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Contents

FIGURES

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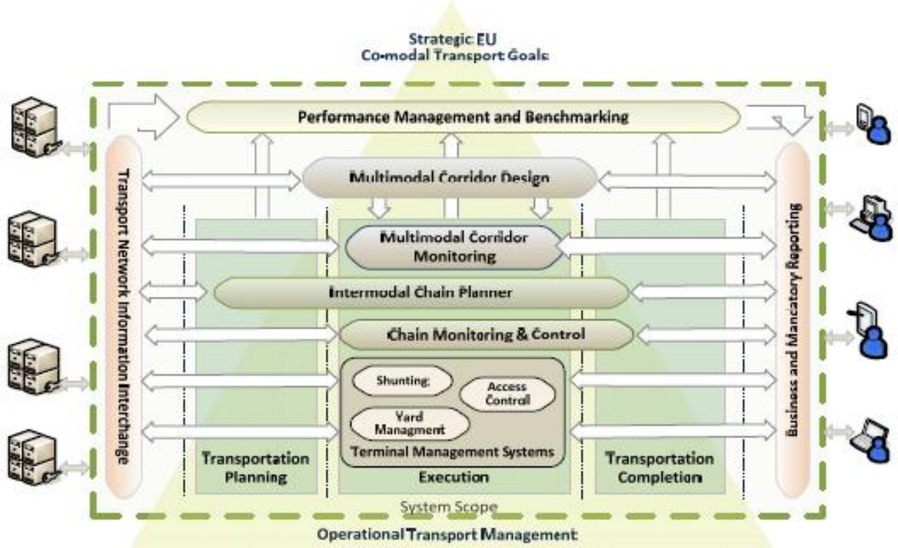
Executive Summary

One of the three areas of eMAR Business Applications is the Transport and Logistics. eMAR investigates interfacing transport logistics applications with the eMAR software platform to develop EU corridors by providing enhanced e-Maritime services that will improve efficiency and service quality along the corridor. The approach is presented in the following figure



As depicted in the diagram above, the goal is to provide applications, covering each area based on inputs by Interporto Bologna (IBI) (EAST-WEST MED transport logistics network), PTV (Germany based transport logistics network) and CCITL VGTU for East- West Transport Corridor (EWTC). Existing applications will be transformed to SOA compatible and although would be used autonomously could interchange services and could produce composite applications combining services from any registered member of the e-Maritime network.

The present deliverable analyse three business cases, to be used in the eMAR Transport and Logistics Applications and these are:

- Italy to North America; Interporto Bologna is a central hub acting as the backyard of the ports of Ravenna, La Spezia and Leghorn and as an inland terminal and gateway-system for intermodal services leading to southern ports of Taranto, Bari, and Naples. The purpose of the pilot is to contribute to the integration of shipping and maritime services in a complete “door - to – door” logistics chain. Exploiting the capabilities of IBI platform for Corridor and Transport Chain Management, the maritime actors and services will be integrated with the hinterland actors and services, tackling the fragmentation of intermodal transport with emphasis on the maritime. The pilot eMAR implementation will involve interconnection of existing application and extensions to serve the interconnection of the following:

- The Hamburg Vienna Corridor Network; Vienna is a central hub for the industry of Austia but also for the industrial development for many East European Countries with access to different seaports; Rotterdam Antwerp and Hamburg in the North, Constanta in the East and Koper and Triest in the South. The eMAR corridor Hamburg Vienna will address the application of the eMAR reference model for corridor supply chain management aiming to develop the corridor by proving enhanced eFreight services that will improve efficiency, service quality and frequency along the corridor.

- The East- West Transport Corridor (EWTC); the EWTC has evolved as the backbone of the Pan-European transport corridor IXb and recently links it with Swedish, Danish and German ports via port of Klaipeda. It includes several TEN-T ports, motorways of sea, road and railway links. During ongoing project "EWTC II " (in frame of the Baltic Sea Region Programme 2007-2013) the corridor development activity will be expanded to Black Sea, Central Asia and Far East (including China) according to green corridor concepts. A durable network of stakeholders, the EWTC Association, will be developed under coordination of the CCITL VGTU and supported to utilise the eMAR software platform and services.

The AS IS analysis of the three business cases apart from interesting information of flows, stakeholders network, infrastructure & IT capacity present their importance for the geographical areas from economic and business point of view.

Furthermore, the IT applications and systems in place, provide a sound basis for eMAR Platform, so that integration and efficiency to be achieved. The user requirements at business level support the drafting of the Pilot Plans. The Business Cases describe the new approach to be followed in implementing the demonstrator describing the new situation with the use of Transport and Logistics application in line to eMAR Platform.

1 Introduction

Long distance multimodal transport chains are significantly influenced by their maritime elements in terms of sea legs and related nodes (ports) both as short Sea Shipping and intercontinental transport. The shipping companies gradually dominate transport chain management while the ports constitute major gateways to the hinterland substantially involved in the efficient and secure transfer of cargo to/from the cargo owners.

The two main players, ship owners and ports, operate separately (with their own strategies and operational plans) and in isolation from other transport modes preventing proper integration of shipping services in the "door to door" logistic chains.. Often different stakeholder groups appear to act in isolation from each other according to their own restricted agendas prolonging a culture of intermediaries to carry out tasks which can be easily automated with modern information and communication technologies (ICT). Considering the broader list of stakeholders involved in multimodal transport chains (e.g. ship-agents, charterers, freight forwarders, cargo-owners etc) the situation becomes more complicated.

The present deliverable respond to the requirements of T3.3 responsible to investigate application of the eMAR reference model for corridor supply chain management in developing three EU corridors by providing enhanced e-Maritime services that will improve efficiency, service quality and frequency along the corridor.

The approach followed can be outlined as follows:

1. Identification of the AS IS situation along the eMAR corridors providing an insight regarding spatial, functional, technological and cargo oriented information of the selected sites.(chapters 2, 3,4) each one dedicated to the three corridors under study)

2. Identification of the user requirements by combining a bottom-up and top-down approach, initially feeding the users with the principles, concepts and innovative dimensions of the project in order to subsequently extract their views, requirements and recommendations. (chapter 5)

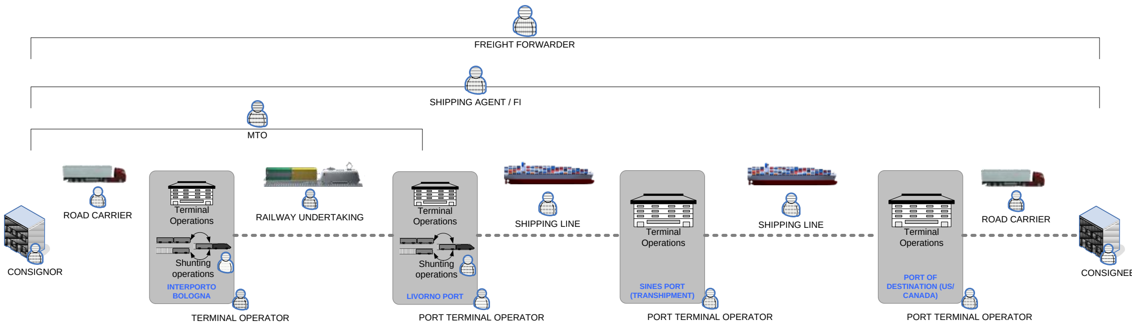
3. Chapters 6,7 and 8, provide the specifications regarding the technological solutions introduced in the pilot cases in connection with the eMAR platform capabilities and EMSF priorities. Finally, and based on the previous analyses, the TO BE situation is articulated thus presenting the operational and technical characteristics of the implemented demonstrators. Each chapter is concluded with the results of the trial session and users' feedback.

2 Business Case 1: Italy to North America

2.1 Brief presentation of the business case

The business case is focused on a multimodal transport service of containerized cargo, involving maritime, rail and road transport modes. The transport service links Italy with North America (United States and Canada), involving different logistics nodes, among whom: Interporto Bologna, La Spezia as port of origin, Sines as port of transhipment and Montreal as port of destination.

The schema of the demonstrator is presented below



A freight forwarder receives a D2D transport booking request from the consignor, thus it starts organizing and planning the whole multimodal transport by sending sub-bookings to the freight integrators: MTO for the inland part at the origin side (from consignor to the port of loading) and the Shipping Agent for the sea leg and the last mile delivery.

As mentioned, the business scenario consists of export flows of containerized cargo from the Northern Italian regions (Emilia Romagna, Veneto, Lombardia and Tuscany) and, in particular, Bologna catchment area to United States and Canada. A significant part of this cargo consists of ceramics products and tiles, thus having its origin in Modena and Bologna area, where one of the most important Italian ceramics district is located.

In the scenario identified, the freight forwarder, based on the requests for a door to door transport received by the shippers and/or cargo owner, is in charge for the entire transport organization, from the consignor up to the consignee.

The transport involves different actors and many logistics nodes:

- the main actors involved are:
    - Freight Forwarder;
    - Freight Integrator/Shipping Agent;
    - Multimodal Transport Operator;
    - Railway Undertaking;
    - Shipping Line

- Road Carriers.

- the logistics nodes are:
  - Interporto Bologna;
  - Port of La Spezia;
  - Port of Sines
  - Ports of destination [Canada and US Eastern coasts (i.e. Montreal)].

2.2 Geographical coverage (and graphical representation)

The maps below present the geographical coverage of the Business Case

Figure 2-1: The Intercontinental part of the chain

Figure 2-2: The National Part of the Business Case

Logistics nodes directly involved:

Interporto Bologna (Bologna freight village)

The Bologna Freight Village consists of an integrated system of logistics, rail and road infrastructures. It covers an area of 2,95 million sq. m., with some 250˙000 sq. m. of buildings where 117 national and international transport companies with 2˙500 direct employees for freight transport, international forwarding, warehousing and logistics operate. Bologna Freight Village is located in the Emilia Romagna Region, North-East of Italy. It is placed on the north-south traffic line where 35% of goods cross the Italian peninsula. It holds a strategic positioning with regard to Priority Axe 1 (from Berlin to Palermo) of the European TEN-T network.

The freight village railway terminal extends over an area of 277˙000 sq. m. The railway facilities include both a container terminal of 147˙000 sq. m. and an intermodal terminal extending on 130.000 sq. m. with 15 tracks and a total storage capacity of 80000 TEUs.

The total handling volume is 127000 Loading Units; for the future a total capacity of 300000 Loading Units is planned to be reached. The Bologna freight village has a total intermodal facilities surface equal to 585˙000 sq.m. The railway terminal accounts for 31 tracks (14 dedicated to intermodal transport) with a total length of 24˙000 m, 8 mobile cranes with a capacity of 42 tons each and 2 locomotives. Inside the railway terminal there are also container maintaining and repairing workshops.

Interporto Bologna SpA is the public-private company that manages the Bologna freight village and is in charge for the planning and realization of all ancillary buildings and facilities (goods storage, handling and other technical and management services) in order to enable the smooth running of the site and to serve the general requirements of users (transport and logistics companies).

Furthermore (and most important) the company is a highly specialised Multimodal Node Manager. Approximately 150 trains per week arrive and leave the freight village, linking it to the main European freight hubs and ports.

IPBO has direct **intermodal connections** with a number of Italian national and international destinations that are assured by 6 different Railway Undertakings operating at the terminal.

In detail, weekly direct connections are assured to: Marcianise, Bicocca Villa San Giovanni, Bari, Pomezia, Nola, Verona, Busto Arsizio, Duisburg, Zeebrugge, Padova, Livorno, La Spezia, Tarvisio, Roncafort, Genova, Brennero.

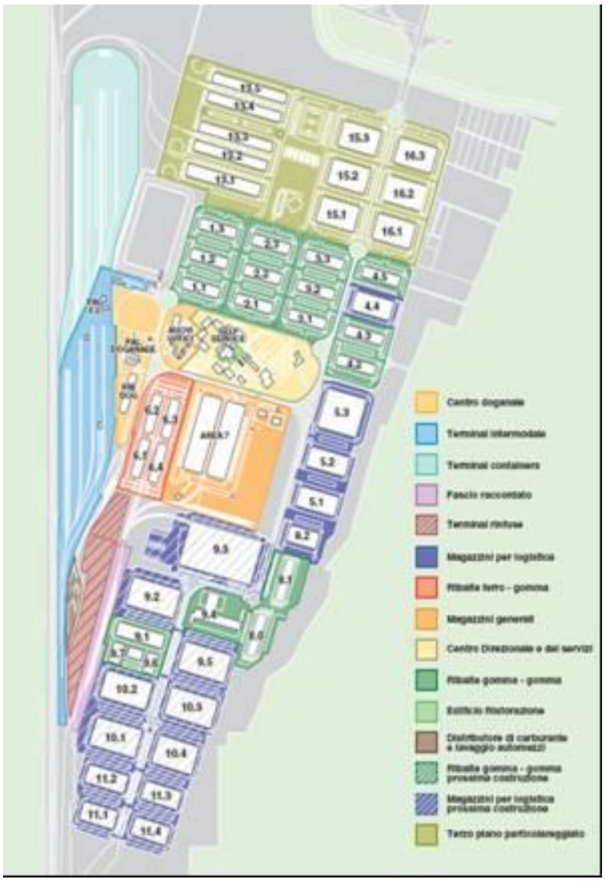


Figure 2-3: Bologna Freight Village map

Port of La Spezia

The port of La Spezia is located in the Liguria Region, about 110 km South of Genoa, in a natural bay. The port is divided into five zones with different operators located in each of them. The total surface of the port is approximately 57,5 ha. The total length of the berths is 5,1 km and it has internal railway tracks with 17 km of length. It has two container terminals, located in zone C and E (see the following figure), and among a number of specialized terminals there are also one for GPL and two for cement. The main terminal operator LSCT – La Spezia Container Terminal, directly connected with the national railway network and from LSCT containers are forwarded inland by truck or train.

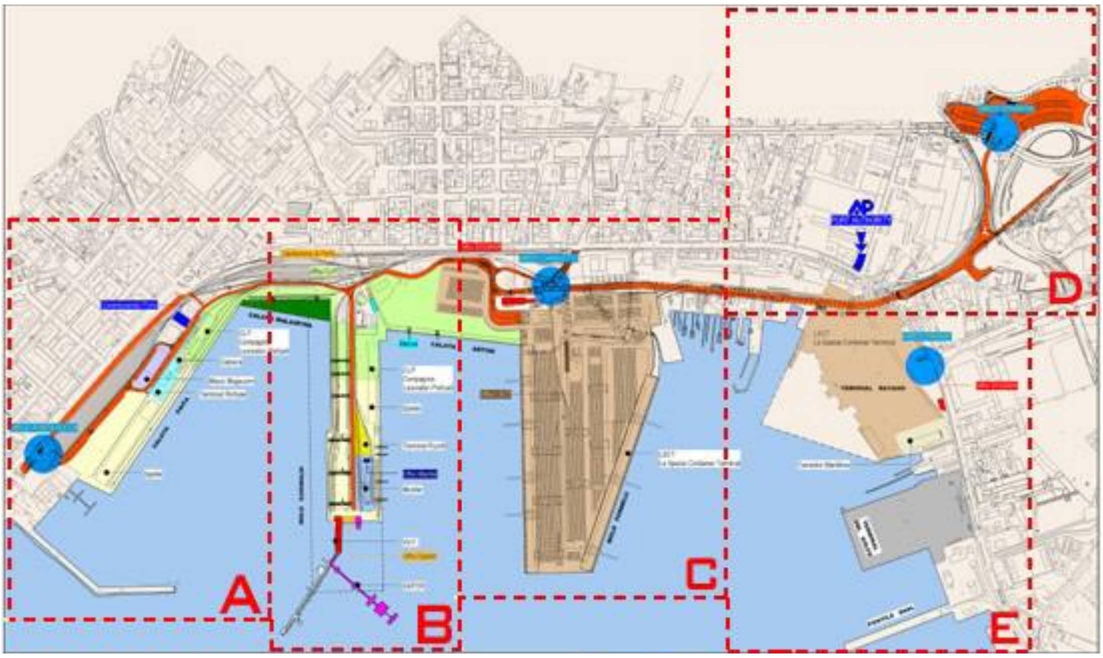


Figure 2-4: La Spezia port zones [source: La Spezia Port Authority]

The whole LSCT is shown on the following figure.

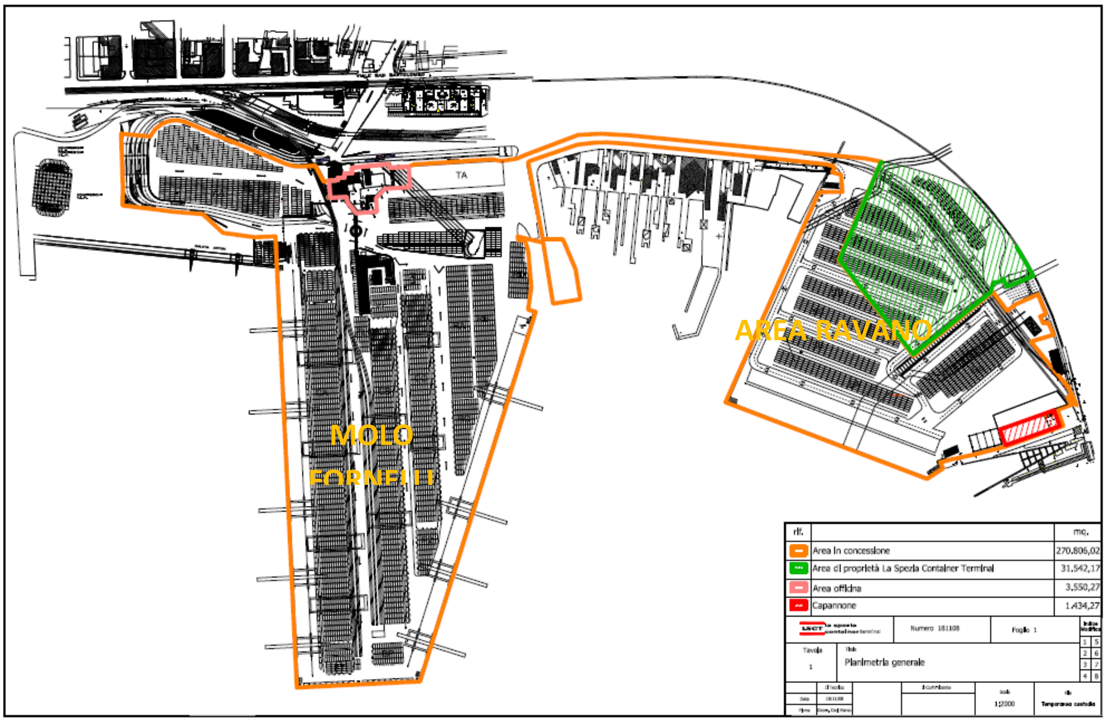


Figure 2-5: La Spezia Container Terminal [source: La Spezia Port Authority]

As regards the vessel mooring, the LSCT terminal develops in the La Spezia gulf on the North-South direction, thus meaning that the vessels can moor on both East and West sides of the molo Fornelli.

The total surface of LSCT is 285000 sqm, with 68887 sqm dedicated to the yard. 5218 ground slots are available to containers, for a total yard capacity of 21664 TEUs.

As regards the nautical features, the Pilotstation is 6 nautical miles South of Molo Fornelli Pier. The Channel to approach the LSCT is 1,8 nautical miles long, with 200 m of width and 14,5 m of depth; the turning basin has a diameter of 500 m and a depth of 14 m.

In the following, the main characteristics of the three available piers are reported.

Berth Numbers	13-15
Berth Length	520 mt.
Berth Depth	13,0 mt.
Height from seaside level	2,5 mt.
Tide	+/-0,3 mt.
Gap between bollards	25,0 mt.
Breaking load of bollards	120 Tons
Gap between fenders	25,0 mt.
Dimension of fenders	1,0 mt.

Molo Fornelli West [source: LSCT]

Berth Numbers	17-18
Berth Length	467 mt.
Berth Depth	13,0 mt.
Height from seaside level	2,5 mt.
Tide	+/-0,3 mt.
Gap between bollards	25,0 mt.

Breaking load of bollards	120 Tons
Gap between fenders	25,0 mt.
Dimension of fenders	1,0 mt.

Molo Fornelli East [source: LSCT]

Berth Numbers	19-20
Berth Length	265 mt.
Berth Depth	6,0 mt.
Height from seaside level	2,5 mt.
Tide	+/-0,3 mt.
Gap between bollards	25,0 mt.
Breaking load of bollards	100 Tons
Gap between fenders	25,0 mt
Dimension of fenders	2,5 mt

Molo Ravano [source: LSCT]

The terminal is divided in various container storage areas. They are served by Stacking Cranes, RTG and Reach Stackers.

The LSCT has 5 rail track: their features are reported on the following table.

	Length	Equipment
1° Track	445 m	RMGs of CA area
2° Track	445 m	RMGs of CA area
3° Track	320 m	Front Handlers
4° Track	360 m	RMGs of CB area
5° Track	360 m	RMGs of CB area

LSCT rail tracks features [source: LSCT]

In 2013 LSCT reached an annual capacity of nearly 1.300.000 TEUs.

Three stacking areas are available for reefer containers, with a total number of 408 connecting points with outlet 380 V, 50 Hz. LSCT can store dangerous goods up to 10% of its total capacity. There are some restrictions related to some typology of goods, in detail IMO classes 1, 2, 3, 4.2, 5.2, 6, 7 and 8 can only pass through the terminal. The fire service is available and fire hydrants are located inside the terminal. 6 truck lanes and 2 railway gates are available for thorough checking. Besides the terminal road gate access there is a waiting area capable to accomodate up to 100 trucks.

LSCT has direct intermodal connections to Bologna freight village that are operated by two railways undertaking companies (Oceano Gate and CEMAT).

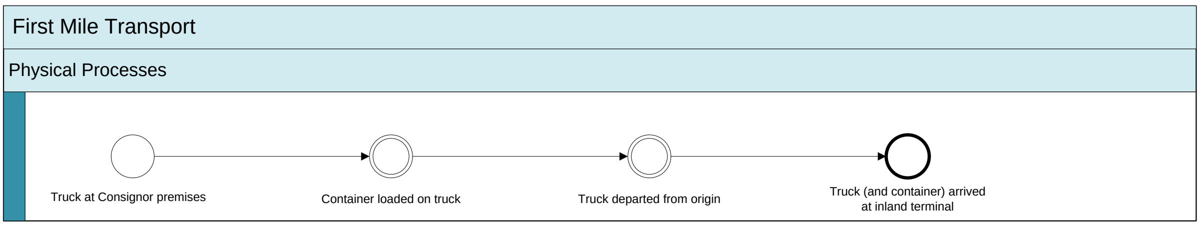
2.3 Business Processes- Modelling

The business processes related to the export flow of the selected scenario are described below; the entire process has been divided in sub-processes linked to the nodes and line operations.

Step1: First mile transport

Stakeholders involved:

- Shipper/Freight Forwarder
- Multimodal Transport Operator
- Road Carrier
- Customs Broker
- Customs Authority



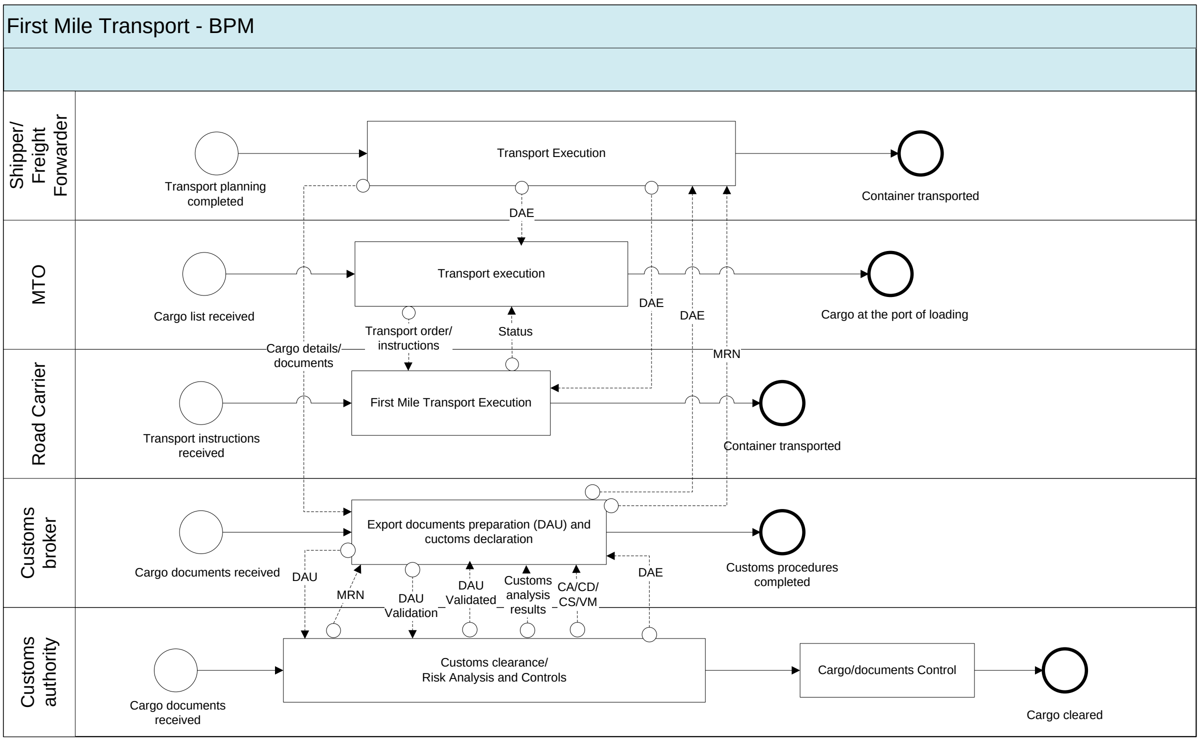


Figure 2-6: First Mile Transport BPM

The physical process analysed in this first step, involves the path of the transport chain from the consignor warehouse up to the inland terminal. The execution process is triggered by the “Transport Order” from the MTO to the road carrier, that goes to the consignor/shipper/freight forwarder premises to pick up the container. The consignor/shipper/ff releases the cargo together with the DAE (Documentazione Accompagnamento Export), the needed documentation for export goods. This documentation can be obtained only after an exchange of information, related to the goods to be exported, between the consignor/shipper/FF and the customs authority: the cargo owner sends to the customs broker info related to the goods to be exported; the customs broker elaborated this info and prepare the DAU (Documento Amministrativo Unico) and submit this document to the customs authority, asking for its validation. The customs authority receives back the MRN (movement reference numbers) related to the cargo and, once the risk analysis and controls have been performed, the DAE.

Thus the road carrier (and the MTO) receives the cargo together with the DAE and transports the cargo to the inland terminal for the change of transport mode. The MTO is informed about the cargo status during the transport, in particular the main status notified can be the departure from the consignor and the arrival of the truck (and cargo) to the inland terminal; significant exception can be notified as well.

