015 EU statement -15-4826.
In terms of **specific port-hinterland corridor characteristics** to be covered	The project will enhance mobility of people, as well as reduction in the cost of transport of freight, thus promoting development and enhancing the competitiveness of national production and distribution to and from the capital of Albania and its major port, benefiting not only the prefectures it traverses, but more distant areas as well. Thus, the project will contribute substantially to regional development and growth of employment and incomes throughout Albania. This is a priority for the country, GDP per capita of which is relatively low (3,400 euros in 2013) and in which the unemployment rate is relatively high (16%, also in 2013). The project has connectivity with capital of Albania with capital of Montenegro and Serbia through SEETO Route 2 and SEETO Route 4 where it meets the Orient-East Med in Belgrade. It is directly linked by rail to Tirana International Airport and thus it has global character. The project is directly linked by rail to seaport of Durres and thus is earmarked to have regional context and international character.
In terms of **technical and/or organisational capabilities** to be already in place	The project affects the annual traffic demand growth, connecting seaport of Durres for freight and passengers transport and linking to all 4 terminals including ferry terminal and containers terminal within port of Durres and railway connection to Rinas airport for passengers in/out toward Durres and Tirana Public transport terminal PTT and Use of Infrastructure KIPs per domestic and international rail network and indicative extension TEN-T core network corridor and corridor VIII by rail.
In terms of **stakeholder engagement &cooperation** to be already in place	• Beneficiary entity is HSH Albanian Railways • Implementing Agency is the Infrastructure Management Business Unit of HSH • TA Project Management and works supervision and proposed Project Implementation Unit within organizational structure of the Infrastructure Management Business Unit
In terms of **financing for the implementation &**	The project improves inter-modality with rail, road, maritime and air modes of transport between seaport of Durres to Tirana Pubic transport terminal (PTT) and railway connection to Rinas Airport (TIA), i.e. the

operation to be already available	Cohesion KIPs. The project is affecting positively the economic environment of the country and other countries in the region via Rail corridor VIII and interconnectivity to core comprehensive SEETO network. It is included in the indicative extension of TEN-T core network from Podgorica-Durres/Tirana. The project is the main transport solution in the same connection and result-related Intermodal performance KIPs with modal split and share of rail transport to/seaport and to/from airport. There is intermodal transport solution in this connection rail/maritime/air/road.