Step2: Inland Terminal Handling

Stakeholders involved:

- Shipper/Freight Forwarder
- Multimodal Transport Operator
- Shipping Agent
- Terminal Operator

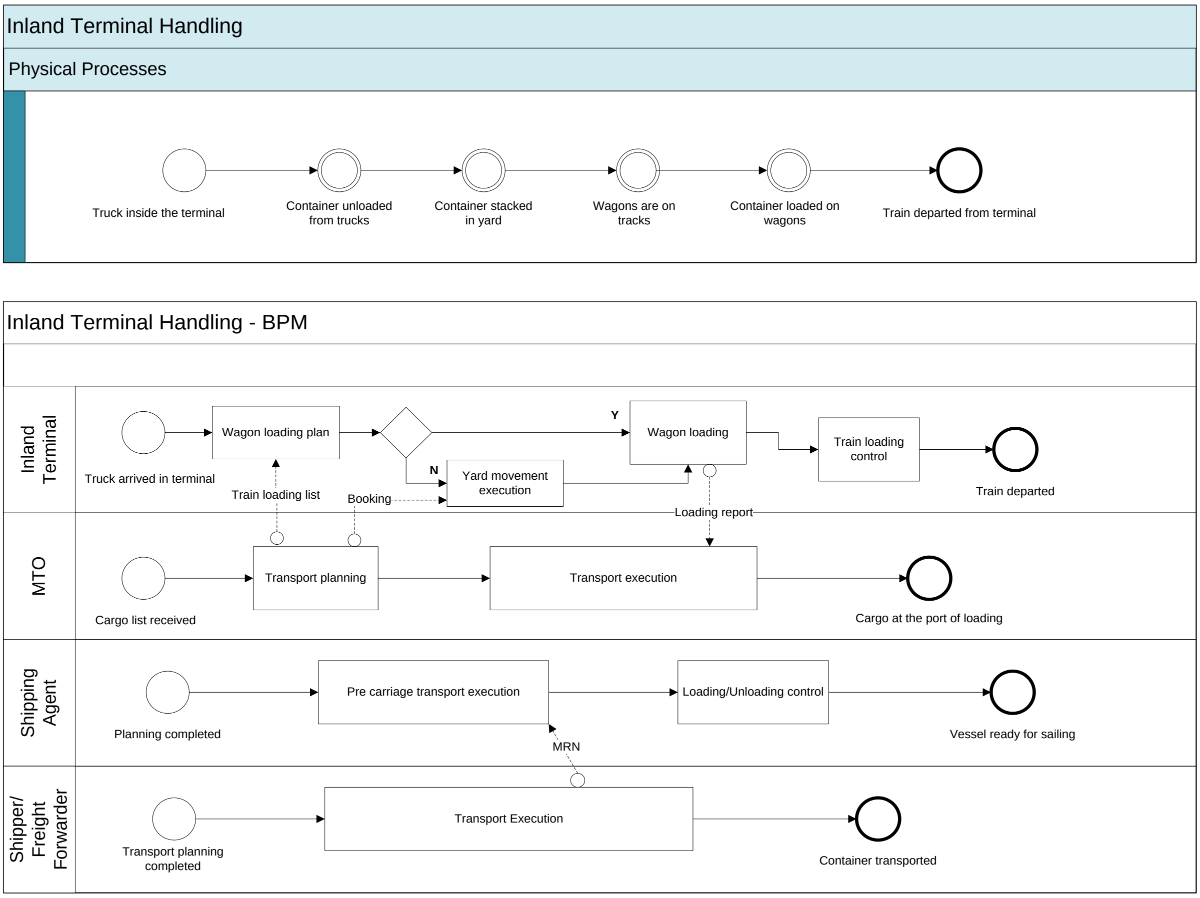


Figure 2-7: Inland Terminal Handling BPM

The second step is related to the unloading of the cargo in terminal and the movements of it within the inland terminal; the process ends with the completion of the loading operations, and the related controls, of the cargo on the train wagons.

The process is triggered by the "Train Composition" message sent by the MTO to the terminal operator, thus after the completion of the loading operations, the terminal sends back a loading report, with the "real" train composition. Then checks and controls are made by the MTO and the RU.

Step3: Inland Terminal Shunting

Stakeholders involved:

- Multimodal Transport Operator
- Terminal Operator
- Shunting Operator

- Railway Undertaking

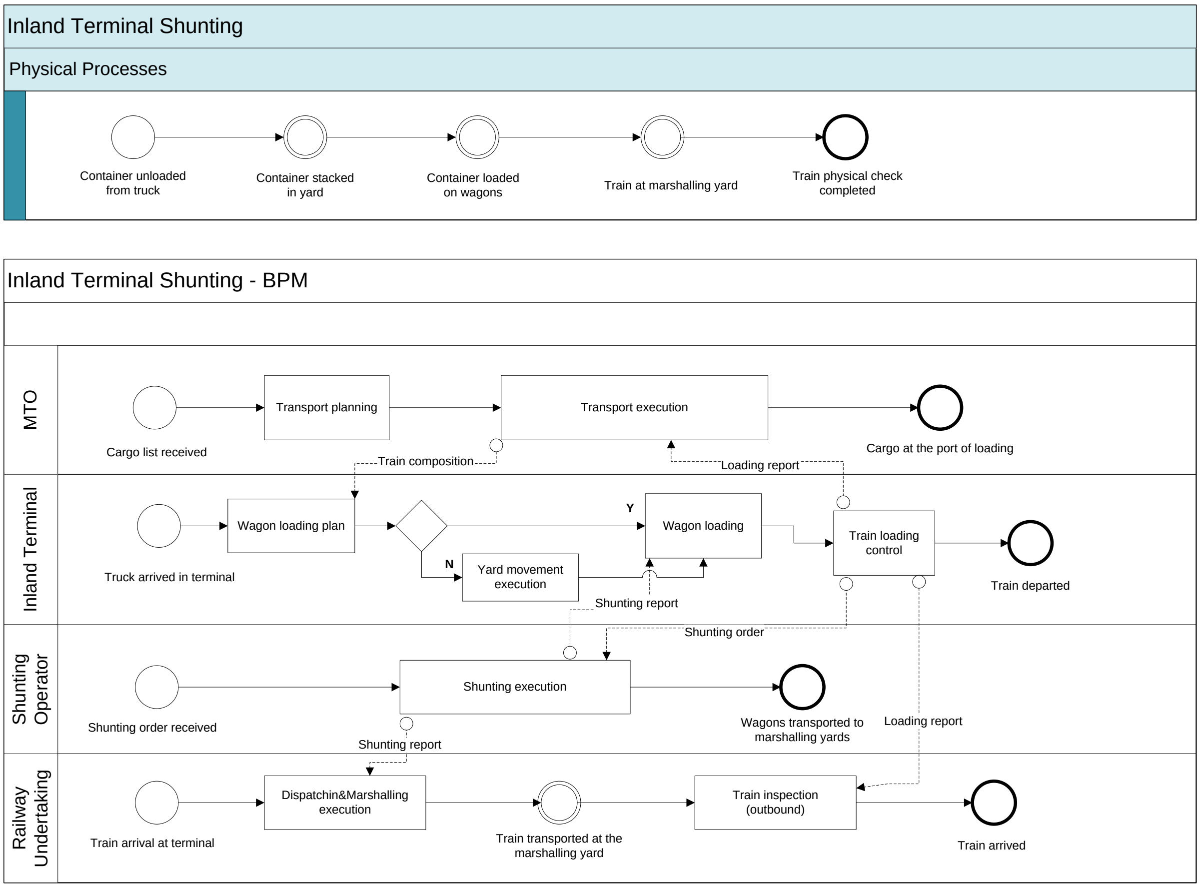


Figure 2-8: Inland Terminal Shunting - BPM

The process involves the shunting of the wagons from the terminal tracks, where handling operations are performed, to the marshalling yards, where the railway undertaking takes over the responsibility of the cargo. As soon as the terminal operator ends the loading procedure and performs the controls, sends a request for shunting to the shunting operator; the shunting operator performs the shunting and, once concluded, notifies the railway undertaking.

Step4: Rail Transport

Stakeholders involved:

- Multimodal Transport Operator
- Railway Undertaking
- Port Terminal Operator
- Infrastructure Manager
- Shipping Agent

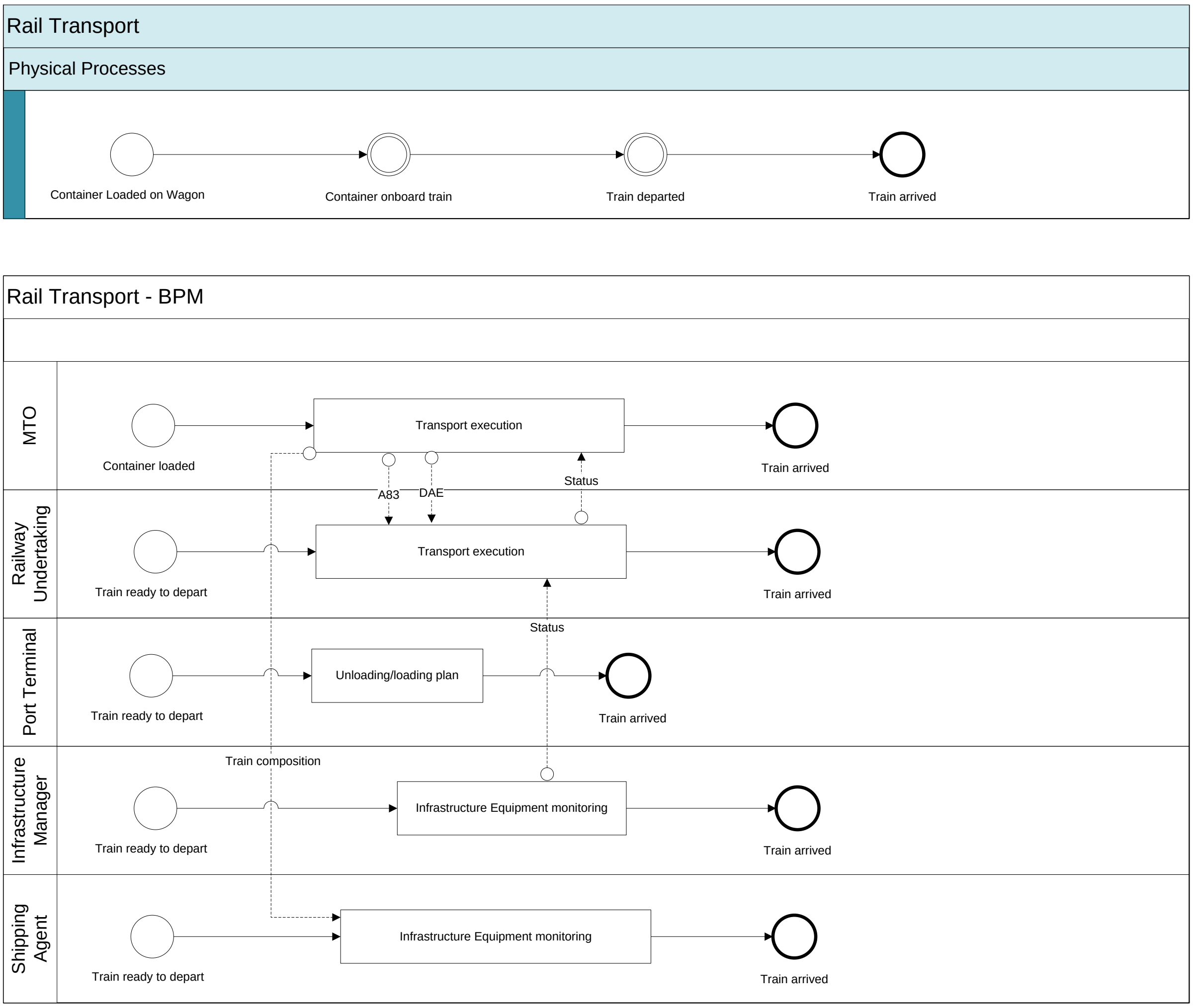


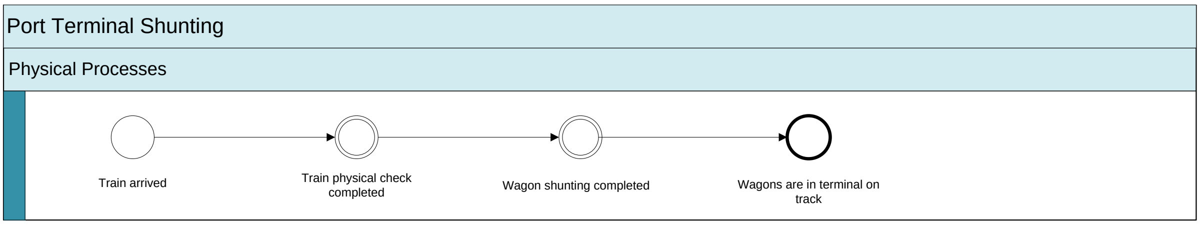
Figure 2-9: Rail Transport – BPM

The cargo is transported from the inland terminal (Bologna) to the port terminal of loading (La Spezia) via rail. Thus the process involves the railway undertaking that performs the rail traction and notifies the MTO about the cargo statuses (mainly departure/arrival/exceptions). The notifications are collected from the infrastructure manager monitoring system and then forwarded to the MTO.

Step5: Port Terminal Shunting

Stakeholders involved:

- Multimodal Transport Operator
- Railway Undertaking
- Port Terminal Operator
- Shunting operator (port)



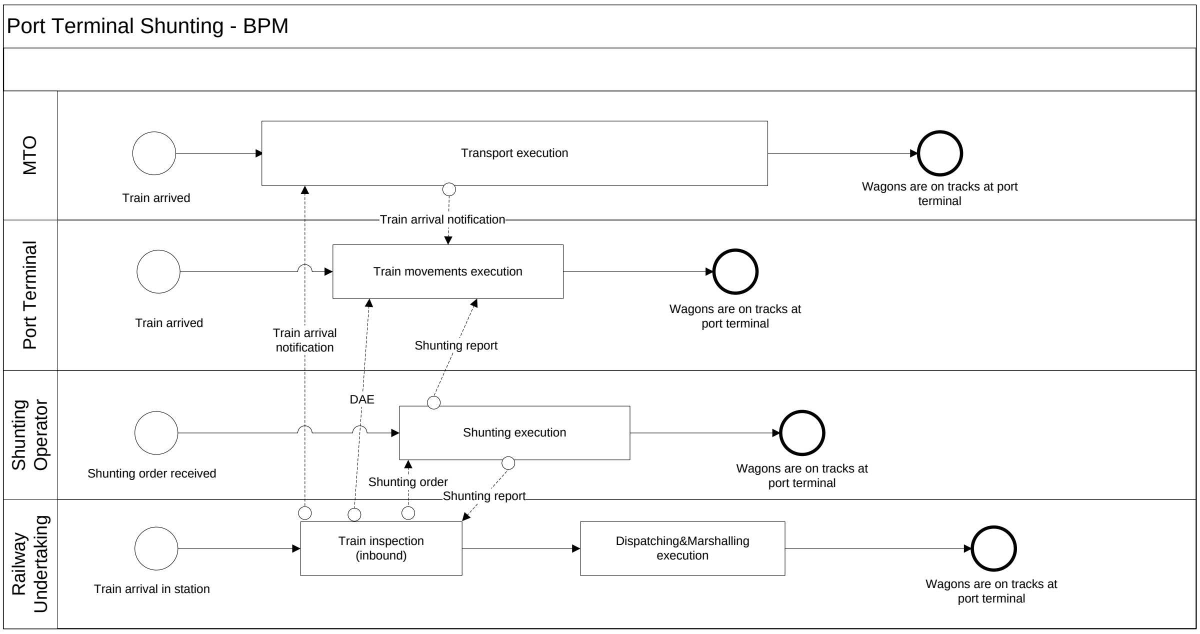


Figure 2-10: Port Terminal Shunting

The process is similar to the one performed at the inland terminal. The railway undertaking arrived at the train station close to the terminal, "calls" the shunting operator; the shunting operator, once checked the train and the cargo, takes over the wagons. Upon the completion of the shunting of the train the operator notifies both the railway undertaking and the port terminal.

Step6: Port Terminal Handling

Stakeholders involved:

- Port Terminal Operator
- Shipping Agent
- Shipping Line
- Customs broker
- Customs Authority

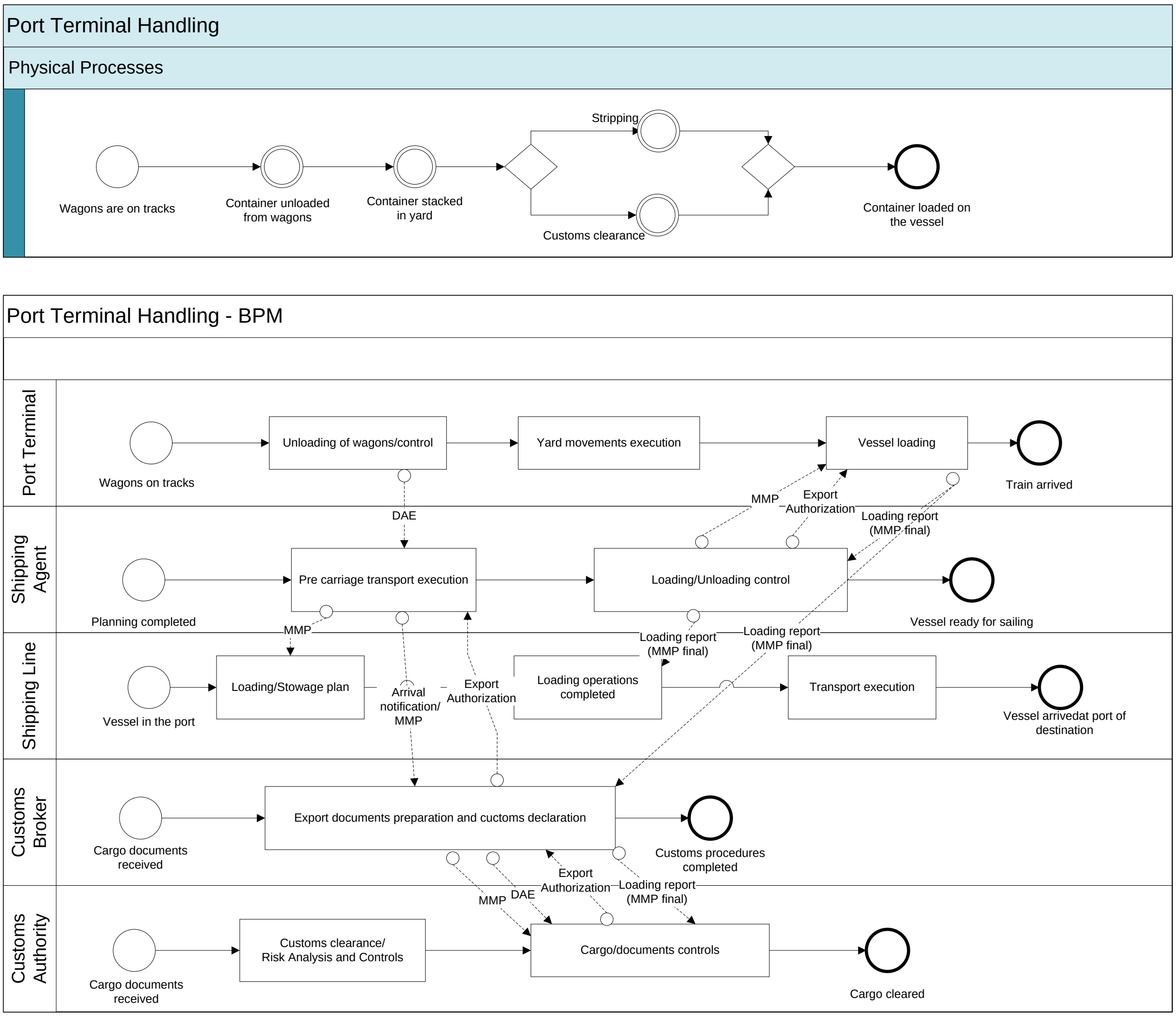


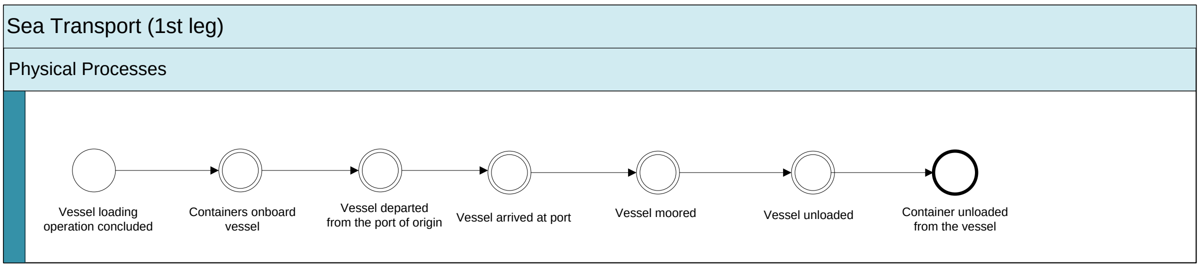
Figure 2-11: Port Terminal Handling – BPM

Once the cargo is in terminal the handling operations are performed by the port operator, following the list provided by the shipping agent (MMP – Manifesto Merci in Partenza); thus the containers are unloaded form wagons and stacked in yard. In the meanwhile the shipping agent, through the customs broker, submits the list of cargo and the related DAE document to the customs authority, asking for the authorization to export the cargo. The customs authority performs all the needed checks and controls on the documents and on the cargo (if needed), then if everything is compliant with what declared, the authorization is released. After the receipt of this authorization the port terminal starts, based on the MMP list, the loading of the cargo on the vessel; upon the completion, the terminal notifies the conclusion of the operations with a loading report to the shipping agents and the customs authority. The loading report represents also the final MMP list that is sent also to the shipping line.

Step7: Sea Transport (1st leg)

Stakeholders involved:

- Port Terminal Operator
- Shipping Agent
- Shipping Line
- Harbour master



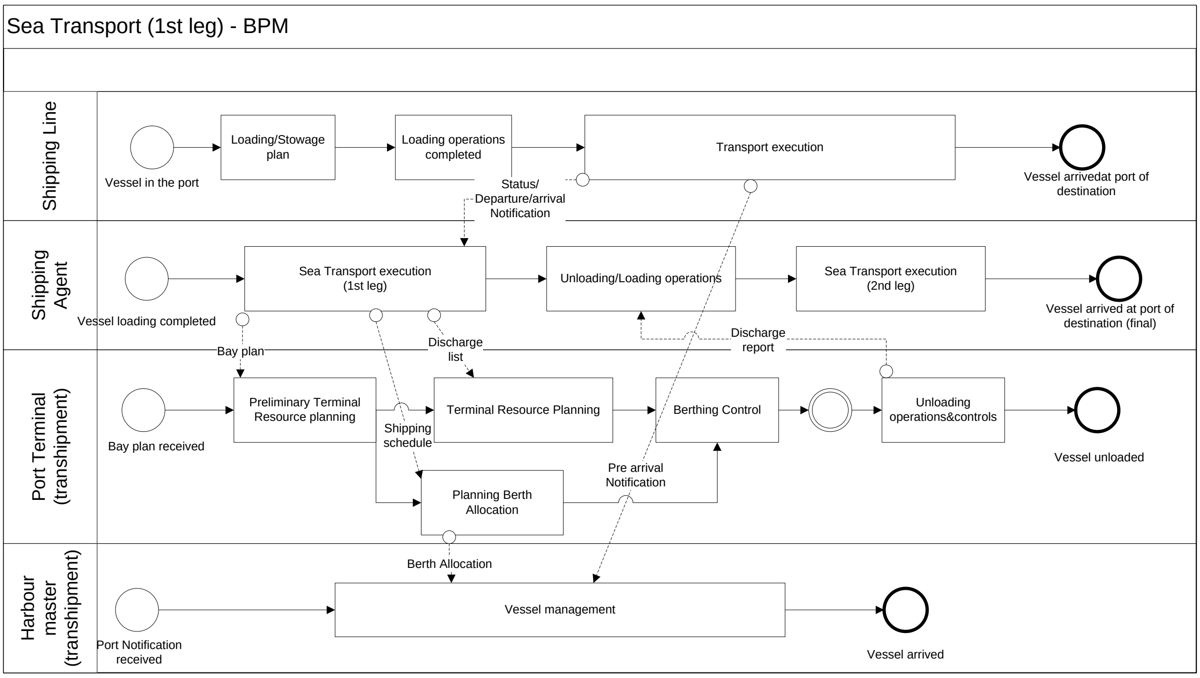


Figure 2-12: Sea Transport (1st leg) - BPM

The process starts with the vessel departure from the port of origin and ends with the vessel arrival to the port of transhipment, where the cargo is unloaded in order to be loaded again on another vessel. The vessel is loaded at the port of origin, thus it leaves the port; the shipping agent is informed about the vessel status: normally it is based on the schedule, but in case of problems or exceptions, those are notified to the shipping agent. The vessel has to notify its arrival to the port 24 hours before (pre-arrival notification). As soon as the vessel reaches the port, it is moored to the wharf and then the unloading operations starts. The port terminal performs the unloading operations based on the instructions received by the shipping agent with the discharge list; it is notified also that the cargo is unloaded for transhipment purposes and need to be loaded on another vessel.

Step8: Sea Transport (2nd leg)

Stakeholders involved:

- Port Terminal Operators
- Shipping Agent
- Shipping Line
- Harbour master

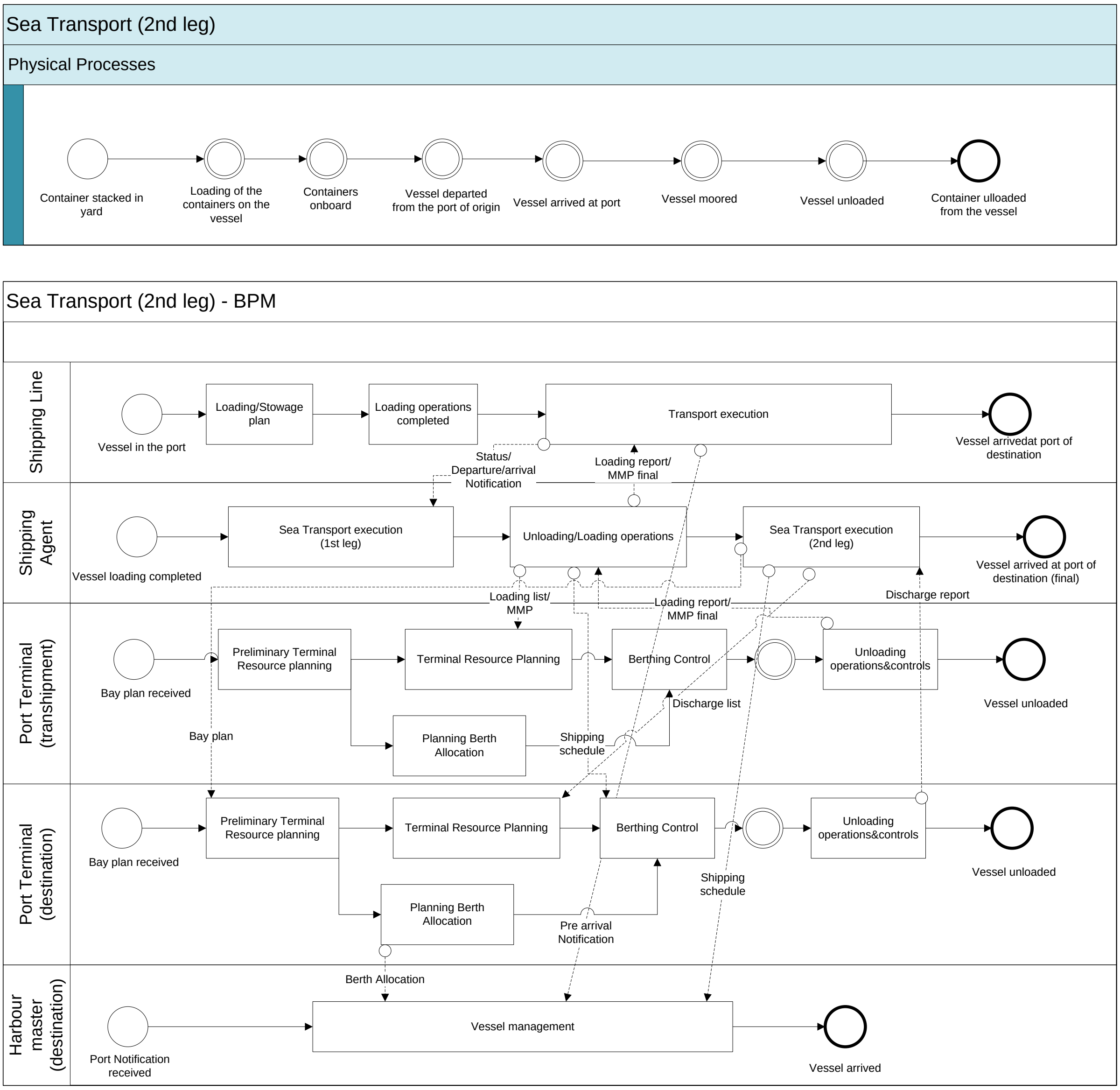


Figure 2-13: Sea Transport (2nd leg) - BPM

In this section the process focuses on the loading of the second vessel that transports the cargo to the port of (final) destination and on the sea transport process. As described above, the vessel is loaded following the loading instruction that the shipping agent has sent to the port terminal operator; upon the completion the port terminal sends a report to the shipping agent that represents also the new manifest of the departing cargo (MMP). Once loaded the vessel can departs, thus leaving the port and informing the shipping agent about the departure; the shipping agent is informed about the vessel status along the transport process: again it is based on the schedule, but in case of problems or exceptions, those are notified to the shipping agent. The vessel has to notify its arrival to the port 24 hours before (pre-arrival notification). As soon as the vessel reaches the port, it is moored to the wharf and then the unloading operations starts. The port terminal performs the unloading operations based on the instructions received by the shipping agent with the discharge list.

2.4 Stakeholders involved

2.4.1 Role of the stakeholders in the transport process

Logistics Service Client:

Freight Forwarder: the FF in the business case represents the main interface for the shipper; it receives the D2D booking request, processes it and forward sub bookings to one or more FI in order to “build” the multimodal transport chain that can address the original request. Furthermore the FF is in charge for all the documentation needed in order to export the cargo. (customs procedures, insurance,..)

Freight Service Integrators:

Multimodal Transport Operator (MTO): the MTO in the business case takes care of “so-called” pre-carriage of the cargo, meaning the organization of the inland transport of the cargo, from consignor’s warehouses up to the port of loading. In detail, the MTO will organize the first mile transport (from the consignor’s warehouse to the inland terminal where all the cargo is consolidated) performed by a road carrier, and then the rail transport between the inland terminal (Interporto Bologna) to the port of loading (La Spezia). The main customers of the MTO identified in the business case, are the Shipping Lines especially thanks to the presence of it in the ports: Genoa (Head Office), La Spezia, Naples, Ravenna and Leghorn.

Shipping Agent: the shipping agency has the main aim to represent the Shipping Company towards the cargo owners or freight forwarder and the cargo owners or FF towards the logistics service providers, thus representing another interface able to link the different actors involved in the transport chain. Within the demonstrator, the Shipping Agent organizes the transport from the port of loading (Leghorn) to the final delivery to the consignee warehouses, thus booking and managing the shipping line as well as the various road carriers involved in the last mile delivery.

Logistics Service Providers:

Shipping Line: the shipping line involved in the defined business case is the world's largest

shipping line in terms of container vessel capacity. Within the demonstrator, the company performs the sea transport between the POD (Leghorn) and the POL (i.e. Montreal).

Railway Undertaking: the Railway Undertaking defined in the business case is one of the biggest railway operators in Italy; within the demonstrator it will provide the rail traction service from Interporto Bologna to the port of Leghorn.

Road hauliers (truck operators): various road carriers are considered in the business case, both for the first mile traction and for the last mile delivery.

Shunting Operators: in the selected business case scenario there are two shunting operators that perform the shunting of the train within the logistics nodes linked by the rail leg: Interporto Bologna and port of Leghorn.

Terminal Operators: the terminal operators considered in the business case scenario are: one intermodal terminal operator operating in the inland terminal (Interporto Bologna) and 3 port terminal operators, performing handling operations in the port of loading (Leghorn), in the port of transshipment (Sines) and in the port of discharge (I.e. Montreal).

2.4.2 Information flow between the stakeholders

The interactions related to the communication and information flows among the actors involved along the transport chain have been identified and listed in the table below. The complete information flow has been divided in 2 main phases: one related to the planning activities, the other one mainly related to the execution and monitoring phase.

Planning phase: messages and business interactions.

ID	FROM	TO	TYPE OF INFO	Notes
P1	Consignors/Shippers	Freight Forwarder	Transport Bookings for the D2D transport Chain	
P2	Freight Forwarder	MTO	Transport booking (Door to Terminal – D2T)	
P3	Freight Forwarder	Shipping Agent/Freight	Transport booking (T2D)	

		Integrator	(for the maritime leg)	
P4	MTO	Road Carriers (first mile)	Transport booking	
P5	MTO	Railway undertaking	Transport booking	
P6	Road Carriers (first mile)	MTO	Transport booking confirmation	Only in cases of alternative proposal
P7	Railway undertaking	MTO	Transport booking confirmation	Only in cases of alternative proposal
P8	MTO	Freight Forwarder	Transport booking confirmation (D2T)	
P9	Shipping Agent/Freight Integrator	Shipping Line	Transport booking	
P10	Shipping Agent/Freight Integrator	Road Carriers (last mile)	Transport booking	
P11	Shipping Line	Shipping Agent/Freight Integrator	Transport booking confirmation	Only in cases of alternative proposal
P12	Road Carriers (last mile)	Shipping Agent/Freight Integrator	Transport booking confirmation	Only in cases of alternative proposal
P13	Shipping Agent/Freight Integrator	Freight Forwarder	Transport booking confirmation (T2D)	
P14	Freight Forwarder	Consignors/Shippers	Transport booking confirmation (D2D)	

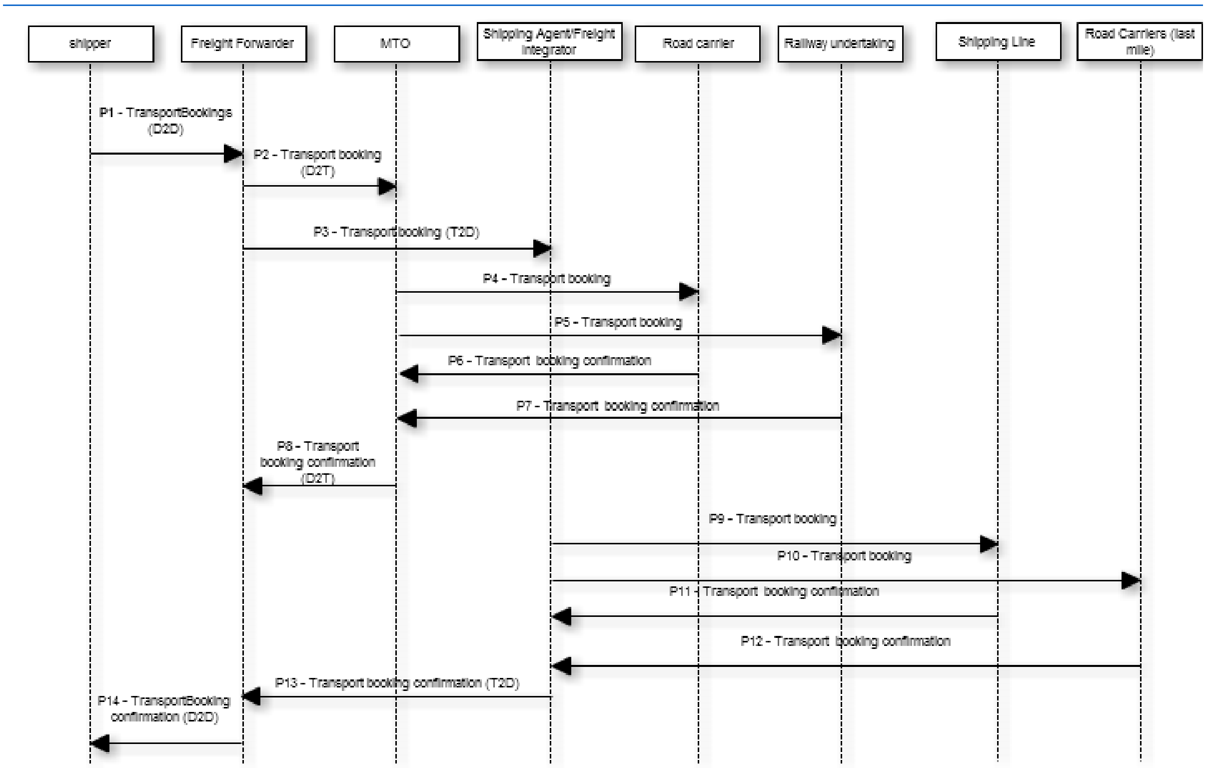


Figure 2-14: Information Flow during Planning Phase

<u>Execution and Monitoring phase:</u>

ID	**FROM**	**TO**	**TYPE OF INFO**
M1	MTO	Road Haulers	Transport orders
M2	MTO	IPBO Terminal	Cargo list
M3	Road Hauler	MTO	Departure from the consignor
M4	Road Hauler	MTO	Arrival at IPBO terminal
M5	MTO	IPBO Terminal	Train loading list
M6	IPBO Terminal	MTO	Cargo status (unloading from the truck)
M7	IPBO Terminal	Shunting Operator IPBO	Shunting order
M8	Shunting Operator IPBO	IPBO Terminal	Shunting report
M9	IPBO Terminal	Railway Undertaking	Train Loading report
M10	Railway Undertaking	MTO	Train composition bis

M11	IPBO Terminal	Shunting Operator IPBO	Shunting Order
M12	Shunting Operator IPBO	Railway Undertaking	Shunting report
M13	Rail undertaking	MTO	Cargo status (train departed)
M14	Rail undertaking	MTO	Cargo status (train arrived)
M15	La Spezia Port terminal	Shipping Agent/Freight Integrator	Cargo Status (unloading in port terminal)
M16	La Spezia Port terminal	Shipping Agent/Freight Integrator	Cargo Status (loading on the vessel)
M17	MSC	Shipping Agent/Freight Integrator	Cargo status (vessel departed)
M18	MSC	Shipping Agent/Freight Integrator	Statuses (vessel/cargo)
M19	MSC	Port Terminal of transhipment	Pre arrival notification
M20	Shipping Agent/Freight Integrator	Port Terminal of transhipment	Discharge list
M21	Port Terminal of transhipment	Shipping Agent/Freight Integrator	Discharge report
M22	Shipping Agent/Freight Integrator	Port Terminal of transhipment	Loading list/cargo manifest
M23	Port Terminal of transhipment	Shipping Agent/Freight Integrator	Loading report (MMP)
M24	MSC	Shipping Agent/Freight Integrator	Cargo status (vessel departed)
M25	MSC	Shipping Agent/Freight Integrator	Statuses (vessel/cargo)
M26	MSC	Port Terminal of destination	Pre arrival notification
M27	Shipping Agent/Freight Integrator	Port Terminal of destination	Discharge list
M28	Port Terminal of destination	Shipping Agent/Freight Integrator	Discharge report
M29	Shipping Agent/Freight Integrator	Road Haulers (last mile)	Transport orders
M30	Port Terminal of destination	Shipping Agent/Freight Integrator	Cargo status (exit the port)

M31	Road Haulers (last mile)	Shipping Agent/Freight Integrator	Cargo status (cargo delivered)
M32	Shipping Agent/Freight Integrator	Freight Forwarder	Cargo delivered
M33	Freight Forwarder	Consignor	Cargo delivered

3 Business Case 2: Hamburg - Vienna Corridor

3.1 Brief presentation of the business case

The focussed business case is the transportation of containers from the port of Hamburg to Vienna.

Connecting the Port of Hamburg with Austrian hinterlands is achievable by road, rail or water. Hamburg is one of the major sea port destinations providing connections to Austria. Several operators are serving this transport axis with different supply chain concepts and transportation scenarios. The interesting fact in this corridor is that three alternative modalities are available:

- road transport

- rail transport

- inland navigation

Furthermore it can be distinguished between direct transports and combined transports. In every case the information from and to the harbour, especially concerning the shipment is also interesting for all players involved in the hinterland transport chains.

A detailed description of each transport modality is provided below.

3.2 Geographical coverage (and graphical representation)

The origin and destination nodes of the corridor are Port of Hamburg and Vienna Terminal. In the following, the geographical coverage has been analysed according to the transportation mode used.

3.2.1 Road Transportation

Depending on the chosen route and specification of truck (amount of axis) transit time between Vienna and Hamburg is estimated between 16 and 19 hours (time designations refer to routes indicated in the following figure)

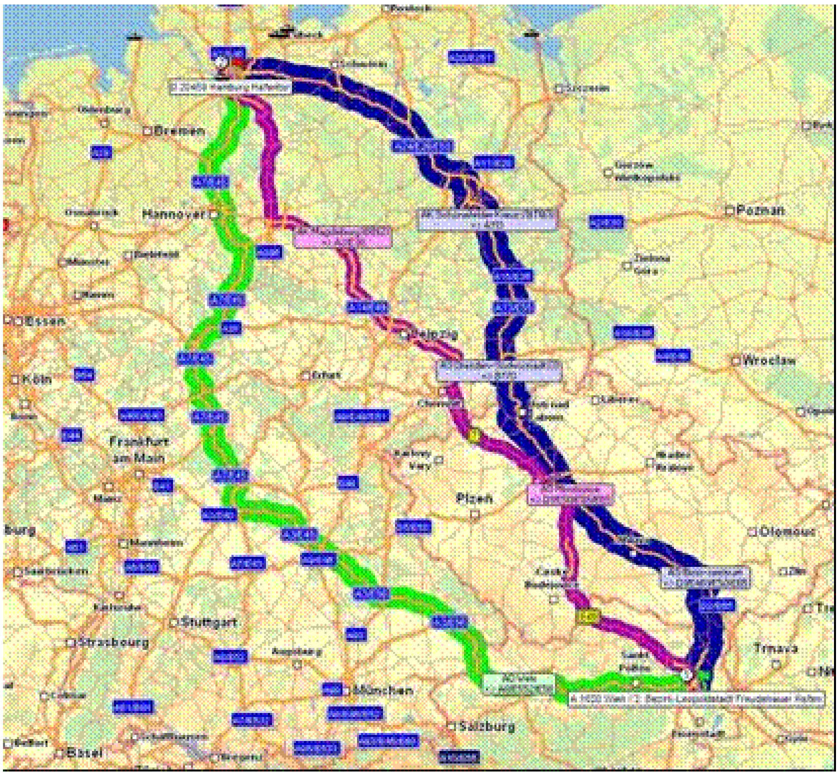


Figure 3-1: Transport Routes (5 Axis) Euro Trailer

3.2.2 Rail Transportation

The main route of the railway hinterland connection between Hamburg and Vienna runs through *Göttingen – Fulda – Nürnberg – Regensburg – Linz/Enns* with a transit time of approximately one up to two days depending on the time for manipulation, closing date for cargo or halts in between. Based on prognostic data the transport axis between Hamburg and Vienna is among the most frequent linkage in the European network with more than 30 freight trains per day in 2020 at peak sections.

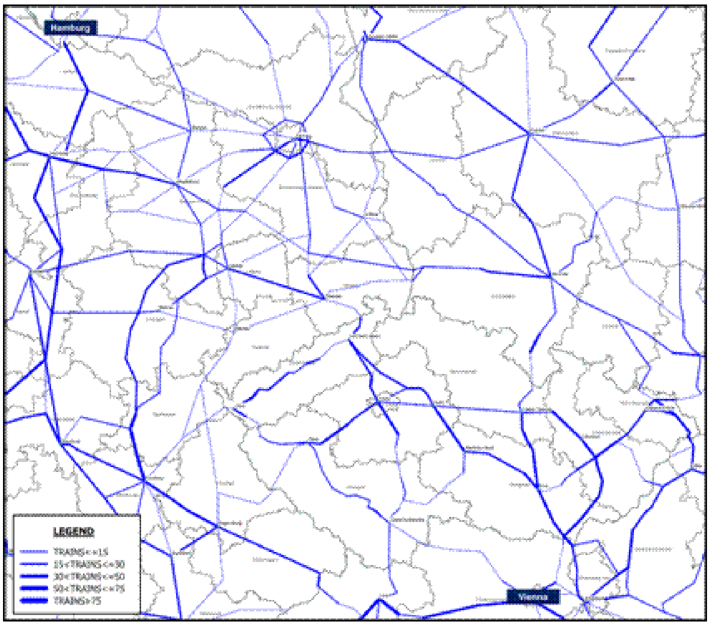


Figure 3-2: Rail Transport Network[1]

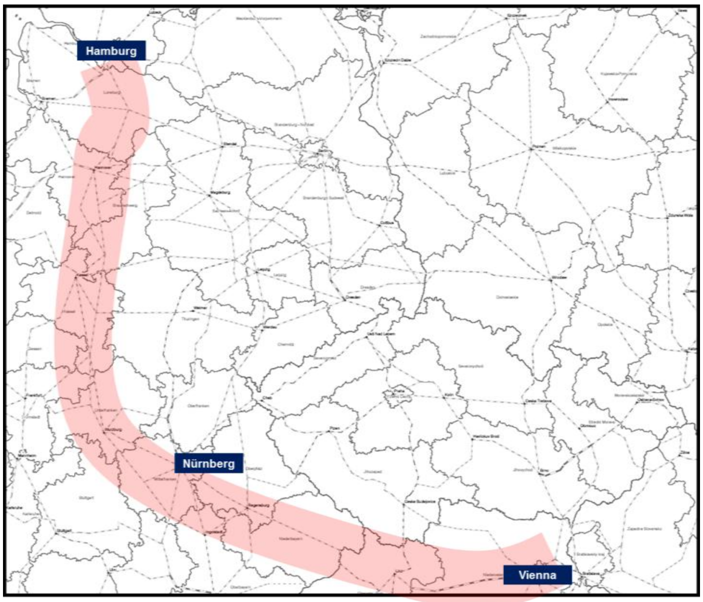


Figure 3-3: Corridor Hamburg – Vienna[1]

3.2.3 Inland Navigation

Inland Navigation is routed from Central Channel entering the Rhine-Main-Danube Canal at *Duisburg* and then passing *Düsseldorf – Koblenz – Mainz – Kelheim – Regensburg* and *Linz/Enns* as shown in the network map below. Depending on

- Ship Type,
- Lock Operation Time and
- Water Level

the transit time will be estimated between 170 and 200 hours.

Figure 3-4: Center Channel and Rhine-Main-Danube Canal[1]

3.3 Traffic composition and density

3.3.1 Port of Hamburg

As one of the most important and frequented freight hubs in the world the Port of Hamburg performs a railway capacity of more than 1’200 trains per week – Thereof more than 750 intermodal trains.

The mode of **railway transportation** between Hamburg and Austria is identified to be highest developed with a modal share of 90%. Transportation schedule for regular departures from Hamburg to Vienna are listed as follows:[1]

- Hamburg to Vienna | Rail Cargo Austria AG
  4 times a week
- Hamburg to Vienna | TFG Transfracht GmbH & Co. KG
  3 times a week
- Hamburg to Vienna | TFG Transfracht GmbH & Co. KG
  5 times a week
- Hamburg to Vienna | IMS Intermove Systems GesmbH
  6 times a week

As shown in the figure below the port infrastructure is connected to the European network by the port railway main stations – as marked as interfaces between the blue and the black line.

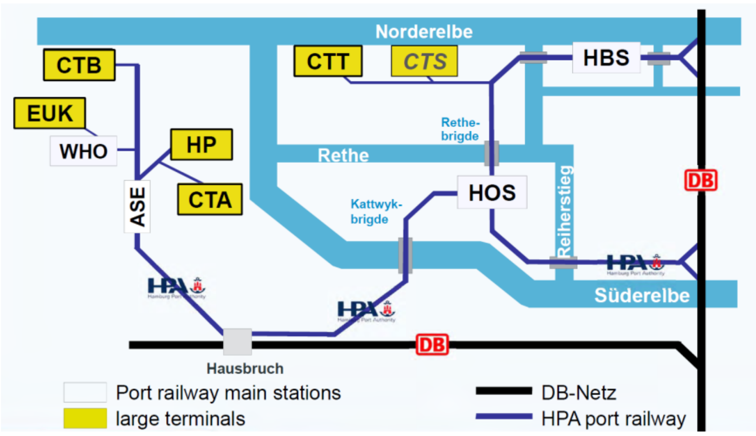


Figure 3-5: Railway Infrastructure Hamburg[2]

In summary 14 operators are providing service between Hamburg and Austria as listed in the next figure.

[1] Port of Hamburg „Railway Services“
in: http://www.hafen-hamburg.de/en/intermodal/austria [25.02.2013]

Departures / Port of Hamburg			
City	**Operator**	**Rail Terminal**	**Departures**
Enns	IMS Intermove Systems Speditions- und Transport GesmbH	Ennshafen OÖ GmbH	6per Week
Enns	Roland Spedition GmbH	Ennshafen OÖ GmbH	8per Week
Enns	Kühne & Nagel (AG & Co) KG	Bahnterminal Hafen CTE Enns	6per Week
Linz	TFG Transfracht Internationale Gesellschaft für kombinierten Güterverkehr mbH & Co. KG	Bahnterminal Linz Stadthafen CCT	3per Week
Linz	Rail Cargo Austria AG	Bahnterminal Linz Stadthafen CCT	4per Week
Salzburg	TFG Transfracht Internationale Gesellschaft für kombinierten Güterverkehr mbH & Co. KG	Bahnterminal Hbf CCT Salzburg	8per Week
Salzburg	Rail Cargo Austria AG	Bahnterminal Hbf CCT Salzburg	5per Week
Werndorf / Graz	Roland Spedition GmbH	Graz Süd CCT	1per Week
Wien	Rail Cargo Austria AG	WIENCONT Containerterminal GMBH	4per Week
Wien	TFG Transfracht Internationale Gesellschaft für kombinierten Güterverkehr mbH & Co. KG	WIENCONT Containerterminal GMBH	3per Week
Wien	TFG Transfracht Internationale Gesellschaft für kombinierten Güterverkehr mbH & Co. KG	WIENCONT Containerterminal GMBH	5per Week
Wien	IMS Intermove Systems Speditions- und Transport GesmbH	WIENCONT Containerterminal GMBH	6per Week
Wolfurt	TFG Transfracht Internationale Gesellschaft für kombinierten Güterverkehr mbH & Co. KG	Bahnterminal CCT Wolfurt	3per Week
Wolfurt	Rail Cargo Austria AG	Bahnterminal CCT Wolfurt	5per Week

Figure 3-6: Departures from Port of Hamburg

The capacity for railway services from Hamburg to Austria can be identified with about 61 trains per week at present.

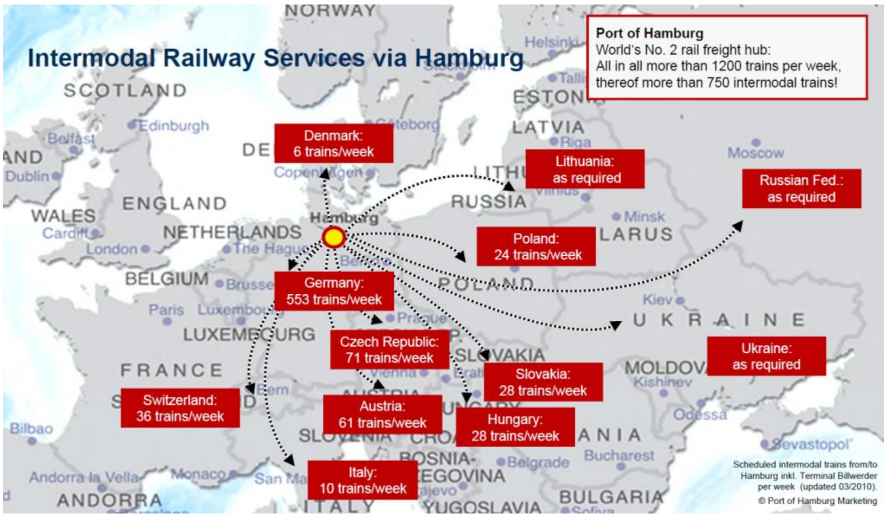


Figure 3-7: Railway Capacity from/to Hamburg[4]

Besides the fully developed railway infrastructure the Port of Hamburg offers also services for **inland navigation** via Elbe and Central Channel especially for Container and Heavy Cargo. These transportations are scheduled on a regular base as follows:[2]

- Hamburg to Braunschweig
  5 times a week
- Hamburg to Hannover and Minden
  3 times a week
- Hamburg to Magdeburg, Aken, Riesa, Dresden, Decin and Lovosice
  2 times a week

[2] Port of Hamburg „Inland Waterways“
in: http://www.hafen-hamburg.de/en/list/Binnenschifffahrt [25.02.2013]

- Hamburg to Haldensleben, Magdeburg and Braunschweig
  2 times a week
- Hamburg to Glückstadt, Brunsbüttel and Cuxhaven
  3 times a week

So far no transport service is routed with destination in Vienna.

For short range collections or deliveries **road transportation** is still the most attractive alternative. Due to low freight costs in East Europe also road transportation to regions in Central and Eastern Europe tend to be higher than average. With a focus on the hinterland connection between Hamburg and Austria road transportation is negligible with approximately 10% modal share.

3.3.2 Terminal Vienna

The port of Vienna as the professional logistics center in the heart of Europe links three main means of transportation, namely rail, water and road. Due to recent activities the port of Vienna has become a leading logistics service provider for major trade and traffic routes in the catchment area of Vienna and Bratislava. Since the completion of the Rhine-Main-Danube Canal in 1992 the Terminal in Vienna acts as an east-west hub for shipping, connecting the North Sea to the Black Sea serving an economic area with 700 million people.

Figure 3-8: Port of Vienna[5]

By the use of the junctions for A23 Südosttangente (city motorway) and the A4 Ostautobahn (motorway) the port is connected to the City Center and other important traffic hubs - such as the central marshalling yard at Kledering and the Vienna International Airport in Schwechat.

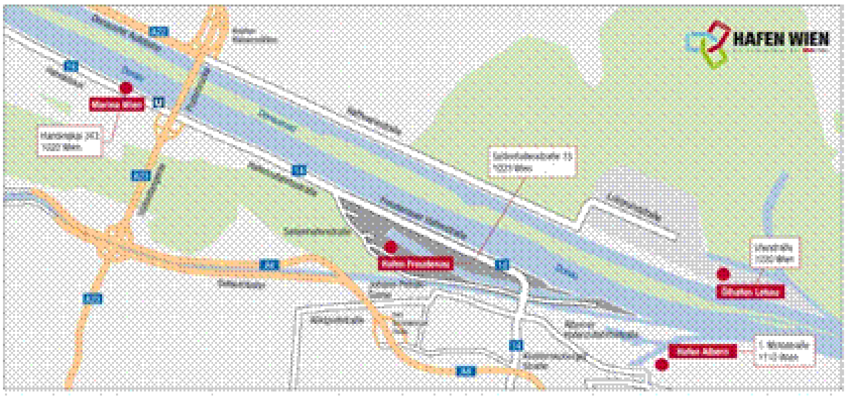


Figure 3-9: Location Port of Vienna[6]

3.3.2.1 Services

The services being offered at the logistics hub are including handling and transhipment activities for bulk commodities and general cargo ranging from raw materials and fertilisers to construction materials, fuel, road salt and grain. The entire service portfolio will be described in the following.

With an area of 70’000 square meters the port offers **storage logistics services** including also crane installation (for cargo lifting) and rail connections providing smooth transhipment processes especially for heavy and bulky goods. The warehousing services include also:[3]

- High-rack storage
- Block storage
- Cold stores and deep freeze storage
- Cross docking
- Order picking
- Packing
- Loading / unloading of containers
- Stuffing / stripping
- Customs clearance, transports
- Other services on request

The **car terminal** offers space for about 10’000 vehicles in an open-air area of 160’000 square metres. Also value added services such as *Washing installations*, *Removal of protective covering*, *Vehicle workshops*, *Halls for cleaning vehicles and fitting of radios, spoilers and other accessories*, *Petrol station*, *Railway tracks for 50 vehicle transport cars* and *Ro-ro facility* is being processed at the terminal.

The **cargo handling terminals** are provided for general cargo and bulk goods including

- Bulk goods and raw material warehouses

[3] Hafen Wien – Our Services, in http://hafen-wien.com/en/home/service [25.03.2013]

- Open-air storage areas
- Crane installation with 6-160 t lifting capacity
- Mobile excavators
- Rail connection
- Covered loading zones
- Ro-ro ramp
- 2 weighbridges

The **container terminal** has an area of 60’000 square meters. Services being offered are

- Container handling from 6 to 45 tons with gantry crane and mobile handling equipment; daily block train connections to European seaports
- Container storage: 5’000 TEU capacity; storage of all types including reefer points for refrigerated containers
- Container repair and adaptation to individual customer requirements
- Container business: the company buys and sells new standard and special containers
- Container rental: the company's containers include not only storage and transport but also office and sanitary containers
- Customs clearance
- Incoming/outgoing road transport management

Further services provided at the Terminal can be grouped to Customs, Real estate management, Project development, Marina and Shipping centre.[4]

To sum up the short listing/figures expressing the capacity of the terminal:[5]

- 12 million tons of freight handled annually
- 50% by road, 35% by rail and 15% by river
- 60’000 lorries were handled in 2008
- 85 container trains departure weekly to Hamburg, Bremerhaven, Rotterdam and Duisburg, or to the Eastern European hubs of Bratislava and Budapest
- further rail connections to Cologne and Sopron will be developed

3.3.2.2 Departures

With focus on the corridor between Vienna and Hamburg railway departures from Vienna are scheduled as follows:[6]

- Vienna to Hamburg Walhof
  more than 15 times a week
- Vienna to Hamburg
  once a week

[4] Hafen Wien – Our Services, in: http://hafen-wien.com/en/home/service [25.03.2013]
[5] Hafen Wien – Importance for Vienna, in: http://hafen-wien.com/en/home/hafen/bedeutung [25.03.2013]
[6] WienCont Infoportal, in: http://wol.wiencont.com:8480/Zugdaten/pEZugListe.aspx [25.03.2013]

A full listing of all operators involved in service provision is shown in the next figure.

Stakeholders | Terminal Vienna		
Function	**Company**	
Transport Operator	Hupac Intermodal AG	Chiasso (CH)
Transport Operator	Intercontainer Austria	Vienna (AT)
Transport Operator	ICF - Intercontainer-Interfrigo	Basel (CH)
Transport Operator	IMS - Intermove Systems	Vienna (AT)
Transport Operator	InterLogistik	Vienna (AT)
Transport Operator	Kühne + Nagel GesmbH	Enns (AT)
Transport Operator	Roland Spedition GmbH	Schwechat (AT)
Railway Operating Company	LTE Logistik- und Transport-GmbH	Graz (AT)
Railway Operating Company	Rail Cargo Austria AG	Vienna (AT)
Railway Operating Company	TXLogistik AG	Bad Honnef (DE)
Railway Operating Company	WLC - Wiener Lokalbahnen Cargo GmbH	Vienna (AT)
Railway Operating Company	TGF Transfracht - Internationale Gesellschaft für kombinierten Güterverkehr mbH & Co. KG	Frankfurt am Main (DE)

Figure 3-10: Stakeholders at Terminal Vienna[7]

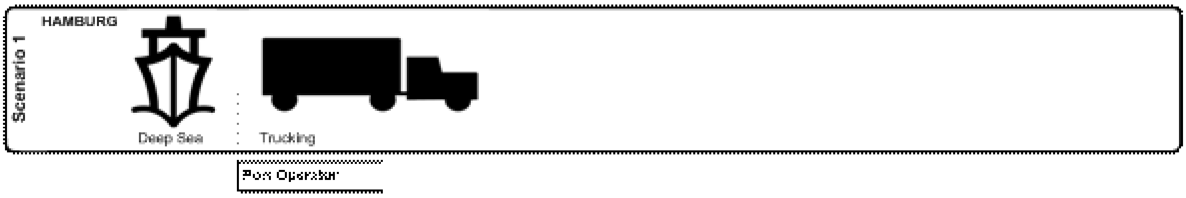
3.3.2.3 Economic Relevance

Apart from the Wiener Hafen group (a member of the Wien Holding group) more than 120 private companies are located in an area of 3.5 million square metres, including around forty transportation companies renting premises and taking advantage of the economic benefits of the site. At present the port of Vienna provides jobs for 5'000 people. This makes it an important source of employment for the entire region.[7] A remarkable percentage of the goods sold or processed in Vienna are handled by the port of Vienna, with about 335'000 container units handled per year.

[7] Hafen Wien – Importance for Vienna, in: http://hafen-wien.com/en/home/hafen/bedeutung [22.03.2013]

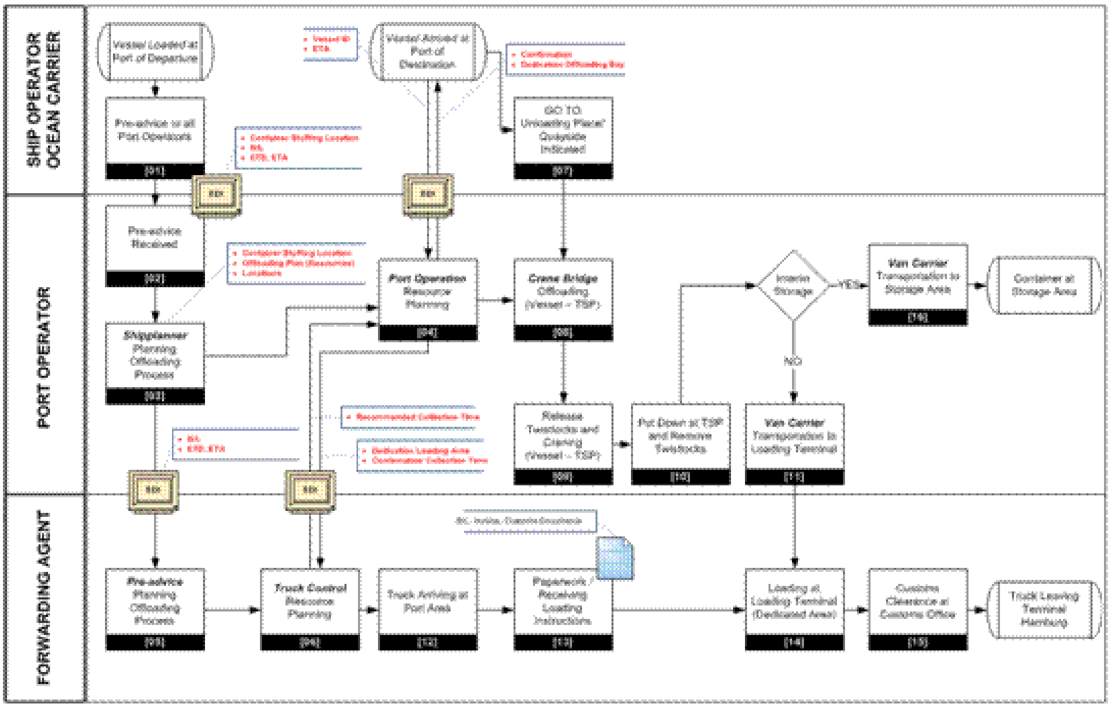
3.4 Business Process – Modelling

3.4.1 Scenario 1 | Trucking



Stakeholders Involved

- Ship Operator / Ocean Carrier
- Port Operator
- Stevedore / Crane Bridge Operator / Barge Owner
- Forwarding Agent



Pre-Advice and Planning (Process Steps 01 until 06)

Ship Operator or *Ocean Carrier* sends all shipping information as pre-advice to the *Port Operator* [01]. Upon receiving the information via EDI [02] the *Port Operator* will plan the offloading process [03]. In the meanwhile the *Forwarding Agent* or the *Holder of the B/L* will be informed – requesting date of collection [05|06].

Vessel Arriving at Port of Destination (Process Steps 07 until 16)

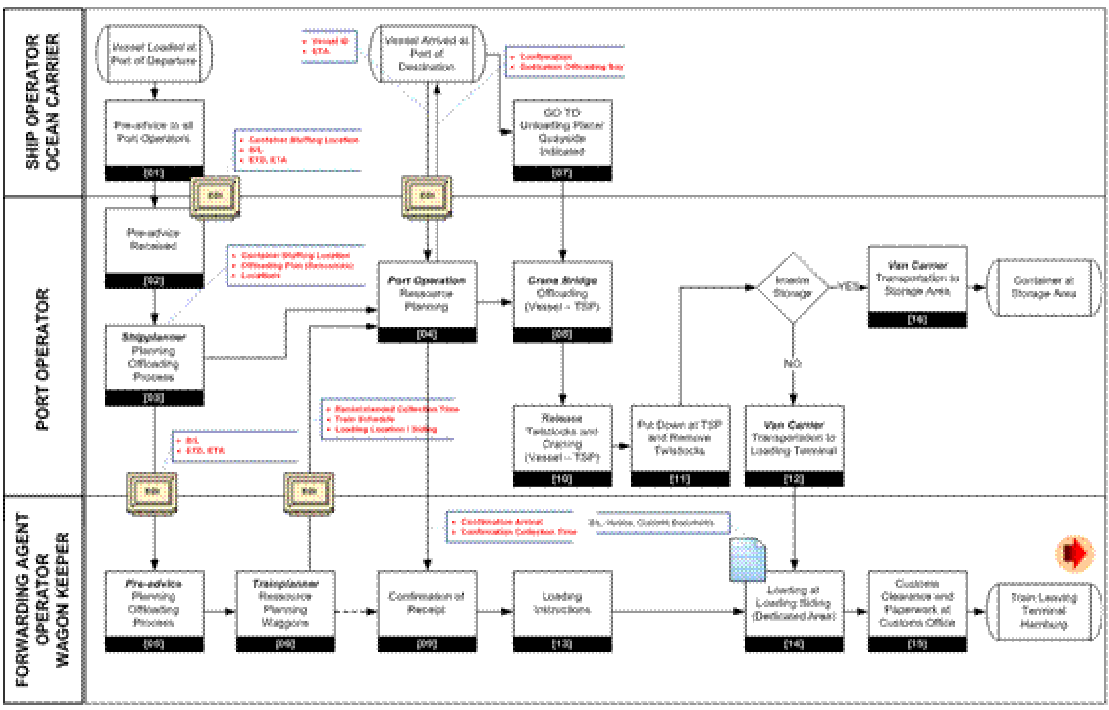
Vessel Arrived at Port of Hamburg. Confirmation will be sent from the *Ship Operator* or *Ocean Carrier* to the *Port Operator* for detailed resource planning in order to the unloading process [04]. Unloading instructions will be transmitted to the *Crane Bridge Operator* and the *Ship Operator* [07|08]. The execution of offloading process starts [09/10]. In case of direct loadings shipments will be transported to the loading terminal [11] where truck is available for offloading [14].

3.4.2 Scenario 2 | Railway

3.4.2.1 Scenario 2.1 | Port of Hamburg

Stakeholders Involved

- Ship Operator / Ocean Carrier
- Port Operator
- Stevedore / Crane Bridge Operator / Barge Owner
- Forwarding Agent / Railway Operator
- Wagon Keeper



Pre-Advice and Planning (Process Steps 01 until 06)

Ship Operator or *Ocean Carrier* sends all shipping information as pre-advice to the *Port Operator* [01]. Upon receiving the information via EDI [02] the *Port Operator* will plan the offloading process [03]. In the meanwhile the *Forwarding Agent* or the *Holder of the B/L* will be informed – requesting date of collection [05|06].

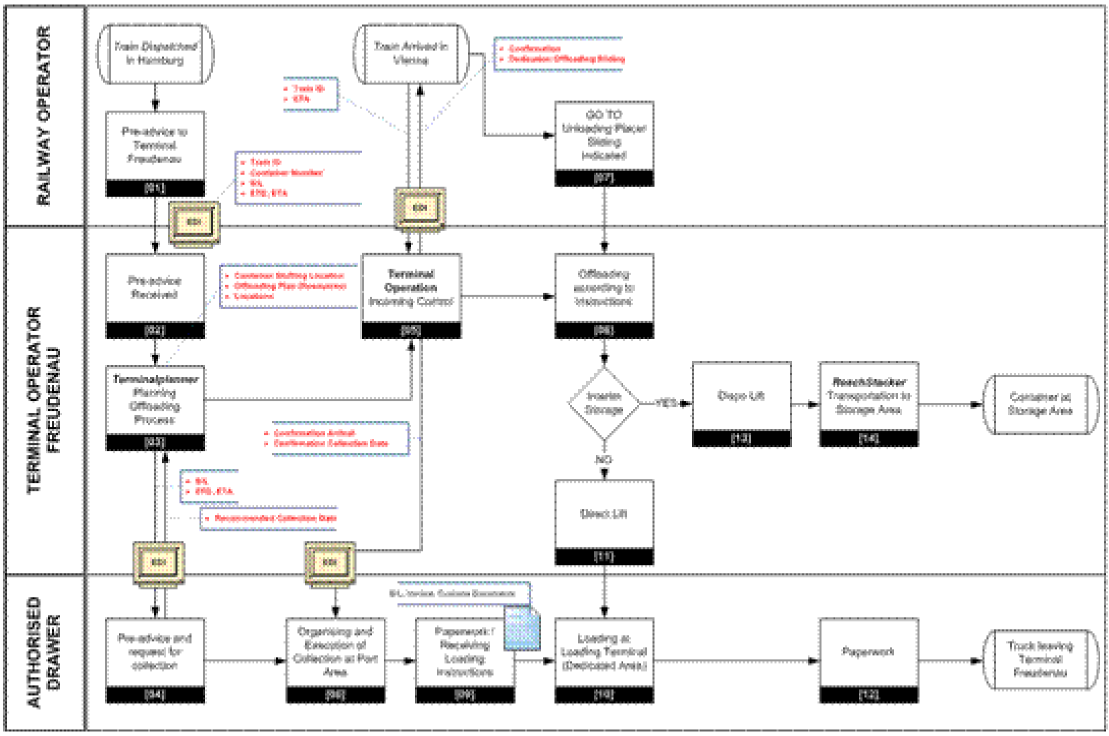
Vessel Arriving at Port of Destination (Process Steps 07 until 16)

Vessel Arrived at Port of Hamburg. Confirmation will be sent from the *Ship Operator* or *Ocean Carrier* to the *Port Operator* for detailed resource planning in order to the unloading process **[04]**. Unloading instructions will be transmitted to the *Crane Bridge Operator* and the *Ship Operator* **[07|08]**. The execution of offloading process starts **[09|10]**. In case of direct loadings shipments will be transported to the loading terminal **[11]** where truck is available for offloading **[14]**.

3.4.2.2 Scenario 2.2 | Terminal Vienna

Stakeholders Involved

- Railway Operator
- Wagon Keeper
- Terminal Operator
- Stevedore / Offloading Operator / Barge Owner
- Authorised Drawer



Pre-Advice and Planning (Process Steps 01 until 06)

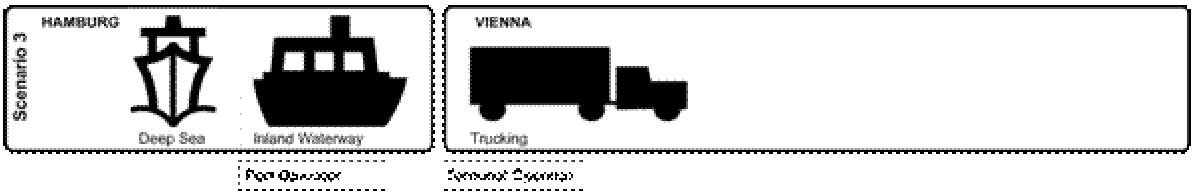
Railway Operator sends all shipping information as pre-advice to the *Terminal Operator* **[01]**. Upon receiving the information via EDI **[02]** the *Port Operator* will plan the offloading process **[03]**. In the meanwhile the *Forwarding Agent* or the *Holder of the B/L* will be informed – requesting date of collection **[04|05|06]**.

Train Arriving at Terminal of Destination (Process Steps 07 until 14)

Train arrived at Terminal in Vienna. Confirmation will be sent from the *Railway Operator* to the *Terminal Operator* for detailed resource planning in order of the unloading process **[05]**.

Unloading instructions will be transmitted to the *Offloading Operator* and the *Ship Operator* [07|08]. The execution of offloading process starts [09|10]. In case of direct loadings shipments will be transported to the loading terminal [11] where truck is available for loading [10|11].

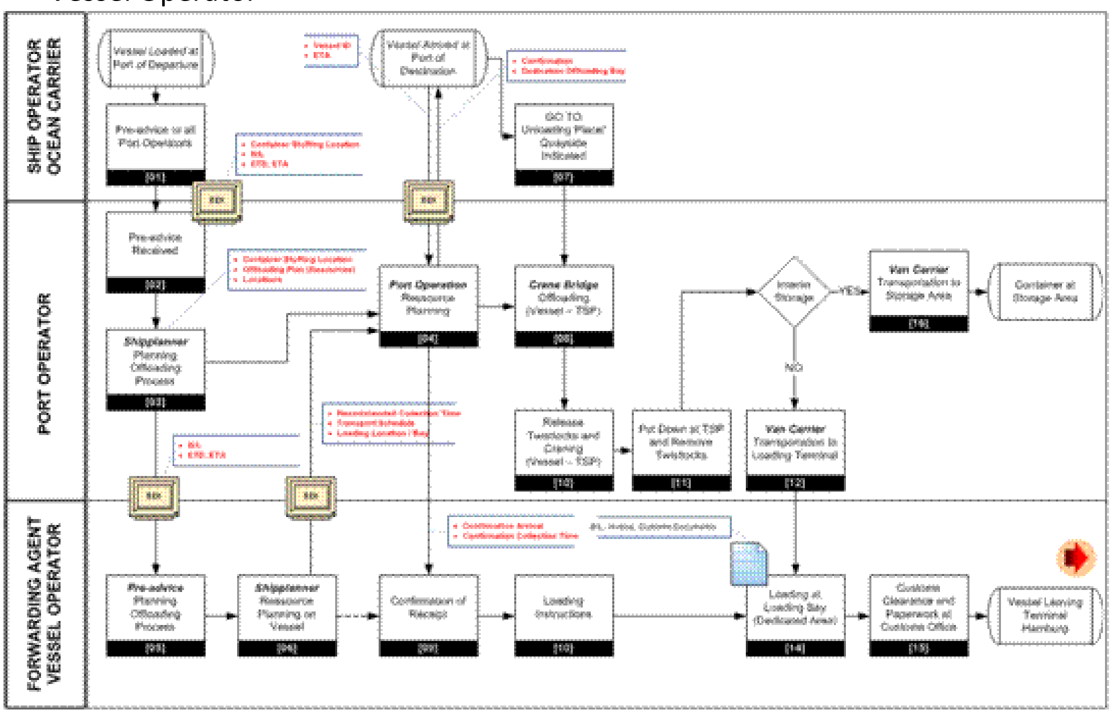
3.4.3 Scenario 3 | Inland Waterway



3.4.3.1 Scenario 3.1 | Port of Hamburg

Stakeholders Involved

- Ship Operator / Ocean Carrier
- Port Operator
- Stevedore / Crane Bridge Operator / Barge Owner
- Forwarding Agent
- Vessel Operator



Pre-Advice and Planning (Process Steps 01 until 06)

Ship Operator or *Ocean Carrier* sends all shipping information as per pre-advice to the *Port Operator* [01]. Upon receiving the information via EDI [02] the *Port Operator* will plan the offloading process [03]. In the meanwhile the *Forwarding Agent* or the *Vessel Operator* will be informed – requesting date of collection [04|05|06].

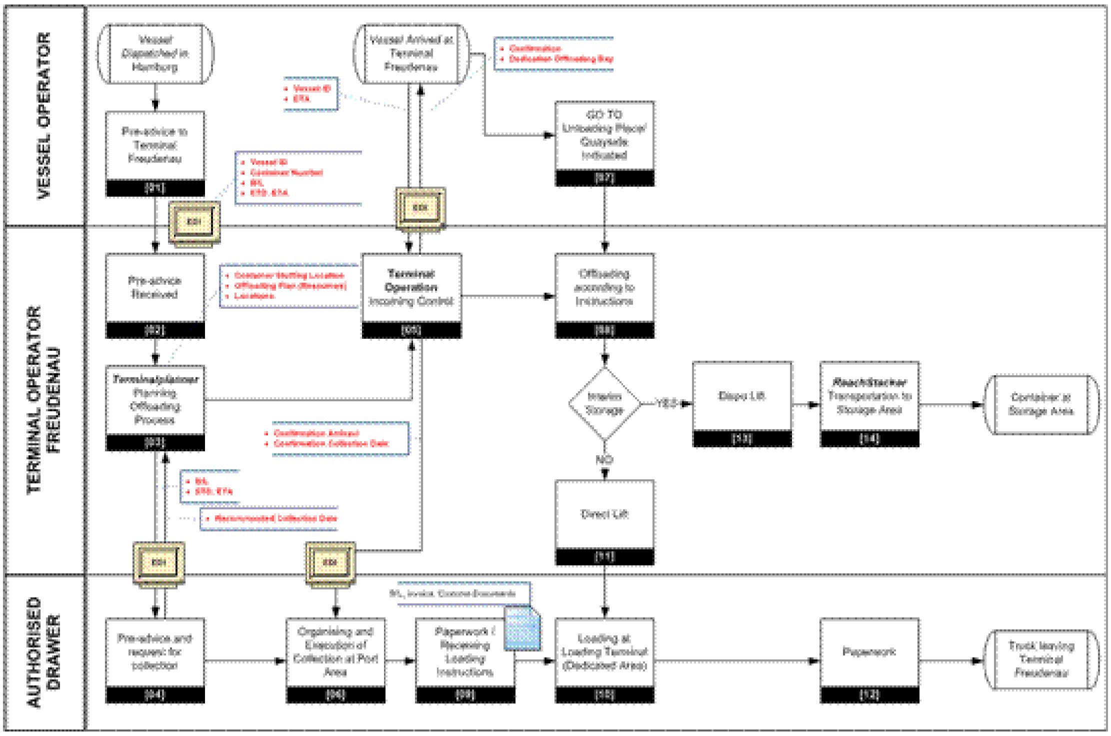
Vessel Arriving at Port of Destination (Process Steps 07 until 16)

Vessel arrived at Port of Hamburg. Confirmation will be sent from the *Ship Operator* or *Ocean Carrier* to the *Port Operator* for detailed resource planning in order to the unloading process **[04]**. Unloading instructions will be transmitted to the *Crane Bridge Operator* and the *Ship Operator* **[07|08]**. The execution of offloading process starts **[10|11]**. In case of direct loadings shipments will be transported to the loading bay **[12]** where vessel is available for loading **[14]**.

3.4.3.2 Scenario 3.2 | Terminal Vienna

Stakeholders Involved

- Vessel Operator
- Terminal Operator
- Stevedore / Offloading Operator / Barge Owner
- Authorised Drawer



Pre-Advice and Planning (Process Steps 01 until 06)

Vessel Operator sends all shipping information as pre-advice to the *Terminal Operator* **[01]**. Upon receiving the information via EDI **[02]** the *Port Operator* will plan the offloading process **[03]**. In the meanwhile the *Forwarding Agent* or the *Holder of the B/L* will be informed – requesting date of collection **[04|05|06]**.

Vessel Arriving at Terminal of Destination (Process Steps 07 until 14)

Vessel arrived at Terminal in Vienna. Confirmation will be sent from the *Vessel Operator* to the *Terminal Operator* for detailed resource planning in order of the unloading process [05]. Unloading instructions will be transmitted to the *Offloading Operator* and the *Ship Operator* [07|08]. The execution of offloading process starts. In case of direct loadings shipments will be transported to the loading terminal [11] where truck is available for loading [10|11].

3.5 Stakeholders involved

Important stakeholders included in the entire transport process to be mentioned:

- Harbor Master
- Customs Agent (CHA) / Importer / Exporter
- Container Freight Station (CFS) / Inland Container Depot (ICD)
- Logistics Operator(s)
- Surveyor
- Bank / Financial Institutions / Insurance Institutions
- Customs Authorities
- Port Health Organization (PHO)
- Immigration
- Container Agent
- Plant Quarantine Organization (PQO)
- Mercantile Marine Department (MMD)
- Navy/Coast Guard

In the following list there is definition of the Stakeholders involved. Due to their different roles in the transport process, there are different information demands and information flows. The information transactions and the required information are shown in the list.

Process Step	Sender	Receiver	Description
1 | 2.1 | 3.1	Ship Operator	Port Operator	Vessel ID
1 | 2.1 | 3.1	Ship Operator	Port Operator	Container Stuffing Plan
1 | 2.1 | 3.1	Vessel Operator	Port Operator	B/L No
1 | 2.1 | 3.1	Vessel Operator	Port Operator	ETD, ETA
1 | 2.1 | 3.1	Port Operator	Forwarding Agent Railway Operator Vessel Operator	B/L No
1 | 2.1 | 3.1	Port Operator	Forwarding Agent Railway Operator Vessel Operator	ETD, ETA
1 | 2.1 | 3.1	Forwarding Agent Railway Operator Vessel Operator	Port Operator	Recommended Collection Date *Additional Information

1 | 2.1 | 3.1	Port Operator	Forwarding Agent Railway Operator Vessel Operator	Confirmation Collection Date
1 | 2.1 | 3.1	Port Operator	Forwarding Agent Railway Operator Vessel Operator	Dedication Loading Area
1 | 2.1 | 3.1	Ship Operator	Port Operator	Arrival Confirmation
1 | 2.1 | 3.1	Port Operator	Ship Operator	Dedication Offloading Bay
2.2 | 3.2	Railway Operator Vessel Operator	Terminal Operator	Train ID Vessel ID
2.2 | 3.2	Railway Operator Vessel Operator	Terminal Operator	Container ID (B/L)
2.2 | 3.2	Railway Operator Vessel Operator	Terminal Operator	ETD, ETA
2.2 | 3.2	Terminal Operator	Authorised Drawer	Container ID (B/L)
2.2 | 3.2	Terminal Operator	Authorised Drawer	ETD, ETA
2.2 | 3.2	Authorised Drawer	Terminal Operator	Recommended Collection Date
2.2 | 3.2	Railway Operator Vessel Operator	Terminal Operator	Arrival Confirmation
2.2 | 3.2	Railway Operator Vessel Operator	Terminal Operator	Train ID Vessel ID
2.2 | 3.2	Terminal Operator	Railway Operator Vessel Operator	Dedication Offloading Area
2.2 | 3.2	Terminal Operator	Authorised Drawer	Confirmation Arrival
2.2 | 3.2	Terminal Operator	Authorised Drawer	Confirmation Collection Date
(…)			

4 Business Case 3: East West Transport Corridor in the Southern part of the Baltic Sea Region (EWTC)

4.1 Brief presentation of the business case

EWTC is one of the main corridors in the Southern Baltic Sea Region stretching from Esbjerg (Denmark) and Sassnitz (Germany) in the West to Vilnius (Lithuania) in the East. The Eastern part of the corridor is a gateway to and from the Baltic Sea Region connecting it with Russia, Kazakhstan and China to the East of Belarus, Ukraine and Turkey to the South-East.

EWTC is one of the key links between Sweden and Denmark with Lithuania delivering freight by maritime transport. Future perspectives of the Corridor are first of all related to the increasing container transportation flows throughout the world. In view of this, it is necessary to apply harmonised (uniform) information systems which could allow to simplify typical visual space cooperation documents and measures, provide for effective operations of the ports and sustainable (uninterrupted) movement of freight, and contribute to the formation of a new common EU maritime transport policy.

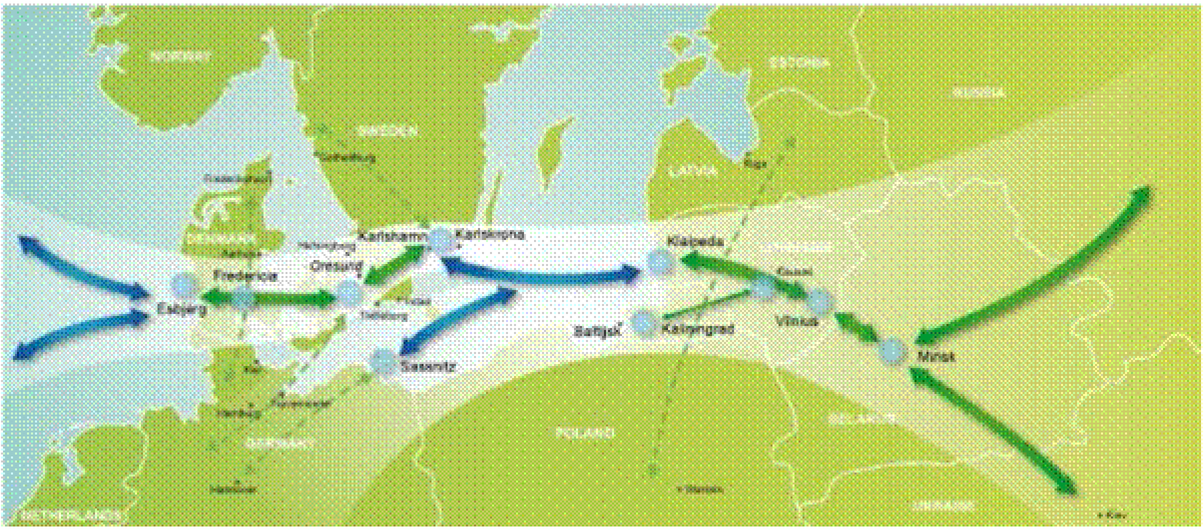


Figure 4-1: East-West transport corridor in the Southern Baltics area, source: EWTCII, 2012

EWTC is an attempt to form an effective transnational supply chain, providing a variety of transportation and logistics services. To achieve a synergy effect and enjoy the benefits, cooperation between different stakeholders within the global supply chain is necessary.

EWTC also implements the connection of the EU transport network (TEN-T) with the networks of neighbouring countries (Belarus, Russia, and Ukraine). That implies the multitasked agenda to improve transnational connections and conditions for businesses to the East-West transport corridor from the global perspective.

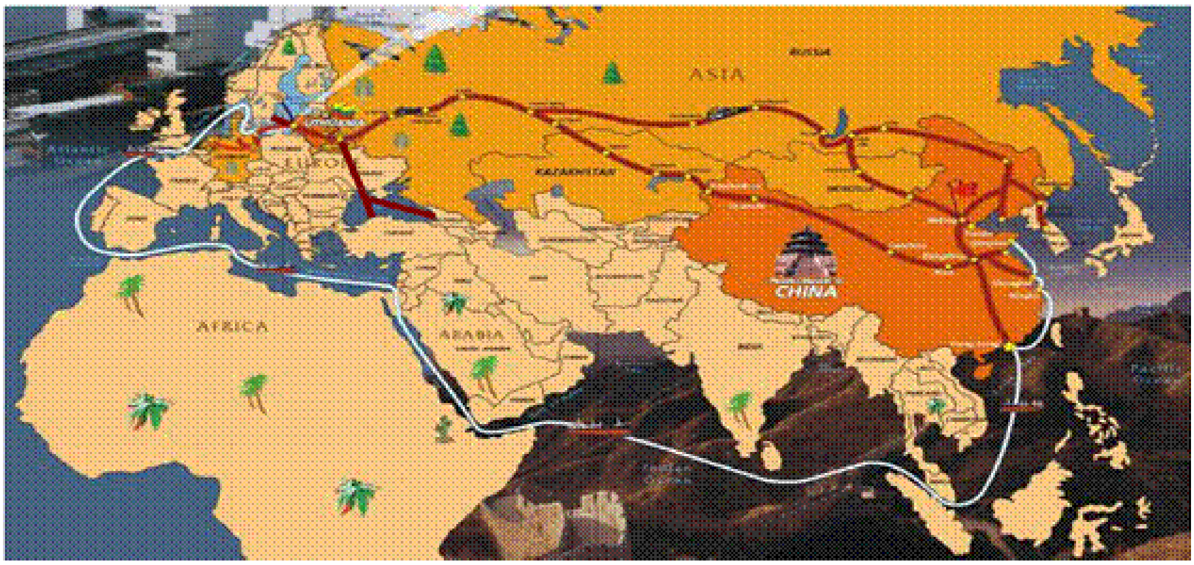


Figure 4-2: East-West transport corridor Global perspective, source: EWTC, 2007

EWTC stimulates the economic growth of the region:

- Through international cooperation. The aim of the project is to develop and work for the efficient, safe and environmentally friendly handling of the increasing amount of goods moving toward East-West direction in the South Baltic Region.
- Through joint forces of stakeholders in the region to enhance sustainable transport planning and innovative solutions in the field of transport.
- Through developing skills and qualification of logistics specialists along Asia- Europe connections, as well as through establishing the networks and platform of researchers.

4.2 Traffic composition and density of EWTC

Global Study on Trade and Transports in the East West Transport Corridor was aimed to map current trade and transport flows in the corridor and analyse its future potential. The market share of the EWTC in global perspective was estimated to 2.3 percent as of 2010. That is an approximately 2.3 percent (from 552 bill. Euros) of the trade between countries (Figure 3 3) in east and west with potential to use the EWTC as a transport link was transported through the corridor in 2010. The potential for the future transport development showed an anticipated increase of about 100 percent of GDP in the countries until 2030, which in turn means that the transport flow likely will double.

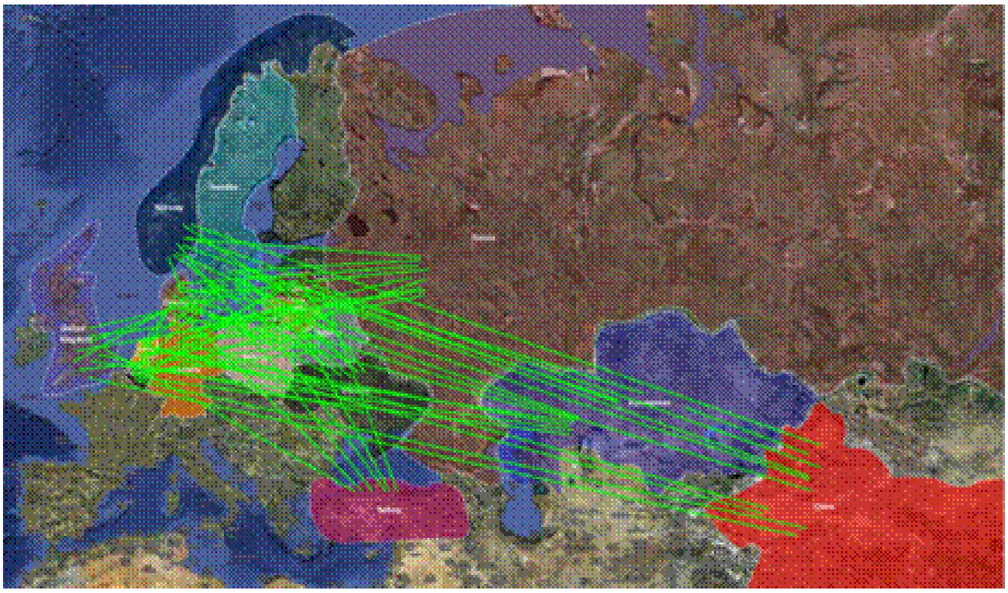


Figure 4-3: Asia – Europe trade flows – 552 billion euros, source: EWTCII (SWECO study), 2012

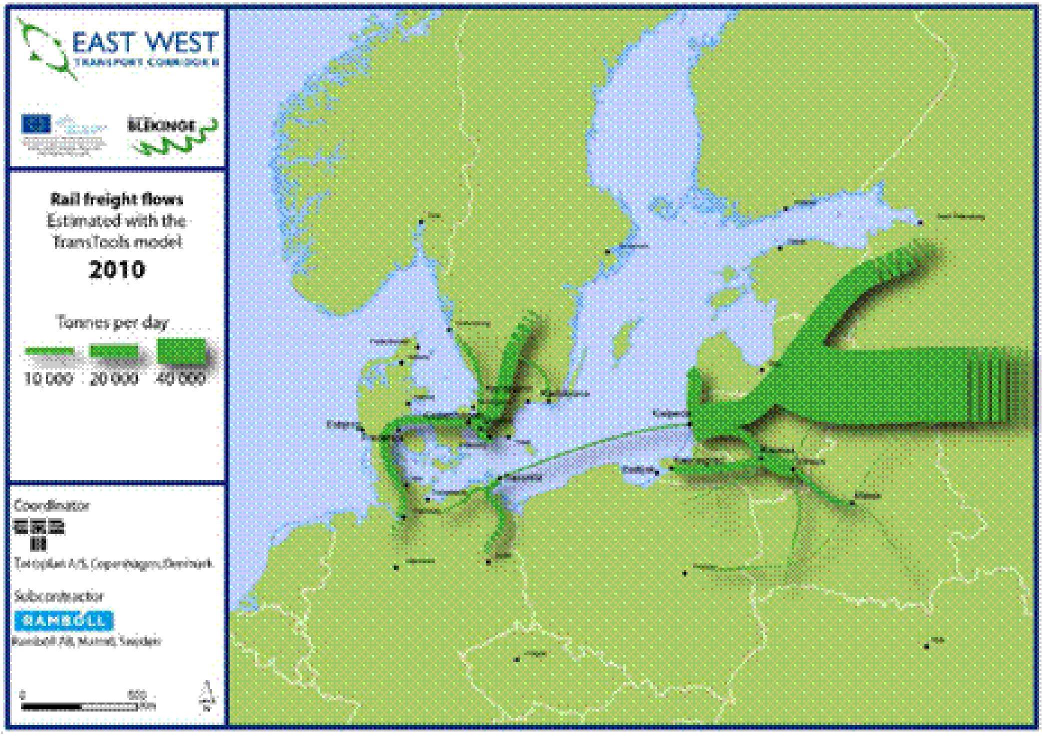


Figure 4-4: EWTC rail freight flows 2010, Source: EWTCII Transport forecast and simulations, 2012

When looking at the current rail freight flows through the EWTC corridor, the largest flows are with Russia, as well as between **Klaipeda** and Vilnius/Kaliningrad on the Eastern shores of the Baltic Sea. In the Western part, the largest flows are between Scandinavia and the European Continent, via Denmark.

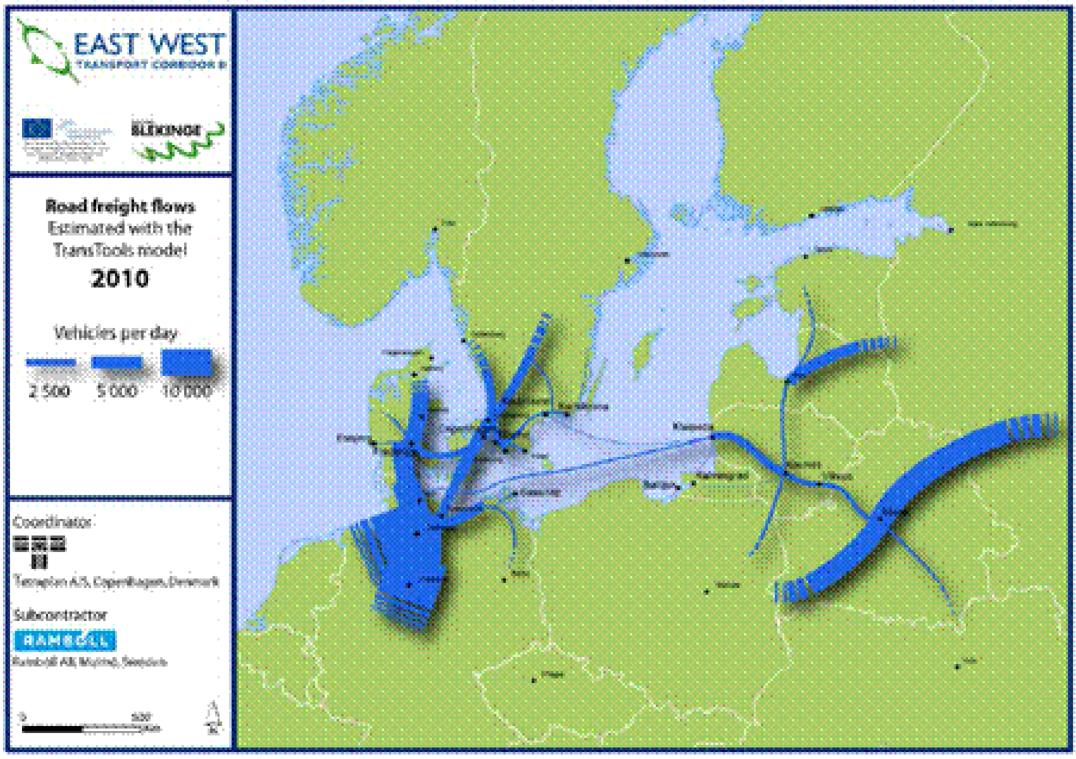


Figure 4-5: EWTC road freight flows 2010, Source: EWTCII Transport forecast and simulations, 2012

4.3 EWTC geographical coverage (and graphical representation)

The EWTC corridor is part of the European transport network with links to European Neighbouring countries comprising roads, railways and ports/hubs:

- TEN-T core network for road and rail;
- TEN-T comprehensive network for road and rail;
- Motorways of the Sea and TEN-T core ports;
- EWTC road, rail and ports;
- Larger intermodal hubs.

Industrialization of the inland China, as well as economic developments in Russia and the Black Sea area can be expected to result in the growing railway transport flows and connection of these areas with Europe. Land bridge with the New Silk route and possible other trans-continental routes will become increasingly important for trade between Asia and Europe.

In the global context it is not yet clear which routes will be attractive in the future since some of them still need to be developed. As Chinese manufacturing is moving further to the west inland China (due to lower manufacturing costs and congestion closer to the Chinese coast), the land route to Europe becomes more attractive, especially for higher value cargoes. Different routes are already being tested or effectively used for transportation of cargo between Europe and China during the recent years. The interest in the routes via Kazakhstan has also increased.

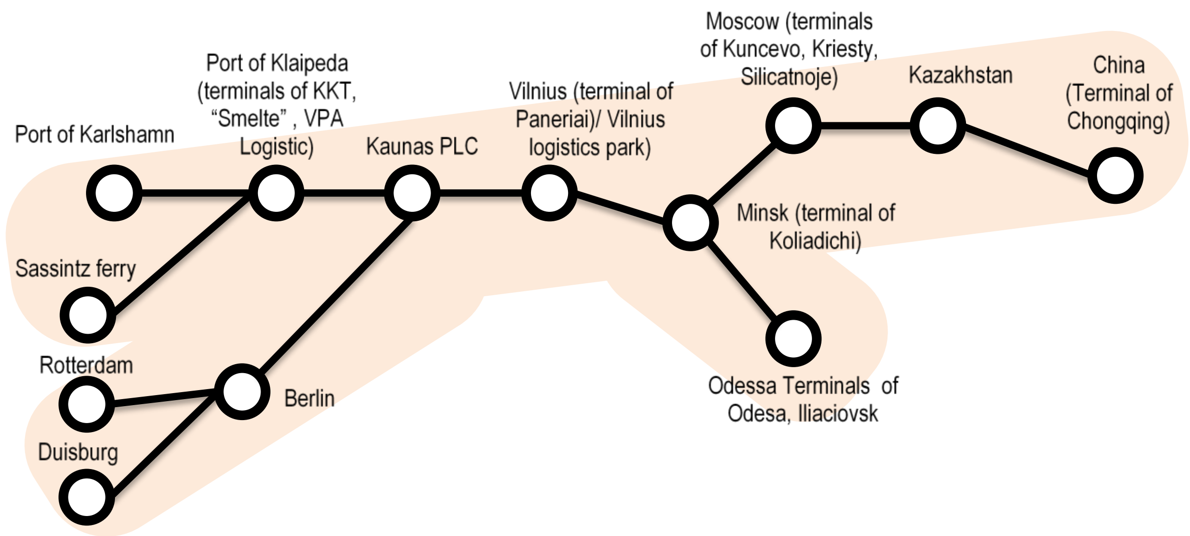


Figure 4-6: EWTC with main hubs, Source: VGTU CCITL

4.3.1 Railway transport network along EWTC

"Saule" Chongqing (China) - Antverpen (Belgium), by transit via Šeštokai (Lithuania);

The container train "Saule (Sun)" connects Europe and China (through China,Kazakhstan, Russia, Belarus; Poland, Germany, and Belgium.) and is unique in that cargo arrives to Europe from China in 10 days (by sea – in 40 days). "Sun Train" unites nine countries from China to Belgium, and runs very fast. The project operator seeks to ensure that trains are always full of freight.

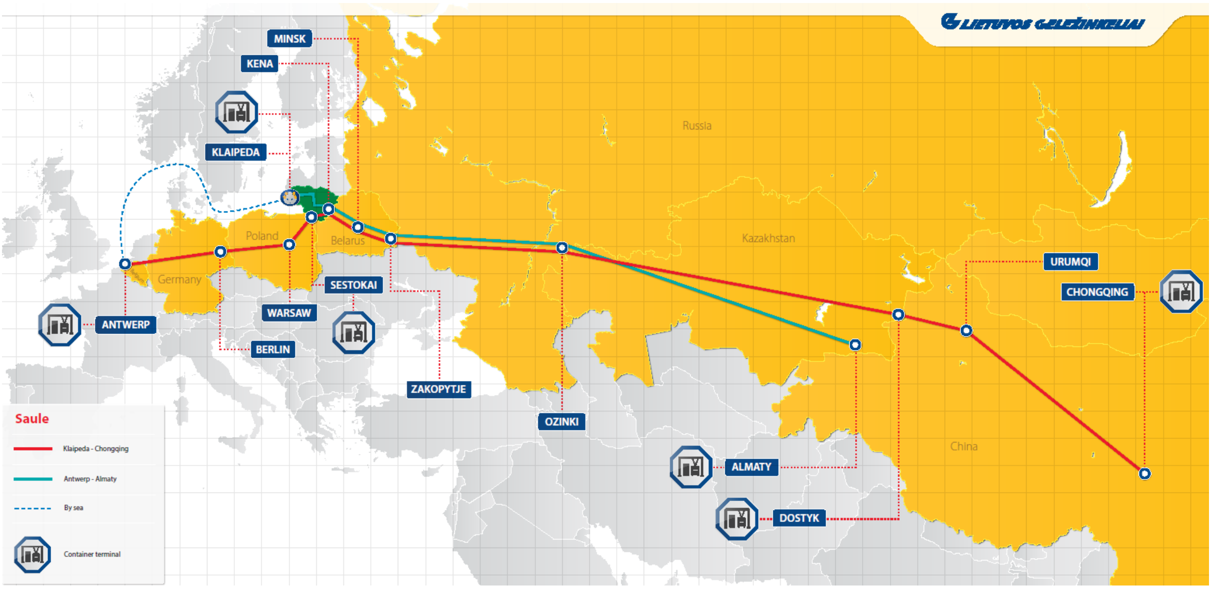


Figure 4-7: The container train "Saule (Sun)", Source: Lithuanian Railways, 2014

There are opportunities for freight transportation by routes from Kazakhstan to the Baltic Sea and from China to Belgium through Šeštokai.

- From Kazakhstan through Russia and Belarus to Lithuania within 8 days (reference to the map).
- From China through Kazakhstan, Russia, Belarus, Poland, Germany, the Netherlands to Belgium within 18 days (reference to the map).
- Rendering distribution and warehousing services in Lithuania, Belgium, and China.

Synergy with the northernmost ice-free port of Klaipeda in the Baltic Sea ensures freight traffic all year round.

Baltijos vėjas (Baltic Wind)

The container train "Baltijos Vejas (Baltic Wind)" departs from Paneriai railway (Lithuania) station to Kostanay (Kazakhstan). The loaded train is scheduled to go from Lithuania twice a month.

Figure 4-8: The container train "Baltijos Vejas (Baltic Wind)"

The train goes at the pre-scheduled time 3 times a month, thus, ensuring attractive prices and timely delivery of cargo. The train travels from Lithuania to Kazakhstan within 4-5 days; since all customs inspections are undergone in Lithuania, the train goes to Kazakhstan hot-shot.

"Merkurijus" (Kaliningrad/Klaipėda – Moscow);

"Merkurijus" container train connects Kaliningrad and Klaipeda sea ports and, via Vilnius and Minsk, goes to Moscow, the capital of Russia. In one run, "Merkurijus" accepts up to 114 containers (TEU). The train departs from Klaipeda and Kaliningrad to Moscow once a week and covers the distance between the two cities within two days. The train service terminals: Klaipeda Container Terminal, Klaipeda Smeltė, and Ecodor.

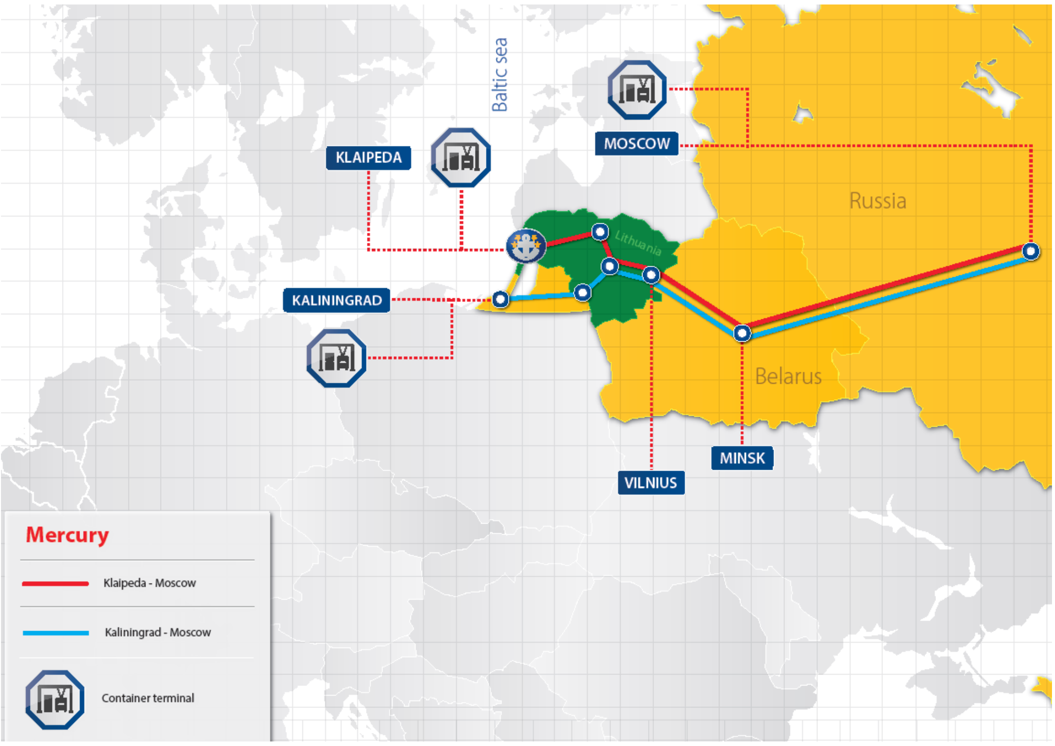


Figure 4-9: The container Train Project "Merkurijus"

More details:

- Regularity: 1-2 runs per week
- Delivery time: 54 hours
- Distance: 1,342 km
  Capacity: up to 57 conventional units (114 TEU) at one time.

Also the EWTC connects the Trans-European Transport Network (TEN-T) with the networks in the neighbouring countries (Belarus, Russia, Ukraine) with focus on the development of the Baltic – Black Sea transport link.

Container Train "Viking train"

Container Train "Viking train" is a joint project of Lithuania, Belarus and Ukraine railways, port stowage companies in Klaipeda, Odessa and Ilyichevsk seaports, connecting with railways of the Baltic and Black seas. All sizes of universal and special-purpose containers and trucks with semitrailers (contrailers) are carried by the train which from Scandinavian and Western European countries are delivered by sea transport to the seaport of Klaipeda, as well as through Mukran-Klaipeda ferry and are transported further to Ukraine, Belarus, the Middle East, the Caucasus, Turkey - through seaports of Ilyichevsk Odessa and backwards.

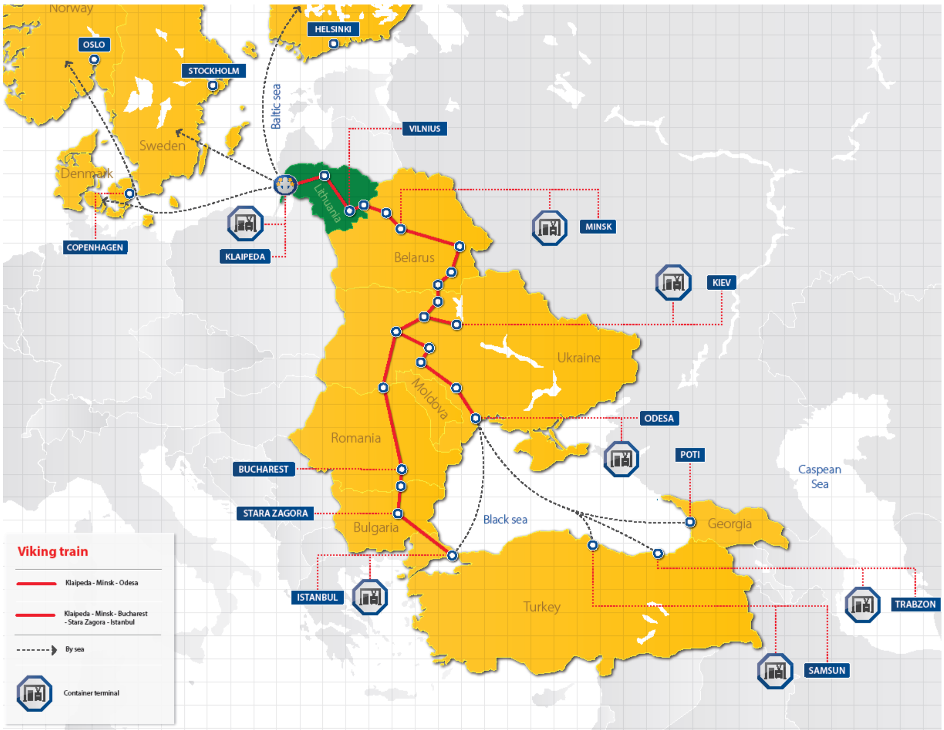


Figure 4-10: Container Train "Viking train"

The route (1734 km) is covered in 54 hours. Today a computerised environment is one of the key ways of accelerating customs clearance procedures; both, customs authorities and foreign economic operators are interested in the above developments. E-declarations facilitate declaration completion process and lead to the reduction of paper documents, and, what is most important, the exchange of documents and information between traders and customs officers online. The solution requires maximum 30 minutes of time to check consistency and safety of cargo during border-crossing Lithuania – Belarus.

Figure 4-11: Current Black Sea – Baltic Sea solution, Source: Anders Refsgaard, DFDS, 2013

It improves the delivery speed and trade potential between the countries, and increases the potential trade between the EU members states and the third countries. It also relatively reduces the emission per transported tone of goods.

This train, in comparison to road transport, carries freight much safer and more environment-friendly. The container transport train "Viking train" was awarded for the best practice of intermodal transport in 2009 and 2014.

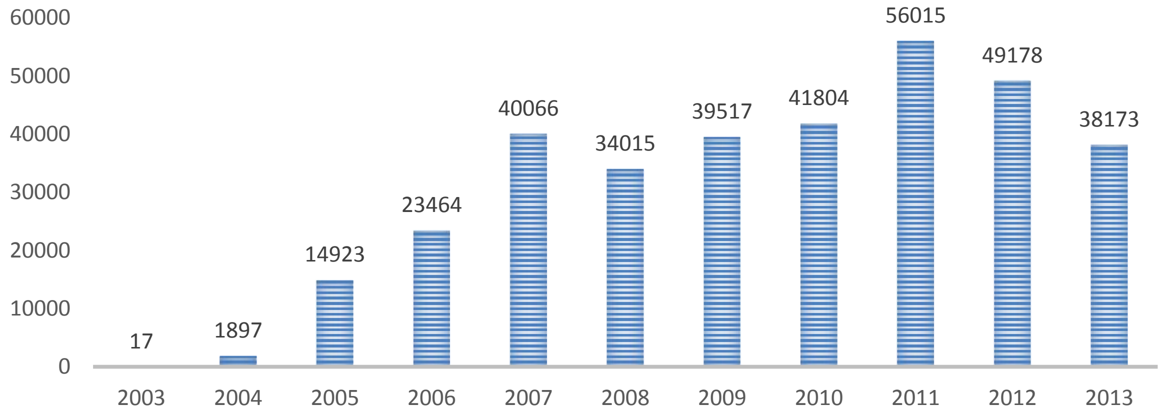


Figure 4-12: Container transportation by the combined transport "Viking train" in 2003-2013 (TEU)

The next important achievement in developing the transport link between the Baltic and Black sea Regions is shortening the time that train spends on international boarders while cargo is checked through technological innovations which have been introduced to accelerate customs procedures. An electric lock with the GPS/GSM navigation function enables the customs office to track goods through the container – train route (Klaipėda – Minsk – Kiev – Odessa / Iljichovsk).

Figure 4-13: Baltic – Black sea transport link (as a Southern branch of EWTC), Source: Klaipėda Seaport, 2013

The EWTC is one of the testing area of “one-stop-shop” principle.Together it is important to note that in the Ukraine, the concept of implementing the “one-stop shop” principle has proceeded to practical implementation. In Odessa Sea Trade Port the first unified information system has been set up.

Figure 4-14: Odessa single window project, Source Odessa seaport 2013

3.5.1 Sea transport network

Klaipėda Seaport is an object of international importance and one of the major cargo handling transportation hubs in the Eastern part of the Baltic Sea.It is the northernmost ice-free port that guarantees uninterrupted navigation and stevedoring operations without any additional navigational surcharges.

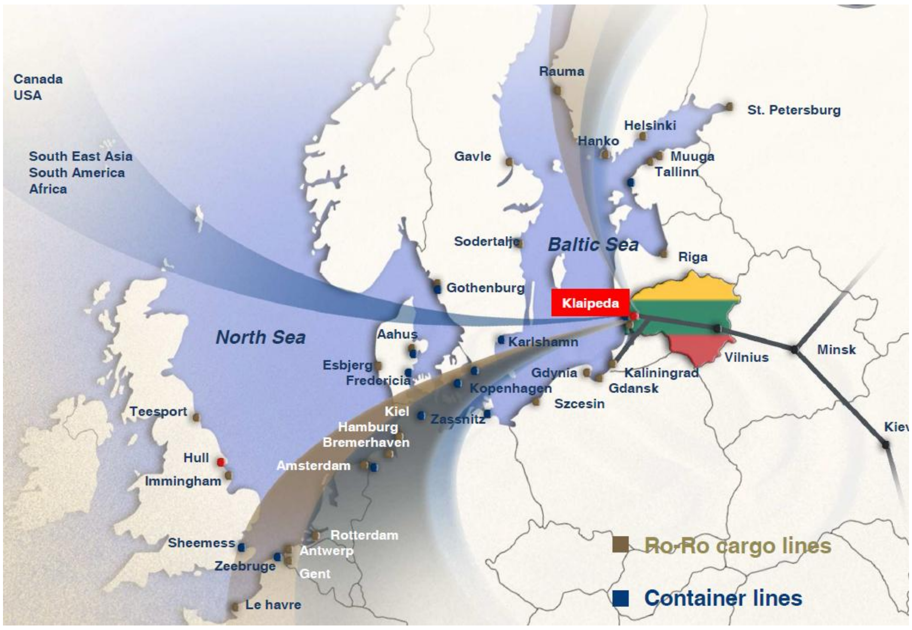


Figure 4-15: Liner Connection of Klaipėda Seaport, 2013

Klaipėda Seaport is the most important industrial and transportation centre. It is the northernmost ice-free port, which guarantees uninterrupted navigation and stevedoring works without any additional navigational surcharges. The annual capacity of Klaipėda Port is over 60 million tons.

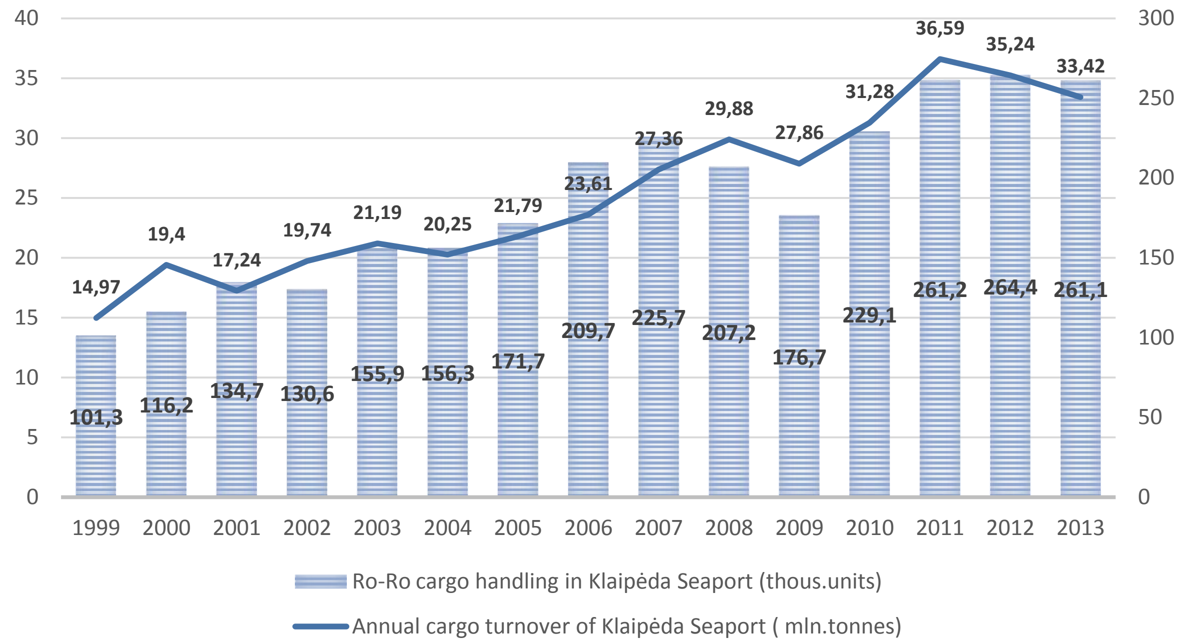


Figure 4-16: Annual cargo turnover of Klaipėda Seaport Source: Klaipeda Seaport, 2013

Klaipėda is a deep-water port. Over 7,000 ships call the port per year. The port is capable of accepting large–tonnage vessels. Klaipėda Port is now equipped with a number of sophisticated security systems including x-ray and video monitoring systems.

Klaipėda Port accommodated the vessels of the following size:

- dry cargo vessels - 100,000 DWT;
- tanker vessels - 160,000 DWT;
  containerships – 6000 TEU.

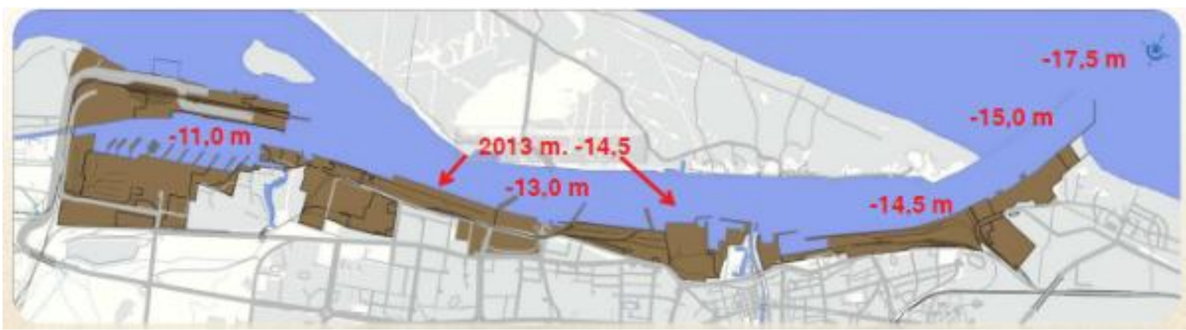


Figure 4-17: Deepen of the Klaipėda Seaport channel, Klaipeda Seaport, 2013

Being a multipurpose port with 38 specialized cargo terminals, Klaipeda handles all types of cargo.

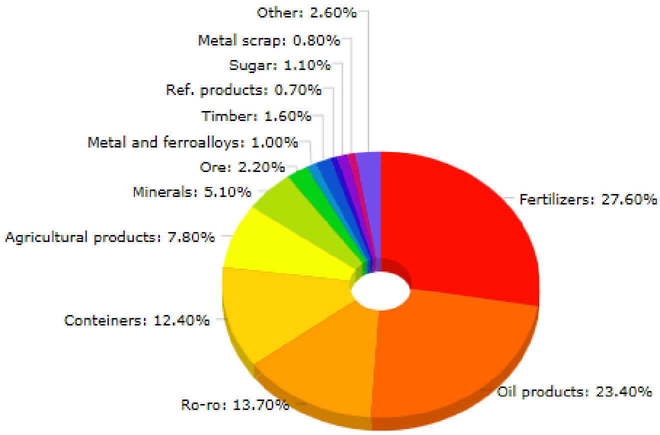


Figure 4-18: Structrure (cargo types) in Klaipėda Seaport in 2012. Source: Klaipeda Seaport, 2013

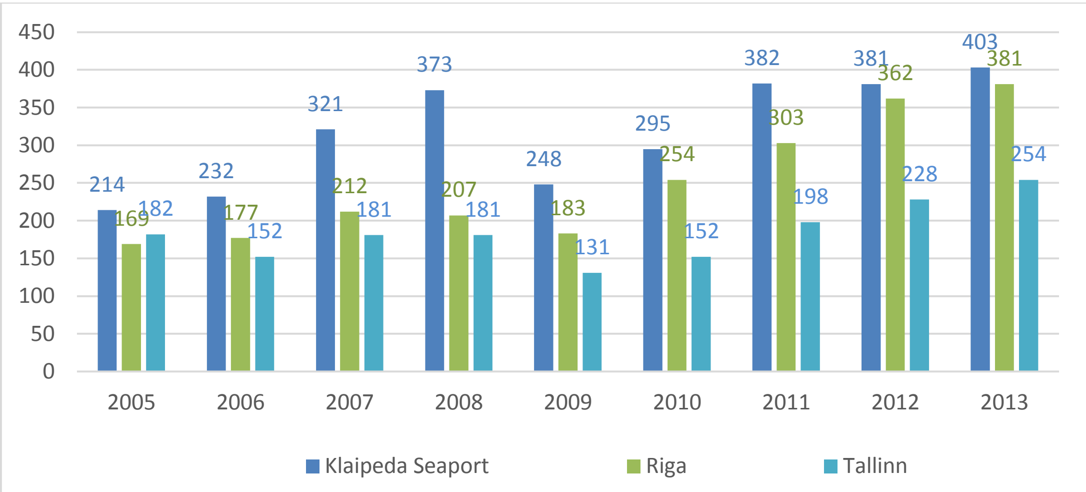


Figure 4-19: Container handling in Baltic ports (thous. TEU). Source: Klaipeda Seaport, 2013

3.6 Business Process – modelling and development

Modelling is necessary in order to foresee possible future developments, but it is not an exact science since there are many parameters that can be selected and used in a different manner. Each of the parameters can change in the future, and not all of them can be modelled. Therefore, such forecasts should always be treated as potential future developments. According to "Global study on trade and transports in the East-West Transport Corridor" performed by SWECO (2012), in one of the 2030 (realistic) scenario the total freight produced in the entire BSR area will increase by 43 percent from 2010 to 2030. The major increases in absolute tonnes are within manufactured goods and building materials. Agriculture and foodstuffs have increased by about 10 percent and the remaining commodities increased fairly evenly, with the exception of crude oil (its amounts have reduced).

- Besides, in the maritime sector a growth of 140 percent between 2010 and 2030 is anticipated.
- The number of vehicle-kilometres undertaken by trucks crossing country borders within the Baltic Sea Region is estimated to increase by 73 percent between 2010 and 2030. This corresponds to an annual growth of nearly 3 percent. The increase is in the region of 20 million vehicle kilometres per day in the BSR and is most notable in Poland and the BSR part of Germany. Russia and Sweden are also expected to have significant increases.
- International rail freight transport is estimated to increase by 43 percent between 2010 and 2030 in the BSR (1.9 percent annual growth). This is by about 145 million tonne kilometres more than in 2010. The most significant increase is observed in Poland, Germany and Sweden, but the increase has also been evidenced in Lithuania. The total tonne kilometre growth between 2010 and 2030 for all rail freight transport in the BSR is 22 percent, which is about half of the growth in international transport.

It is difficult to measure total transport flows toward East-West direction along the EWTC. Transport flows in the entire Baltic Sea Region were estimated in the Baltic Transport Outlook 2030 project, where a total cargo throughput of the ports in the Baltic Sea Region amounted to 760 million tons for 2010 (including all ports in Denmark, Germany, Poland, Sweden, Lithuania, Latvia, Estonia, Russia and Finland). Thus, geographical coverage of the above study is much wider compared to the EWTC.

The sea port in Klaipėda is an important gateway for the Baltic Sea Region linking the Western and Eastern part of the Baltic Sea Region and extending further the East and South-East. Several routes lead freight volumes to the corridor via Vilnius and further to Klaipėda.

In response to the changing trends in global goods flows, companies operating within the East-West Transport Corridor and the concerned states respond to the market changes and seek to adjust their infrastructure capacities in order to meet market needs.

Development of Public logistics centres as satellites network for the Klaipėda seaport.

Public Logistics Centres (hereinafter referred to as PLC) execute the activity related to transport sector at national and transnational level, increase concentration of transport services and logistics in their specified territory and, consequently, contribute to better traffic safety and reduction of a negative environmental impact. PLC shall ensure intermodality, i.e. to serve at least 2 transport modes and be part of the trans-European network.

PLC are established in the vicinity of main transport corridors, in their crossroads and in the neighbourhood of major transport objects (railway lines, sea ports and airports).

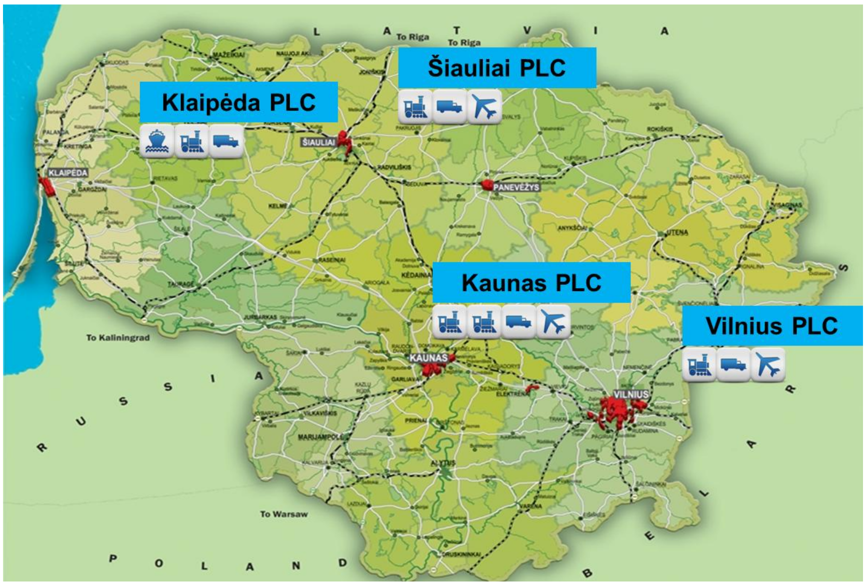


Figure 4-20: Public Logistics centres in Lithuania

Vilnius PLC: the feasibility study is in place, territorial planning documents are under preparation. Possible launch of PLC operations is anticipated by the end of 2013.

Estimated container terminal capacities:

- Four cargo overload tracks (~ 1050 m long), capable of servicing from 60 up to 150 TEU per year;
- Gantry crane, with maximum lifting capacity – 40 t;
- 30 parking lots for trailers;
- Short-term container storage site with a capacity of 960 to 1140 containers (TEU);
- Fully developed terminal will be able to handle more than 100 thousand. TEU per year.

Kaunas PLC: public procurement on the preparation of a feasibility study is under way. Possible launch of PLC operations is anticipated by the end of 2014.

Estimated container terminal capacities:

- Gantry crane, with maximum lifting capacity – 40 t;
- Kauno VLC intermodal terminal will be 4 railway tracks, total length 1600m.
- 30 parking lots for trailers;
- Container storage area capacity (approximately 1,000 TEU)

Also the following freight routes are testing currently as the most important connections to the EWTC in BSR:

- The new Silk Road links and Trans-Siberian Railway. Transportation by train from the Eastern Chinese coast to Moscow takes about 25 days by the Trans-Siberian railway. Transporters delivering goods from/to China via the Trans-Siberian Railway are suffering from the dependency on Russia as a transit country, because transportation via Russia is often related to time consuming bureaucracy, e.g. all administrative routines on border crossings must be translated into Russian. (Wollmer, 2012);

- As an alternative to the Trans-Siberian Railway, a container train service has been established between Lianyungang (located between Beijing and Shanghai on the East coast) in China and Moscow. Transportation lasts 16 days on this route. (Peng, 2007);
- Close cooperation between Lithuanian and Kazakhstan has led to the introduction of the train "*Saule*" travelling between Klaipėda and Almaty and further to China via Dostyk on the Kazakh/China border. The travel time from Klaipėda to the Chinese border can last ten days on the above train. In November 2011 it took 13 days for *Saule* to travel from Chongqing in China to Kena in Western Lithuania (EWTC Transporter, 2012);
- In the Western end of the corridor, Esbjerg is a gateway to ports in UK, the Netherlands and Belgium.

However it is necessary to develop a more effective tool for implementation of the above forecast scenarios. The EWTC Association which was established in 2010 could be such a tool.

The EWTC Association is a triple-helix organization of stakeholders from the public, private, and the academic sector acting as an organization promoting the EWTC (in BSR) concept with the main mission to stimulate new business opportunities along this corridor and profiling the brand of the EWTC concept.

Since the EWTC transport corridor is the sum facilities supplied and offered through partnership, the core of the product of the EWTC Association is quality of cooperation between the EWTCA partners and the extension of partnership: the wider and better the cooperation and the better the integration of provided services, the better is the product.

EWTC activities are aimed at strengthening the liaison between EWTC partners. This is done through a wide range of activities, the most important of which are: dissemination of information and development of dialogues on offers and needs of the partners.

Foreseen processes in the development of EWTC [8]:

Enhancement of intermodal interchanges

Since the East-West Transport Corridor is a corridor demanding transport mode interchanges due to crossing of the Baltic Sea, development of intermodal transport solutions making different transport modes fully integrated along the corridor is a key issue for the EWTC.

[8] Source: BESTFACT project, VGTU, 2013

To meet an increased transport demand, ports and intermodal terminals need to make sure that their facilities are prepared for growth. Thus, for ports in the EWTC it is important to offer the services necessary for handling the maritime freight services (container ships, RoRo ships, railway ferries) demanded by transporters and transport buyers.

Secure hinterland accessibility

It is important to secure a good accessibility to/from these ports and terminals. Especially important are railway connections taking into account the fact that they are faster and more environmentally friendly than road transport. It is also important to ensure that these connections are well integrated into the national rail networks. The EWTC Association emphasises the importance of strengthening hinterland connections in the dialogues with governing national bodies in order to stimulate development of these connections.

Strengthening the Black – Baltic Sea Region route connections

It is also of great importance for the EWTC Association to ensure the integration with the connecting freight routes. The Viking Train has already proved that the link to the South-East is an important connection of the BSR with Belarus and Ukraine. Strengthening of these connections requires joint efforts from railway operators, sea port authorities, transporters and transport buyers in this corridor branch and in the neighbouring countries.

Closer cooperation between operators and authorities

Since the EWTC stretches over several countries, it is necessary to establish close cooperation between port and terminal operators, intermodal operators and regional and/or national authorities. A common view on capacity growth and synchronised schedules between different operators along the corridor could ensure efficient transportation and smooth handling of goods in the corridor.

Tight commercial connection between EWTC hubs

Joint commercial interests are necessary for hubs in order to offer reliable, efficient and valuable services strengthening the competitiveness along the corridor. A possible setup for such cooperation is that hubs and freight operators within the EWTC can make agreements and work together. A joint commercial interest could be a common driver for the EWTC hubs and freight operators to increase transport flows in the East-West direction.

Deployment of ITS services

ITS services are needed to support transportation activities along the corridor. This is especially important for the EWTC due to its physical nature, interchange points, multi-language and cross boarder interaction. Information on a constantly updated traffic situation and interchange status, tracking of goods, booking and confirmation services, intelligent truck parking's and services opening faster border crossings routes, would ensure more efficient transportation and handling thereof. Therefore the EWTC Association is interested to take the initiative to establish collaborative ITS solutions.

4.4 Main stakeholders involved in development of the EWTC

1. **Forwarders, Logistics, Transport Associations (Companies):**

Asia Continental Landbridge Logistics Association Council (China), COSCO (China), Lithuanian Stevedoring Companies Association (Lithuania), Berlin-Brandeburg Logistic Network (Germany), VPA Logistics (Lithuania), JSC Plaske (Ukraine), Tuuchin Co. Ltd. (Mongolia), Belarusian Association of International Forwarders (Belarus), JSC Rubicon (Russia), BELINTERTRANS-transport-logistics center (Belarus), UKRZOVNISHTRANS, LLC (Ukraine), PPL 33-55 (Ukraine), Linava (Lithuania), Lineka (Lithuania), EIA (Belgium), JSC Vilteda (Lithuania), Terminal of Mockava (Lithuania), Lithuanian Intermodal Transport Technology Platform (Lithuania).

2. **Universities and research institutions:**

Vilnius Gediminas Technical University (Lithuania), Wismar University of Technology (Germany), NetPort. Karlshamn AB (Sweden), Transport Economics Centre University of Maribor (Slovenia), Institute of Spatial Planning, Development and Foreign Relations (Russia).

3. **Railways Companies:**

Lithuanian Railways (Lithuania), Ukraine Railways (Ukraine), National Company Kazakhstan TemyrZholy (Kazakhstan).

4. **Maritime, ports, Companies and Associations:**

DFDSSea ways (Denmark), Port of Karshamn (Sweden), Lithuanian Ship-owners Association (Lithuania), Limarko JSC (Lithuania).

5. **Regional Administrators, Municipalities:**

Region Blekinge (Sweden), Karlshamn city Municipality (Sweden), Baltijsk Municipal District (Russia), Šiauliai City Municipality (Lithuania).

6. **Others:**

Hohhot Export Processing Zone (China), LOHR industrie (France), Šiauliai Airport (Lithuania).

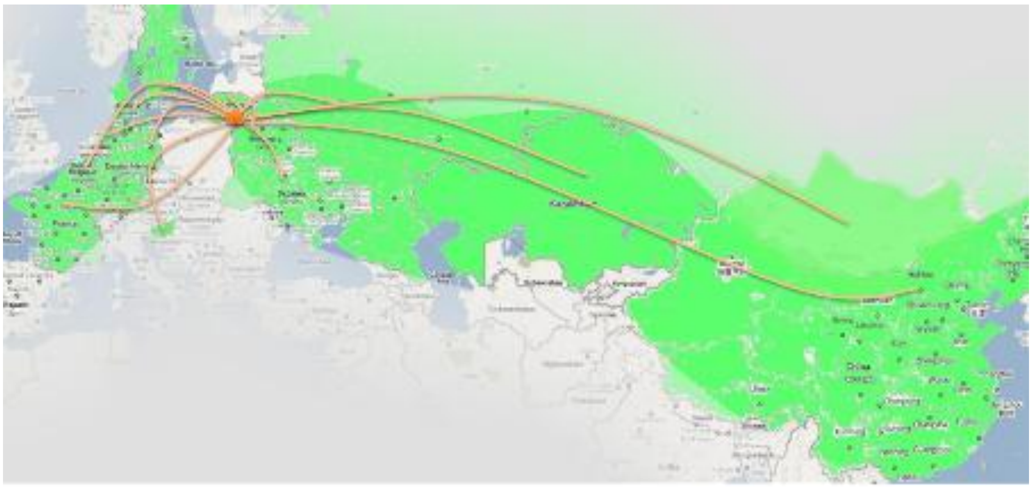


Figure 4-21: Location of partners of International East-West Transport Corridor

Source, EWTCA Secretariat, 2013

Information broker system will ensure information flows between the stakeholders (partners) of the EWTCA.

It is important to highlight the procedure of the EWTC stakeholders' expectations survey (source: TransGovernance project, 2014) with focus on the development of the operational management model to best serve the development potential, operational conditions and users' expectations in the EWTC (Figure 3-15)

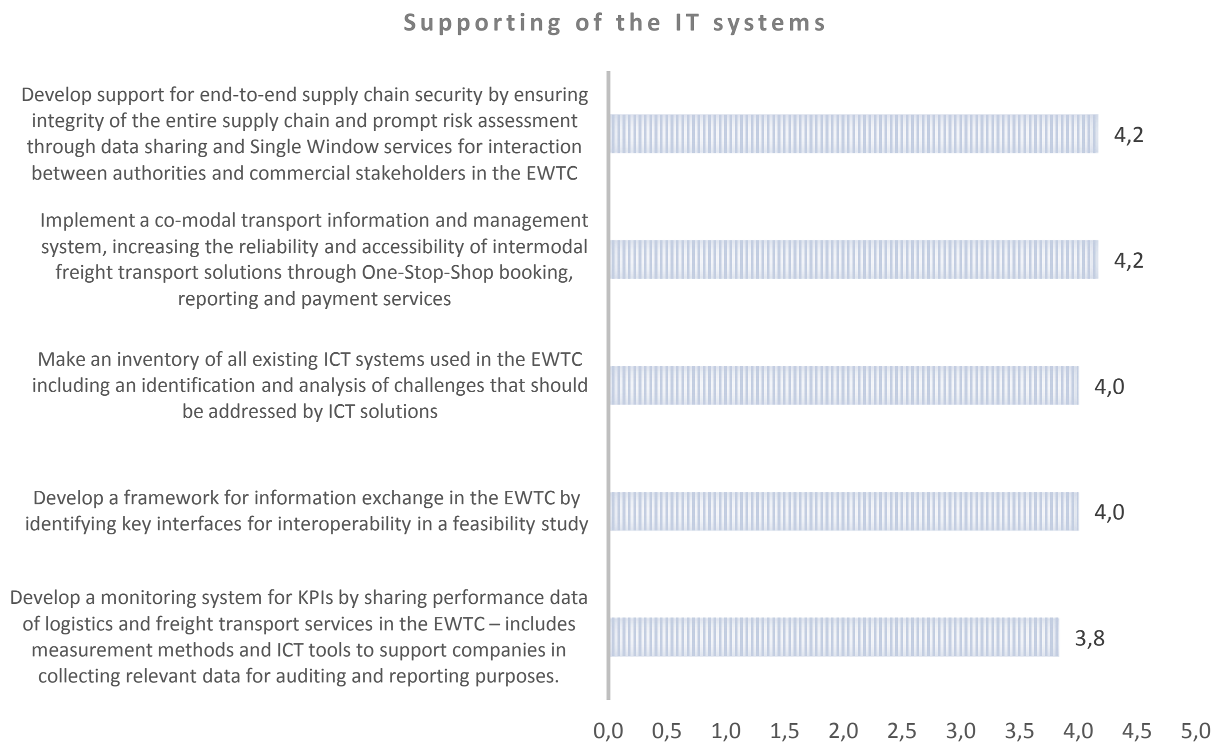


Figure 4-22: EWTC stakeholders prioritised actions for the next 4 years in "Supporting of the IT systems " area (rating scale from 1 to 5, when 1 – it does not matter, 5 – it is very important)

EWTC stakeholders prioritized actions for the next 4 years in "Supporting of the IT systems" area, where the main priorities were:

- Develop support for end-to-end supply chain security by ensuring integrity of the entire supply chain and prompt risk assessment through data sharing and Single Window services for interaction between authorities and commercial stakeholders in the EWTC;
- Implement a co-modal transport information and management system, increasing the reliability and accessibility of intermodal freight transport solutions through One-Stop-Shop booking, reporting and payment services;
- Make an inventory of all existing ICT systems used in the EWTC including an identification and analysis of challenges that should be addressed by ICT solutions.

These priorities are in line with VGTU task in eMAR D3.2.

5 Business Case and Requirements Analysis

5.1 Business Case 1: Italy to North America

5.1.1 User Requirements (business oriented)

The main areas of user requirements from operational and business point of view are:

- improvements in speed and efficiency in executing processes
- simplification of the procedures with the use of accessible and user- friendly systems
- minimisation of errors due to manual data entering
- reduction in reliance on paper
- cost reductions

Elements to be elaborated and will be put into the above thematic areas are:

- Communication and information retrieval/ sharing through e-MAR platform. This interest applies across shipping and port and terminal operations, and was particularly pronounced in areas where paper is still common.
- Integration of the e-MAR Platform with existing systems that can be either an information source or for information sharing.
- Information security is a major concern for most stakeholders and plays an important role in their willingness to share information.
- Transparency of information and actions taken place, lead to higher degrees of trust. Thus, all actions and processes must be registered and become easily traceable and available to the stakeholders.
- Quality of information is important for the stakeholders. While there is availability of information, sometimes it is difficult to be retrieved while other times are not reliable.

5.2 User Requirements (technology oriented)

The main areas of user requirements from the technical point of view are:

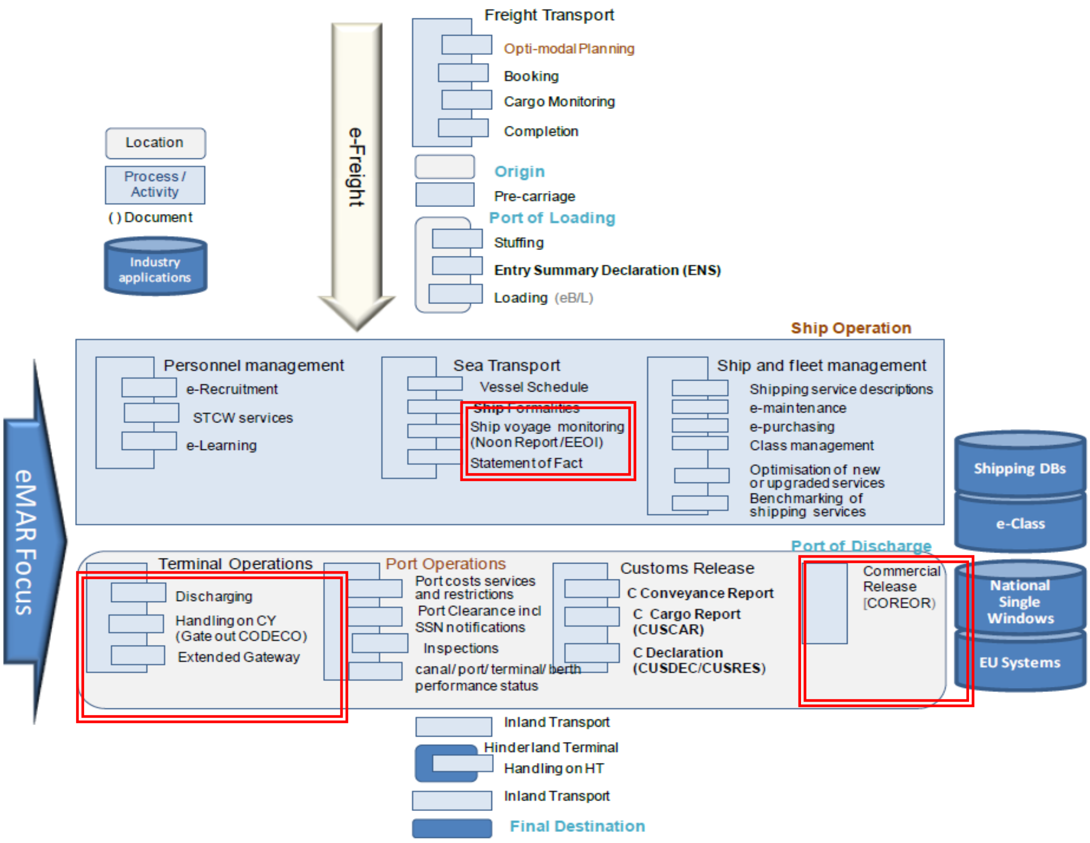
- Security in all stages of the message transaction, i.e. access, establish of channel and throughout the exchange transactions.
- Cost of ownership and operation
- Maximize Interoperability and Interconnectivity
- Allow the use of standards relative to the logistics/ maritime services industry for information exchange

- Use widely accepted communication protocols with straightforward and well documented guidelines or provide an API that can be used and incorporated into proprietary IT solutions.

Elements to be elaborated and will be put into the above thematic areas.

- Usage of effective communication mechanisms that will allow the secure and efficient information exchange either using of the box solutions that can be found or can be easily implemented by the IT department of the involved stakeholders.
- A simple communication protocol (e.g. simple HTTPS-protected channel) can be used
- Utilize existing standards (message / communication) where appropriate / possible
- Lower the cost of entry for SME's and individuals.
- Be able to use interfacing mechanisms to message channels and relay services that will be provided by the platform infrastructure to support intermittently connected systems. There is no need for a system to be continuously connected in order to exchange data.
- Allow stakeholders to participate in a secure / efficient collaborative network by minimising cost of investment. The stakeholder can use the system without having to host an Access Point of develop expensive tools
- Delays in the processing of electronic information can have a direct effect on delays in cargo handling
- A solution should accommodate supply chain stakeholders with different level or IT maturity.
- Allowing parties to communicate using messages without the need for a centralised platform.
- User profile in address lists defines message standard that is used by the receiver
- Users do not need to handle transformations/ mappings.
- Support of common data specific for maritime sector that will allow the interfacing with other stakeholder within the maritime sector.

In relation to the EMSF, IBI platform and case can contribute to the blocks marked in red:



More specifically, the integration of IBI and eMAR platform will allow exchanging information at both planning and execution stages of the maritime transport and sea to terminal. The vessels schedules will be included in the design phase of the transport chain in relation to the maritime part. Information about terminal activities in terms of status of activities (commencement – completion) will feed the platform.

5.3 Business Case 2: Hamburg – Vienna Corridor

5.3.1 Stakeholders and requirements

The transport related processes within the supply chain focussing on transport service providers requirements. Overall two major user groups can be distinguished: Shippers and transport service providers. Based on previously surveys carried out with both user groups the following requirements on intermodal supply chain tools have been derived:

Shippers have mainly strategic requirements focussing on the following issues

- On which corridors are intermodal transport a feasible alternative to road
- Is infrastructure supplied sufficiently
- What transport are suited for intermodal transport (hazardous goods, bulk, liquid)
- What capacities are available on an annual basis

- ► Are seasonal peaks to be taken into account

Requirement of shippers on intermodal supply chain planning are:

- ► Simulation and prognosis of the transport capacities needed on a mid/long term basis
- ► Detailed cost calculation for different transport modes
- ► Transport alternatives available on specific corridors, especially information on time tables
- ► Restriction and limitations (legal, technical etc.)
- ► Details on the infrastructure employed (network information, terminal, transfer points etc.)
- ► Information in case of disturbances

Based on an inquiry among forwarders and transport operators the following list on features for an intermodal transport planning tool include:

- ► Simple and easy to handle
- ► High reliability on data
- ► Interfaces to online booking systems
- ► Intermodal route search/ suggestion
- ► Possibility to interact in the planning process
- ► Data bases on time tables and operators
- ► Tracking & Tracing possibilities
- ► GIS presentation
- ► Capacity planning/free capacities
- ► Event handling in case of disturbances

Concluding the requirements of shippers are mainly located on the strategic level of the reference model while the requirements of transport operators focus on operational and tactical level.

5.3.2 Consolidated Requirements

The following data requirements in general for intermodal shipment planning not only for hinterland transport can be summarized as follows:

- Networks
- Terminals
- Handling models

- Network connections
- Schedules
- Restrictions

These data elements should be or should be adapted to be capable of routing

In relation to the EMSF requirements the BC 2 should contribute to the enhanced and better hinterland transport planning in the given corridor. Interfaces to the different system components of EMAR platform should be realised. These technical requirements and developments are being described in chapter 6 following.

Main benefits for the stakeholders are better data and information availability, shorter reaction times, more transparent processes, cost effective planning steps due to faster available planning results from the system components and last not least more environmental friendly transport alternatives.

5.4 Business Case 3: East West Transport Corridor

5.4.1 Prioritisation of current needs and requirements of the EWTC partners (stakeholders).

Evaluation of the requirements of individual EWTC stakeholders is carried out in two phases. During the first phase we used a special questionnaire in order to identify common needs of the EWTC stakeholders, as well as their requests/expectations in developing the activities in this transport corridor. The main needs and requests of the EWTC partners have been provided in the Table (individual, figure 4-2).
Ongoing second phase is aimed at identify specific EWTC needs and relating them to the EMSF and eMar platform.

The presented survey results are related to the respondents operating in this corridor (they are also the users of this corridor).

France	Belgium	Sweden	Baltic Sea		Lithuania	Belarus	Ukraine	Russia	Mongolia	Kazakhstan	China
Lohrindustrie	EIA	NetPort.Karlshamn AB, Karlshamn city Municipality, Region Blekinge, Port of Karshamn,	DFDS Seaways		Lithuanian railways, LSCA, Linava, Lineka, JSC Vilteda, Mockava, Industrial Park, LITTP, VPA Logistics, Lithuania Ship owners Association, Limarko JSC, Šiauliai Airport, Šiauliai City Municipality, VGTU,	JSV Belintertrans, BIAF,	Ukraine railways, PPL 33-35 LLC, UKRZOVNISHTRANS LLC, JSC PLASKE	JSC Rubicon	Tuuchin Co. Ltd.	National Company Kazakhstan TemyrZholy	Asia Continental Landbridge Logistics Association Council, COSCO, Hohhot Export Processing Zone
		Denmark	Germany	Kaliningrad district Russia	Shuttle train VIKING						
		DFDS Seaways	Wismar University of Technology LNBB	IPPRV, Baltijsk Municipal District	Shuttle train SUN						
					Shuttle train Mercury						

Figure 5-1: Structure of the main stakeholders along EWTC

The survey reflects the areas to be developed in the zone of respondent‘s activity. Out of the possible development areas, companies operating in the East-West Transport Corridor highlighted development of the IT systems; this would facilitate more effective arrangement of business issues and problems related to the customs of the corridor countries and to other national institutions.

EWTC actor’s survey. 10- highest rate, 0 - lowest rate

Country	**Sweden**	**Belgium**	**Germany**	**Lithuania**	**Lithuania**	**Lithuania**	**Belarus**	**Russia**	**Mongolia**	**China**	**China**	**China**	**Belarus**	**Lithuania**	**Sweden**	**Sweden**	**France**	**Lithuania**	**Lithuania**
Functions and tasks	Port Karlshamn	EIA	HERBST	Lineka	Vilteda	VPA Logistics	Belintertrans	IPPRVS	Tuushin co. Ltd	Processing Zone	Cosco	Landbridge Logistics	BAIF	LITTP	Karlshamn	Karsshamn	Lorh	KlaipėdaSeaPort	LG
Expand partnership	7	8	3	8	8	8	10	5	10	5	8	8	6	7	7	1	9	9	10
Disseminate information	3	8	4	9	9	10	6	6	10	5	10	5	7	7	3	3	3	10	10
Simplification	10	6	4	10	10	10	8	7	8	9	7	1	10	8	10	6	2	8	10
IT support	6	6	9	8	8	10	6	2	10	3	5	10	10	7	6	10	10	8	8
Euro-Asia links	9	7	2	7	7	10	9	6	8	10	10	6	10	7	9	0	8	10	9
Common	9	7	7	10	10	9	7	4	10	4	8	10	9	8	9	5	7	10	9

indicators																			
Economic issues	7	8	6	10	10	10	7	9	5	5	9	2	9	7	7	0	5	10	8
Represent EWTC		7	6	7	7	9	9	3	10	7	9	7	7	7	5	4	10	10	10
Best practise	6	7	9	9	9	9	4	1	10	5	7	10	7	7	6	0	10	10	8
Apply governments	9	8	6	8	8	9	8	8	10	8	8	9	9	8	9	2	6	10	10
New transport chains	10	9	9	5	5	9	10	7	10	10	10	3	10	8	10	7	4	10	9
R&D	10	8	5	8	8	10	10	10	10	10	8	4	5	8	10	8	1	10	7

Figure 5-2: Main needs/expectations of the EWTC partners

The majority of respondents emphasised the importance of implementation of the IT systems and simplified procedures for companies operating along the EWTC.

Already started Information Broker system in Baltic Sea Region to be extend along all EWTC.

5.4.2 Consolidated Requirements / Expectations

User requirements (consolidated):

- To strengthen the co-operation between transport undertakers, logistics companies, intermodal transport operators, shippers and consignees, national, regional and domestic authorities, science and research institutions along the EWTC;
- To initiate the simplification of procedures and documentation;
- To initiate the removal of bottlenecks in developing the infrastructure and operations;
- To initiate and promote implementation of common KPI's and services standards along EWTC (with focus on green transport);
- To disseminate best practice and modern logistics solutions;
- To support IT networks development;

Benefits (of above mentioned measures) for private actors:

- Increased efficiency / productivity of logistics processes.
- Increased competitiveness.
- Increased quality.

Benefits for private and public actors:

- Ideal utilisation of infrastructure.
- Reduced emissions.
- Enhancing intermodal interchanges.
- Ensuring hinterland accessibility.
- Shorter transportation routes between the countries around the Baltic sea.
- Closer cooperation between operators and authorities.

6 Pilot Study 1: Italy to North America

6.1 Introduction and Purpose

The IBI pilot supports the Transport Logistics Applications as key info and data source to/from the eMar Platform. (see figure below)

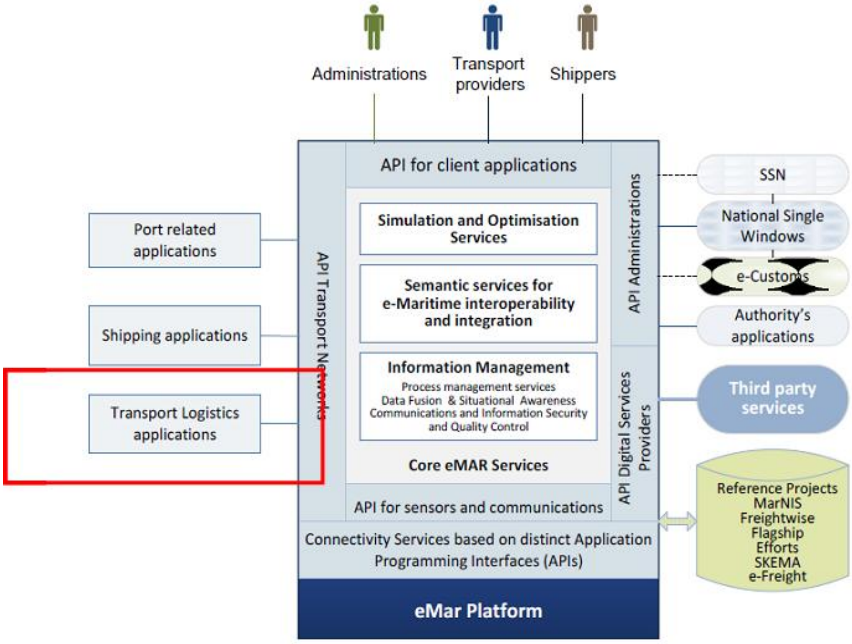


Figure 6-1: Transport Logistics applications and IBI platform in eMar

The purpose of the pilot is to contribute to the integration of shipping and maritime services in a complete “door - to – door” logistics chain. Exploiting the capabilities of IBI platform for Corridor and Transport Chain Management, the maritime actors and services will be integrated with the hinterland actors and services, tackling the fragmentation of intermodal transport with emphasis on the maritime. The pilot addresses core issues of eMar project with the more characteristic to be:

- Use of eMAR reference model for corridor and supply chain management.
- Integration of IBI and eMAR platform allowing the exchange of information at both planning and execution stages of the maritime transport and sea terminal.
- Compliance with Access point for the interfacing, thus supporting the “flexible interoperability and interconnectivity"
- Adopting the Common Framework information architecture
- Implementation of TSD for maritime transport services
- Publishing/discovery of the transport services

6.2 Objectives

The users involved in the IBI pilot represent a broader list of stakeholders acting in multimodal transport. More specifically, the following users will be represented:

- Shipping Line
- Shipping Agent
- Port Terminals
- Hinterland Terminals
- Freight Forwarders
- Multimodal Transport Operators
- Railway Undertakings
- Road Haulers
- Consignor
- Consignee

The common objectives of the stakeholders can be summarised as follows:

- Publishing of transport services using advanced IT systems, providing easy access to interested parties with minimum development and adaptation activities
- Accurate monitoring of the transport chain and status provision from all service providers in relation to the progress and completion of their activities
- Increased and easy access to maritime related services as key driver for enhancing the planning and execution of the transport chain
- Creation of a secure environment for information exchange

6.3 Transport Logistics eMaritime Solutions Description

This section gives a description of the logistics applications from IBI point of view that will be made available to eMAR platform. The IBI platforms presented below, aim at addressing two stakeholder communities; those of cargo managers and transport means operators. The twofold approach followed addresses a) the Strategic Network Design and Service Providers management and b) the Operational cargo Management. In this context, the two interconnected platforms provide multimodal freight transport corridors through CoSPaM and multimodal freight transport chains through M2TC.

6.4 Corridor Supply Chain Management Solution

6.4.1 Corridor Strategic Planning and Management- CoSPaM

The corridor design and management platform facilitates the promotion/publishing of transport providers' services and design of their incremental and collaborative operations **(Multimodal Corridor Design – McoD)** as well as transport monitoring and control along established multimodal corridors **(Management of Multimodal Corridors – M2Co)**. This solution serves the demands for multimodal transport service providers' efficient handling of transport and cargo units.

Multimodal Corridor Design (MCoD)

A Multimodal Transport Corridor is formed by a series of collaborative services from corresponding providers which serve significant cargo flows coming from related catchments areas. The efficient cargo flow is very much dependent on the prompt interaction of the service providers which in turn is primarily dependent on the seamless information flow. MCoD supports the Services Providers towards the open publication and promotion of their services through automatic (electronic document exchange) and manual methods **(Multimodal Service Publishing – MSP)**, Corridor Managers in the development of frameworks tailored to specific needs and requirements **(Multimodal Framework Design - MFD)** as well as introduction of collaborative corridors that may be used for transport (consignment oriented) or corridor (cargo flow oriented) monitoring **(Multimodal Corridor Building – McoB)**. MCoD provides the above services to the other platforms as input either for planning and monitoring of transport chains (Management of Multimodal Transport Chain - M2TC) or corridors (Management of Multimodal Corridor – M2Co)

The screenshot below from the IBI platform presents the UI for building multimodal corridors.

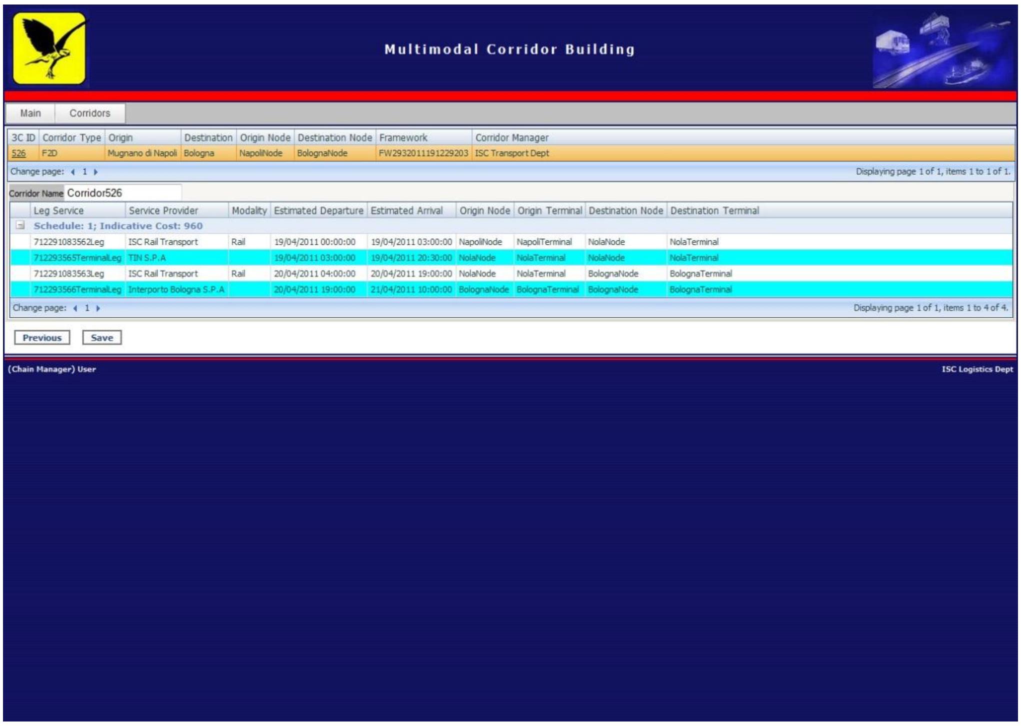


Figure 6-2: Building multimodal transport corridors in IBI platform

Management of Multimodal Corridor – M2Co

The management of multimodal corridor platform (M2Co) supports the preparatory activities between service providers and corridor managers for the establishment of corridors **(Multimodal Corridor Planning - MCoP)** as well as the tracking and tracing of cargo flows along them **(Multimodal Corridor Monitoring – MCoM)**. The interaction between the involved parties is fully automated through a smart subscription mechanism that uses optimization techniques for collecting status data from service providers, through electronic documents exchange **(Multimodal Services Monitoring - MSM)**. M2Co provides the above services to M2TC platform as input for monitoring multimodal transport chains. The interconnectivity of IBI platform with eMar and the details of the provided services are presented in next chapters.

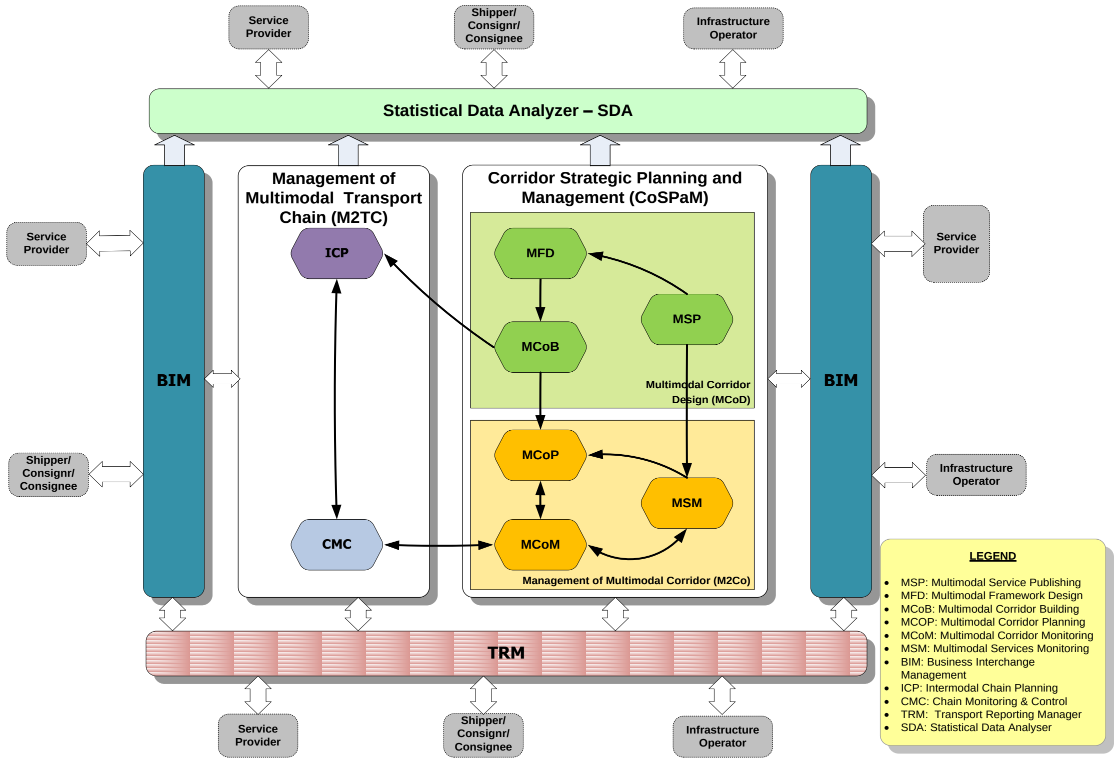


Figure 6-3: Overview of the Corridor Supply Chain Management platforms

6.4.2 Management of Multimodal Transport Chains (M2TC)

The management of multimodal transport chain platform which is fully integrated with the multimodal corridor platform (CoSPaM) facilitates the effective planning of D2D freight transport chains by the cargo responsible bodies, e.g. freight integrators through **Intermodal Chain Planning – ICP**, whereas continuously control and monitor these chains by providing tracking and tracing functionality through **Chain Monitoring and Control – CMC**.

The stakeholders interacting with the Corridor and Supply Chain Management Solution, in the Logistics domain, are the following:

- Freight Integrators/ MTOs; responsible for organizing and controlling the freight transport activities from origin to destination.
- Maritime carriers; responsible for the maritime transport between terminals.
- Stevedoring companies (terminals); responsible for the storage and handling of goods inside intermodal terminals
- Railway Undertakers; responsible for the rail transport between terminals
- Infrastructure Managers; responsible for the maintenance and control of the transport infrastructure
- Road carriers; responsible for the road transport between terminals
- Corridor Managers; responsible for corridor planning and monitoring
- Consignors/Consignees; wishes to transport cargo from an origin location to a destination location/ wishes to receive cargo

Within eMar the corridor/ supply chain management system presented in the two platforms above, is expected to provide enhanced e-Maritime services that will improve efficiency, service quality and frequency along the corridor.

The screenshots, from the IBI platform below, present the UI with the booking details exchanged through the platform and the booking status (confirmed or pending) by the LSPs as well as the overview of the transport chain during the planning respectively.

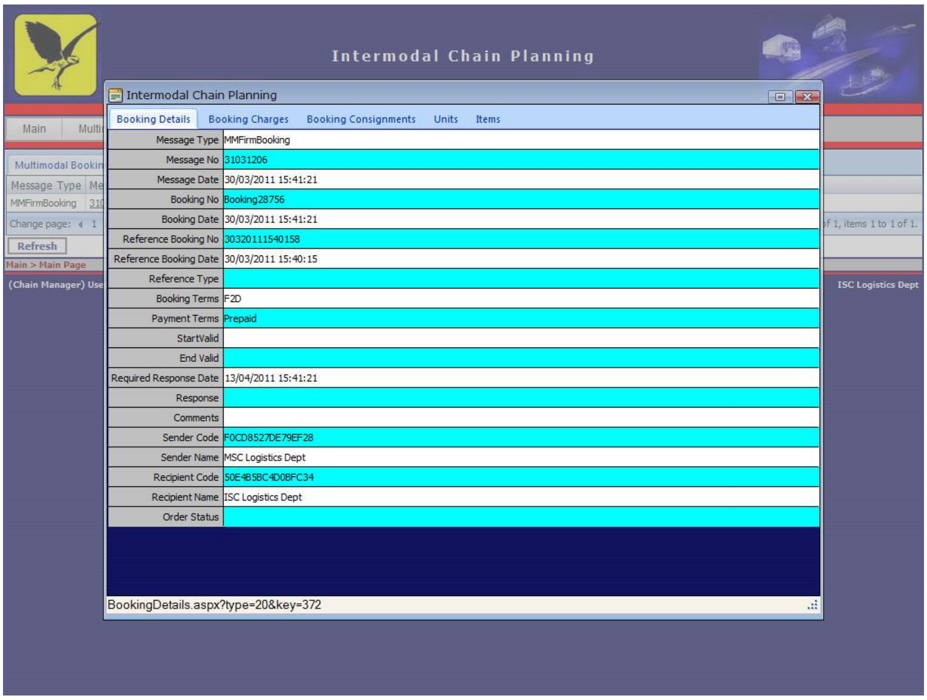


Figure 6-4: Booking information example in IBI platform

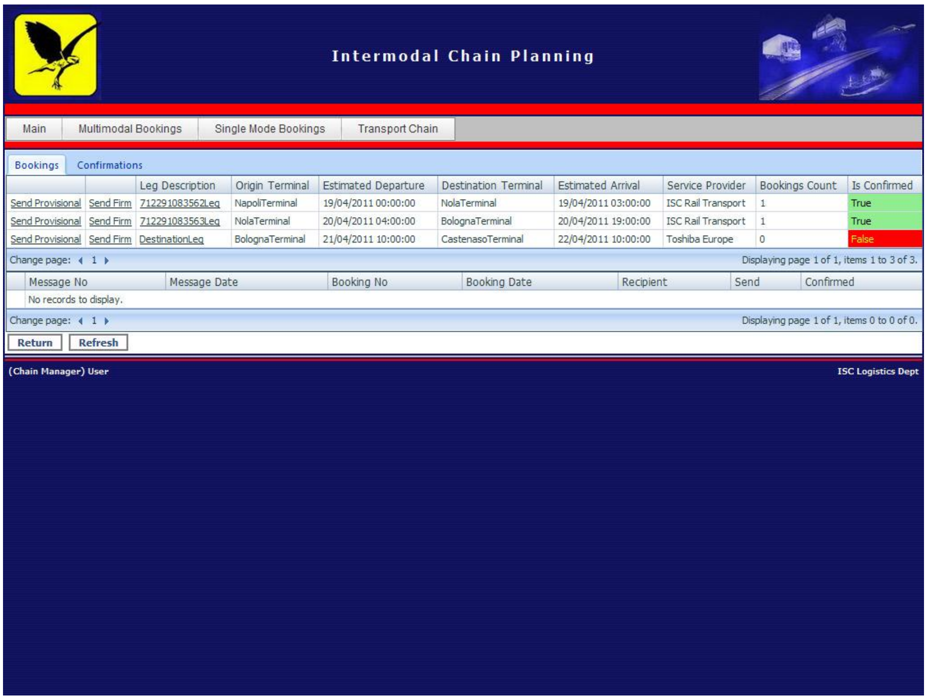


Figure 6-5: Bookings status of a multimodal transport chain in IBI platform

The monitoring activities through IBI platform provides status information to registered authorised users through different interfaces as shown in the screenshots below.

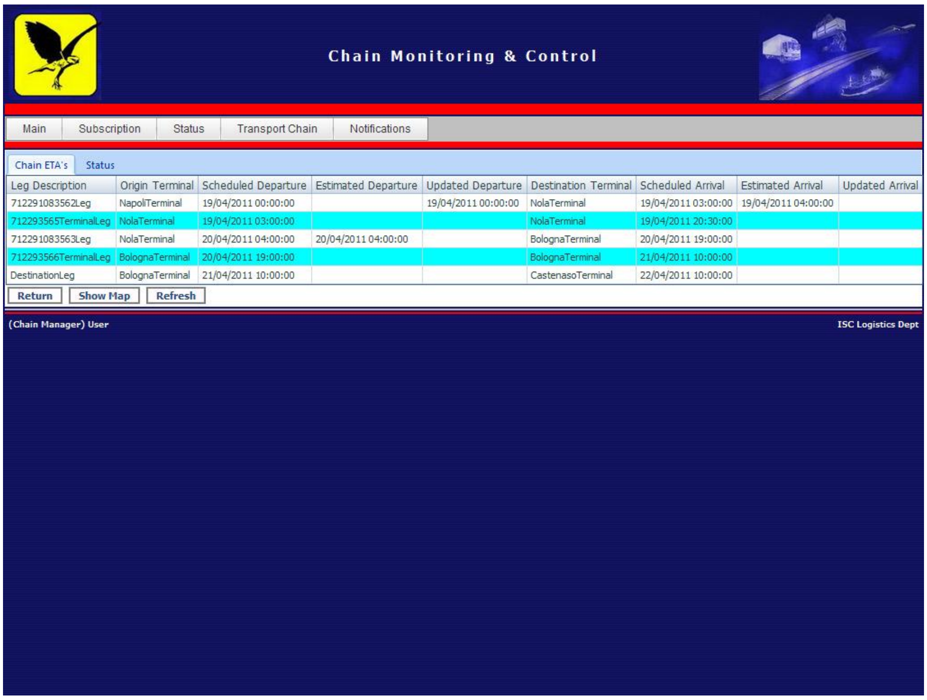


Figure 6-6: Monitoring of consignment in IBI platform

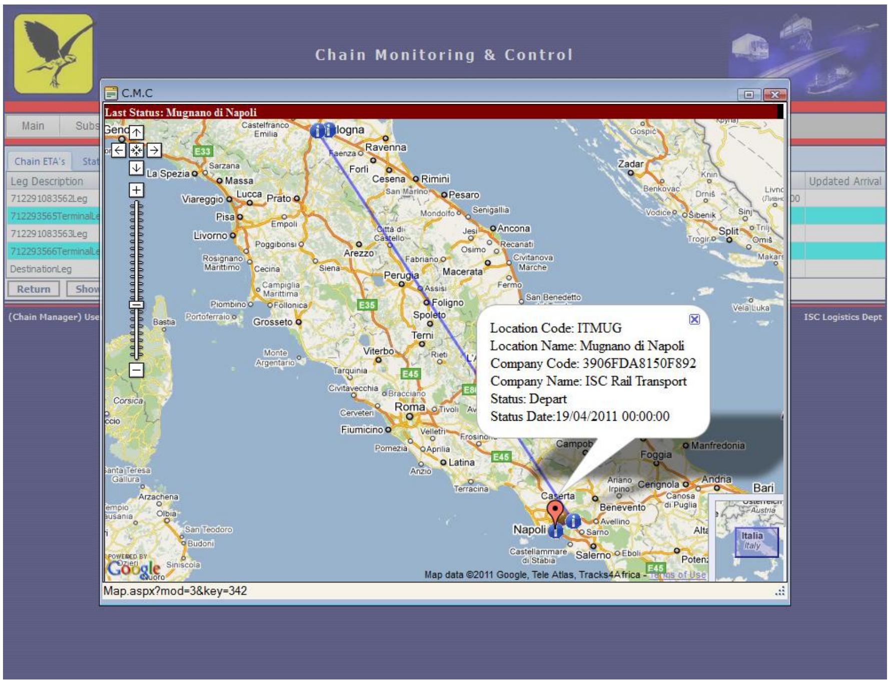


Figure 6-7: Monitoring of consignment in IBI platform (Map view)

6.4.3 Compliance with EMSF

The e-Maritime Strategic Framework (EMSF) describes information exchange requirements for different user communities to reach common goals. It explains how these goals could be achieved through the implementation of appropriate processes, standards and policies. Of particular importance are the associated legal, technology, change management and human factors issues, and special attention is paid to e-Maritime standards promoting interoperability between e-governance enabling tools, ship systems and maritime transport operations and applications.

The following areas of maritime industry will be covered:

- Ship operations
- Port operations
- Ship / cargo interfacing to other modes of transport and logistics through Logistics Chain Management operations

In this context and based on the first version of EMSF, IBI solution can be involved in the following business processes and the appropriate document interchange

Ship Operation

- Discovery of maritime services, voyages, schedules, ports of calls. IBI through push/ pull mechanisms will get access to maritime transport services information from eMar. The details of the related services provided by eMar will be stored in IBI repositories and will be used in building multimodal transport corridors and chains. The interfacing mechanisms must ensure that updates on maritime related services in eMar will be automatically propagated to IBI. Booking/ booking confirmations in relation to the maritime leg of the multimodal transport chain through connections with eMar platform.
- Ship voyage monitoring messages for the maritime leg. Environmental characteristics of specific transport means will be taken into account where applicable.
- Monitoring of transactions to facilitate the assessment of transport services and benchmarking in relation to best practices in similar cases

Terminal Operation

- Monitoring of port operations activities such as loading/ unloading, stuffing/ stripping, as well as gate in – gate out status. The information will be obtained from the maritime related transport services through appropriate interfaces with eMar platform.

Logistics Chain Management

- Transport Planning phase: Transport planning information exchange will be established, via eMar, between IBI platform and ship or port / terminal management systems responsible for maritime/port operation in connection with multimodal transport chains
- Transport Execution phase: Ship related statuses such as arrival / departure of ships loading reports, etc exchanged between stakeholders involved in multimodal transport chains

Interfaces with eMar base Platform

According to eMar architecture there is a potential to envisage two development scenarios:

1. Development of e-Maritime ecosystems providing a virtual infrastructure for providing and consuming e-Maritime application services shared between different organizations (the Ecosystem participants and governed in a distributed manner). In this context the IBI platforms can provide value added services through all phases of the transport process, indicatively preparation: publishing of available transport services within a specific corridor, planning: booking services, execution: monitoring services and warnings/ alerts concerning the transport execution, completion: consolidated reports on nodal/ modal transport services.

2. Existing applications linked to the eMaritime network through eMAR Access Points (includes mapping once existing systems to eMaritime EMSF messages). The connectivity between eMar ecosystem and Corridor Supply Chain Management solution can support the usage of Access Points through the appropriate interfacing mechanisms.

The above are compatible with the eMar approach that the ecosystem can be established using different platforms / tools that produce EMSF semantically compatible services which can be used by ecosystem participants to produce his own solutions. [SRC: D2.1: eMAR Architecture and Base Software platform]. See also **Errore. L'origine riferimento non è stata trovata.**below.

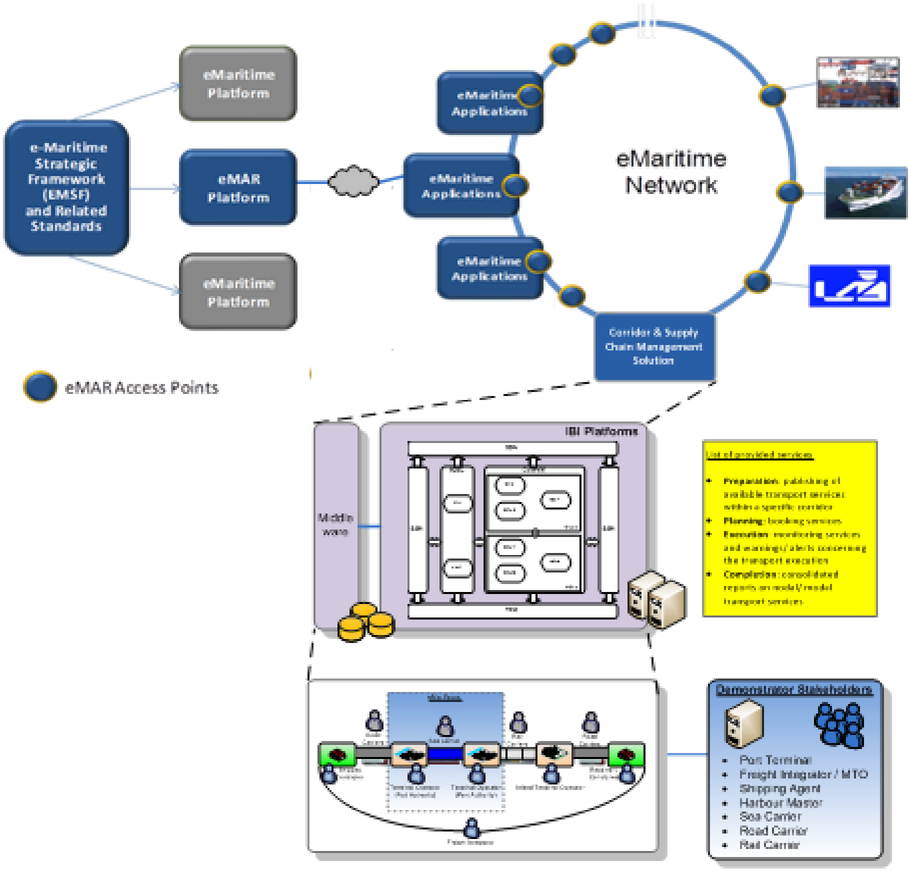


Figure 6-8: Conceptual Architecture of Corridor and Supply Chain Management Solution in eMar

6.4.4 Message and Information Exchange supported

An indicative list of interfaces that can be provided by the IBI platform is presented in the paragraphs below. Each one of the messages that are described below is mapped to the relevant Common Framework structure that will be used in the project.

Since IBI and eMar platforms use different ontologies the semantic interoperability mechanisms must be used to translate the Common framework messages into the relevant message structure used internally by IBI and vice versa.

6.4.4.1 Transport Execution Plan (TEP)

In eMar the freight integrator using IBI platform will plan the multimodal transport chain. Maritime sections of the multimodal transport can be booked through b2b collaboration between IBI and the involved service providers (i.e. Shipping lines) collaborating with eMar platform. Using the same message channel in the reverse flow shipping lines will confirm their availability back to IBI for the specific consignment.

The following elements are included in booking/ booking confirmation messages:

- Freight integrator
- Transport service provider (shipping line)
- General booking information e.g. The booking ID and date
- Booking / transport and payment terms that are required by the customer
- Unique consignment ID
- Consignor/ Consignee
- The expected time of departure from the origin , time of arrival to the destination of the maritime leg
- The origin and destination terminal for the maritime leg
- Equipment (i.e. Container) details of the consignment that will be transported including the container ID, type, seal no
- Cargo items (i.e. Units/ cargo stored in each container),e.g. The ID of the related container stored, quantity, description and dimensions of the cargo

6.4.4.2 Transportation Status (TS from IBI)

This message is provided by IBI platforms as a value added message information concerning the execution of a specific consignment. Within eMar this message will support shipping lines, terminal service providers of eMar platform to contribute to complete D2D monitoring by following the execution of a consignment until its final delivery to the hinterland destination.

Thus the information that is provided by this message includes:

- Details of a specific transport mean (i.e. train, road) in terms of location , date, time of execution and state of transport (e.g. arrive/ depart in a hinterland terminal) in relation to specific consignments

- Details of the equipment (e.g. container) such as container type, size, weight, etc date, time of execution and state of transport (e.g. loaded/ unloaded from hinterland terminal) in relation to specific consignments
- Details of the items stored inside the equipment such as type, size, dangerous classification, dimensions, cargo type, etc date, time of execution and state of transport (e.g. stuffing/ stripping) in relation to specific consignments Warning / alerts related to deviations from expected values (such as expected time of arrival/ departure within a hinterland terminal) as defined in transport chain and the related consignment(s).

6.4.4.3 Transportation Status (TS form eMar)

This is a multifunctional message provided by the maritime carriers responsible for the transport control and execution for specific legs or terminal operators. This information will be provided to IBI platform in order to support the freight integrator in monitoring of the transport. The information depending on the role, responsibility of each service provider and transport execution phase include, in general, the following:

- Details of a specific transport mean (i.e. vessel) in terms of location , date, time of execution and state of transport (e.g. arrive/ depart)
- Details of the equipment (e.g. container) such as container type, size, weight, etc date, time of execution and state of transport (e.g. loaded/ unloaded in seaport terminal)
- Details of the items stored inside the equipment such as type, size, dangerous classification, dimensions, cargo type, etc date, time of execution and state of transport (e.g. stuffing/ stripping in a port terminal)
- In addition available information in relation to the environmental performance of the specific maritime transport services may be also included (subject to data availability)

6.5 Pilot Description

6.5.1 Background info

The IBI pilot deploys a typical export multimodal transport scenario of containerized cargo from Northern Italy to United Stated and Canada. It involves maritime transport in the intercontinental part and rail and road transport modes in the national part. Different logistics nodes with the most characteristics to be Interporto Bologna and the Port of La Spezia as well as the destination terminal in United States and Canada are involved in this pilot.

The IBI pilot brings stakeholders from the majority of the User Roles, defined in the Common Framework. More specifically, the following User Roles are represented in the business case, while the areas of their responsibilities have been provided in section 1.5.1:

- Logistics Service Clients

  - Shipper
  - Freight Integrator
  - MTO

- Logistics Service Providers:
  - Freight Integrator
  - MTO
  - Shipping Line
  - Railway Undertaking
  - Road hauliers (truck operators)
  - Shunting Operators
  - Terminal Operators

The pilot case is presented according to the following three transport phases

- **Preparation**: Involves the setting up of the business environment as well as the establishment/definition of agreements for interconnection and B2B collaboration between the involved stakeholders
- **Planning**: the process of multimodal transport chain planning, the booking process and the establishment of agreements between Logistics Service Providers and Logistics Service Clients for transport services
- **Execution**: Execution of the transport services involving collection of various status reports from transport service providers along the multimodal transport through appropriate interfaces and provision of added value services.

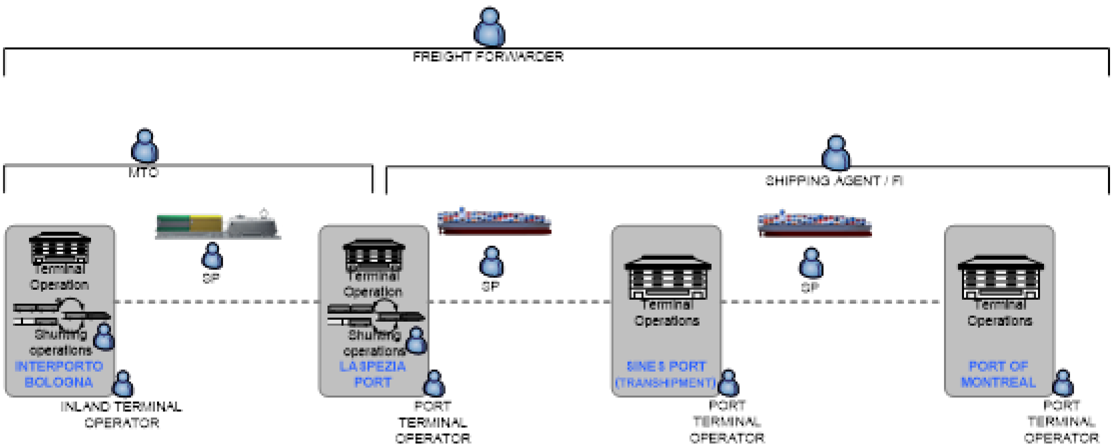


Figure 6-9: Transport chain overview

In this case one freight integrator is responsible for planning a complete transnational intermodal chain, while two other freight integrators are responsible for the bookings of the sub- chains under their responsibility and their execution.

Interfaces and electronic documents according to interoperation agreements, during the preparation phase, feed the IT system of freight integrator with up-to-date consignment data. In addition the publication of the various transport services will be made available during this phase.

The establishment of the transport chain by selecting the most appropriate set of services along the predefined corridors in eMar will be made available to the Freight Integrator to select the most suitable. Next the bookings are submitted and the agreements for the transport services for each one of the legs of the transport are established.

Monitoring services are provided to freight integrator throughout the execution phase of the transport. These services can be provided directly by each transport service provider via appropriate interfaces that are linked to the IBI platforms or via eMar platform.

The following sections detail the transport scenario as well as the interrelations of IBI and eMar platforms, per transport phase.

6.5.2 Preparation

The transport preparation processes include 1) the provision of data to the IBI platform in relation to the LSP services both static (service definitions and characteristics, provider details, prices, transport means (ROAD/RAIL/SEA), working hours of terminals, etc) and the dynamic ones (itineraries and schedules), 2) the definition of the business agreements between the stakeholders of the IBI case.

The business agreements between the stakeholders will feed the IBI platform, setting in this way the contractual terms between the stakeholders that apply in their collaboration. The terms of the contracts define the bilateral obligations of the two parties as well as the transport requirements. Two types of contracts are handled in this business case:

- Long term contracts (LT): agreement of collaboration between the 2 parties, under a commonly defined framework, for an extensive period of time (minimum 6-12 months). Ideally a fundamental characteristic of LT contracts should be the regularity of the service request and the related supply; nevertheless most of the times a regular transport demand is not guaranteed. Usually all the details of the service, both technical and financial, are defined and detailed before the starting of the contract validity and they remain valid for each till the end of the foreseen period.
- Short term contracts (ST): agreement of cooperation between the 2 parties under a predefined framework, on the spot (and /or limited time window). All the details, both technical and financial, are specified and agreed before the running of the service; they remain valid within the period of the service running (agreed before). In

case that the same kind of service is needed between the same parties, another agreement needs to be discussed.

The contracts refer to multimodal transport services as well as to the single mode transport services.

Within eMar, a Logistics Service Provider such as a maritime carrier will register his transport service in eMar platform, i.e. maritime transport services with details on vessels, related schedules, origin/ destination ports etc. In the same context port terminals will provide cargo capabilities (e.g. containerised), services (e.g. stevedoring), time accessibility and infrastructure (to check) within the area of their responsibility. All these data stored within eMar platform can be retrieved upon request from other systems such as IBI platform.

Inland transport services can be of interest for reviewing potential transport capabilities to the mainland. These will be provided by IBI platform. EMar can query IBI platform for transport service definitions using the standardized message exchanges supported by the Common Framework messages (i.e. Transport Service Description Request) and get details for specific services. IBI platform responses with the Transport Service Description Response containing all transport service definition details.

Message id	**From**	**To**	**Info exchanged**	**System involved**
1	Logistics Service Provider	Logistics Service Client	Transport Service Description for Maritime services	IBI platform , eMar Platform
2	Logistics Service Provider	Logistics Service Client	Transport Service Description for Hinterland services	eMar Platform, IBI platform

6.5.3 Planning

The planning process will start with the submission of the Multimodal Transport Booking message to the Freight Integrator (FI) through IBI platform, by the consignor/ shipper. The Multimodal Transport Booking Message provides all details for the D2D transport, defining the origin and destination, cargo types, quantities, dates for pickup and delivery etc.

The IBI platform based on the LSCs Multimodal Transport Booking requirements and through intelligent mechanisms creates and proposes candidate transport corridors to the FI who builds the transport chain and assigns the bookings and execution of the subsets of the transport chain to other collaborators, as follows: .

- MTO – who undertakes the bookings and transport execution from the consignor warehouse to the Port of La Spezia, with all intermediate modes and nodes.
- Shipping Agent – who undertakes the bookings and transport execution from the Port of La Spezia till the port of discharge in the US

The MTO sends Single Mode Booking message (through IBI platform) to the following Service Providers:

- Road Haulers – for the first mile road transport
- Rail Service Provider – for the rail transport from Bologna to La Spezia.

The Service Providers based on their availability provides back a confirmation to the MTO or they will propose an alternative service.

The Shipping Agent sends the Transport Execution Plan (request) through e-mar platform to the Shipping Line that can undertake the maritime transport from La Spezia Port to the discharge port in USA.

As long as all confirmations are provided back to the MTO and Shipping agent through the IBI platform the FI sends to the consignor his "proposal" in responding to the first Multimodal Transport Booking message, which is actually a confirmation.

The consignor checks the MM Transport booking confirmation and everything is fine; communicate his approval through the IBI platform and the Multimodal Instruction message.

Similarly to the booking workflow, a new workflow is created between the actors involved in relation to the final confirmation – Instructions that verify the acceptance of the Booking confirmations by the Service Providers.

With special reference to the Shipping Agent communication, the Transport Execution Plan (response) will be made through the e-mar and IBI platform (while the hinterland messages exchange is performed through the IBI platform).

From the technical point of view, IBI Platform receives a multimodal transport booking from the shipper. The management of the planning operation is performed by the Freight Integrator (FI) who has access and uses the IBI platform. Through the UI provided FI selects the most appropriate transport corridor from the available using the requirements from the booking. Maritime sections of the multimodal transport that involve shipping agents that access the system through the eMar platform can be booked through B2B collaboration between IBI and eMar platforms and the use of Access Points. In this case bookings can be exchanged with shipping agents in the form of Transport Execution Plan messages (TEP request).

In the same manner booking confirmations can be sent in the form of Transport Execution Plan messages (TEP response). In any other case, the FI stakeholders of the demonstrator use IBI platform for booking/ booking confirmation of transport services.

By the end of the planning process, after the transport services for each leg are confirmed, the FI confirms the whole chain to the shipper by sending a multimodal transport booking confirmation.

The Table below presents the detailed messages flow per actor

Message id	From	To	Info exchanged	System involved
3	LSC (Shipper)	FI (Freight Forwarder	Multimodal Transport Booking	IBI platform
4	LSC (MTO)	LSP (Road Hauler)	SM booking	IBI platform
5	LSP (Road Hauler)	LSC (MTO)	SM booking confirmation	IBI platform
6	LSC (MTO)	LSP (Rail Service Provider)	SM booking	IBI platform
7	LSP (Rail Service Provider)	LSC (MTO)	SM booking confirmation	IBI platform
8	LSC (FI – Shipping Agent)	LSP (Shipping Line)	Transport Execution Plan	eMar Platform, IBI platform
9	LSP (Shipping Line)	LSC (FI – Shipping Agent)	Transport Execution Plan Response	eMar Platform, IBI platform
10	LSP (FI)	LSC (Consignor)	Multimodal Transport Booking confirmation	IBI platform
11	LSC (Consignor)	LSP (FI)	Multimodal Instruction	IBI platform
12	LSC (MTO)	LSP (Road Hauler)	SM instruction	IBI platform
13	LSC (MTO)	LSP (Rail Service	SM instruction	IBI platform

Message id	From	To	Info exchanged	System involved
		Provider)		
14	LSC (FI – Shipping Agent)	LSP (Shipping Line)	Transport Execution Plan	eMar Platform, IBI platform
15	LSP (FI)	LSP (Shipping Line)	Goods Item Itinerary	eMar Platform, IBI platform

6.5.4 Execution

During transport execution, monitoring activities in the pilot will be executed via IPBO relevant logistics applications. Real time information about the progress of door-to door services can become available to the LSPs and LSCs using easily accessible communication ways while the level of detail as well as the frequency of data provision can be defined by the interested parties. In this way the data are personalized and integrated and the users have a clear idea about the transport progress when they need it.

Events and Status data related to logistics operations are collected from the transport service providers that operate in the demonstrator. These stakeholders provide status information to IBI platform in terms of actions related either to physically handling of the container (i.e. loading / unloading to a vessel) or administratively (clearance of a container). The structure of the message that can be used for status collection depends on the technological capabilities of each service provider. Through the semantic capabilities of eMar a Transport Execution Status message is generated providing details of the door to door transport and is submitted to the eMar platform.

Transport service providers that use eMar ecosystem can provide their status data by submitting Transportation Execution Status message (Common Framework structure) for their specific services to eMar and from there to IBI platform.

With the emphasis to be given on the maritime part of the transport and with reference to the EMSF architecture, the following status can be provided, in relation to terminal operations

- Loading /Unloading to/from the vessel – covering the maritime gate
- Container Departure Confirmation - covering the land gate

The diagram below presents the messages exchange flow during Transport Execution in the IBI case. As it is shown in the diagram and similar to the Planning activities, monitoring status in relation to maritime transport and port terminal activities will be submitted through B2B collaboration between IBI and eMar platforms and the use of Access Points. In this case status can be submitted by shipping agents and port terminals in the form of Transport Execution Status messages (TS). In any other case the stakeholders of the demonstrator use IBI platform for status messages during transport execution.

The Table below presents the detailed messages flow per actor.

ID	From	To	Info exchanged	System involved
16	LSP (Road Hauler)	LSC (MTO)	SP status – Departure from Consignor Premises	IBI platform
17	LSP (Road Hauler)	LSC (MTO)	SP status – Arrival at Interporto Bologna Freight Village	IBI platform
18	LSP (Interporto Bologna Freight Village)	LSC (MTO)	SP status – Unloading from the truck	IBI platform
19	LSP (Interporto Bologna Freight Village)	LSC (MTO)	SP status – Loading to train	IBI platform
20	LSP (Rail Service Provider)	LSC (MTO)	SP status – Train depart	IBI platform
21	LSP (Rail Service Provider)	LSC (MTO)	SP status – Train arrival (at La Spezia) –	IBI platform
22	LSP (La Spezia Terminal)	LSC (MTO)	SP status – Unloading from the train – TS	eMar Platform, IBI platform
23	LSP (La Spezia Terminal)	LSC (FI – Shipping Agent)	SP status – Loading to the vessel – TS	eMar Platform, IBI platform
24	LSP (Shipping Line)	LSC (FI – Shipping Agent)	SP status – Vessel Departure - TS	eMar Platform, IBI platform
25	LSP (Shipping	LSC (FI – Shipping	SP status – Vessel Arrival at	eMar Platform, IBI

ID	From	To	Info exchanged	System involved
	Line)	Agent)	N.America Port - TS	platform
26	LSP (N.America Terminal)	LSC (FI – Shipping Agent)	SP status – Unloading from the vessel – TS	eMar Platform, IBI platform
27	LSP (FI)	LSC (Shipper)	Status of the transport chain based on the individual statuses collected (Multimodal status)	IBI platform

Note: The information in grey cells to be explored and defined.

6.6 Testing and trials

6.6.1 Short presentation of the implemented business scenario

Italy to North America business case covers the case of intercontinental multimodal transport, a long part of which is maritime transport. Its purpose is to contribute to the integration of shipping and maritime services in a complete logistics chain. Exploiting the capabilities of IBI platform for Corridor and Transport Chain Management, the maritime actors and services will be integrated with the hinterland actors and services, tackling the fragmentation of intermodal transport with emphasis on the maritime.

The business case is a good test bed for eMAR project since:

- It addresses a variety of stakeholders roles with different responsibilities, needs and IT capacities
- It connects rail and maritime transport through interchange points, that have a major role during modal changes
- It provides the transport logistics applications of IBI (CoSPaM and M2TC) integrated to eMAR

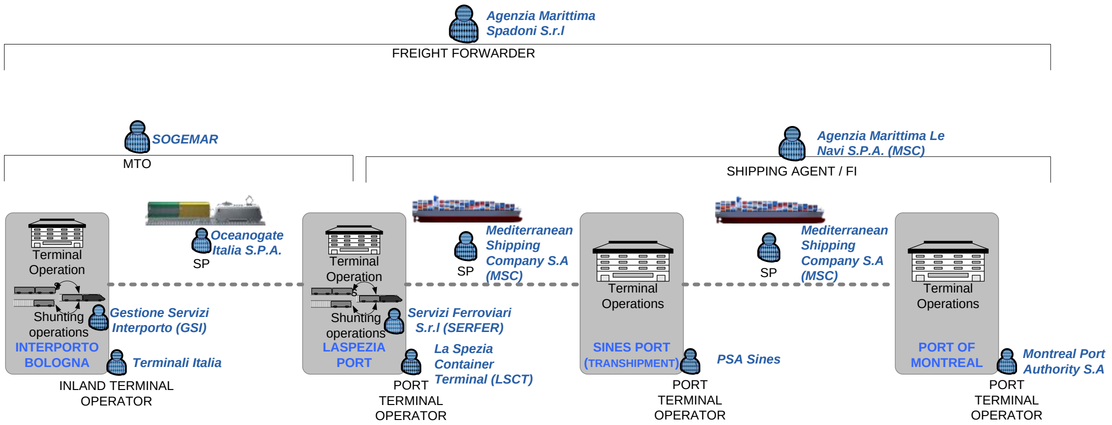
The pilot addresses core issues of eMAR project with the more characteristic to be:

- Use of eMAR reference model for corridor and supply chain management.
- Integration of IBI and eMAR platform allowing the exchange of information at both planning and execution stages of the maritime transport and sea terminal.
- Compliance with Access point for the interfacing, thus supporting the “flexible interoperability and interconnectivity"
- Adopting the Common Framework information architecture

A graphical representation of the business case is provided in the figure below.

The business case is focused on a multimodal transport service of containerized cargo, involving maritime, rail and road transport modes. The transport service links Italy with North America (United States and Canada), involving different logistics nodes i.e. Interporto Bologna, La Spezia as port of origin, Sines as port of transhipment and Montreal as port of destination.

The schema of the demonstrator is presented below:



Containerised cargo having as origin Interporto Bologna reaches La Spezia by train. From there having as final destination Montreal Port in Canada, transhipment activities take place in Sines port, Portugal. The responsibility for the entire transport organisation is undertaken by the Primary Freight Integrator based on the booking received by the shipper. The Primary Freight Integrator assigns the inland part of the transport to the MTO and the maritime transport to the Shipping Agent.

6.6.2 Stakeholders involved

During the life of the eMar project, Consorzio IBI has involved and collaborated with the stakeholders community, in order to bring the expertise and the contribution of the real operational business into the R&D activities foreseen by the project. Starting from the identification and definition of the business case, analysis of the processes and information flows related to the identified business case, up to the evaluation of the IBI – eMar platforms integration.

In particular, among the relevant stakeholders of the business case, the shipping agent and the shipping company, being the most relevant roles in the maritime part of the transport chain, have been involved in the analysis and preparation phase of the demonstration, in the trials of the system and in the assessment and evaluation of the outputs. Their contribution has been important as while for the inland logistics dimension (processes and current operational scenarios) of the identified scenario Consorzio IBI and Interporto Bologna has

specific knowledge (also thanks to its business community), for the maritime part, the two actors brought the relevant needed expertise and contribution. For the validation of the project outputs and results, the main role/user involved have been the primary freight forwarder, being the main responsible towards the consignor/consignee of the shipment in terms of planning, execution and completion of the service.
In detail, the main activities where the users have been involved were:

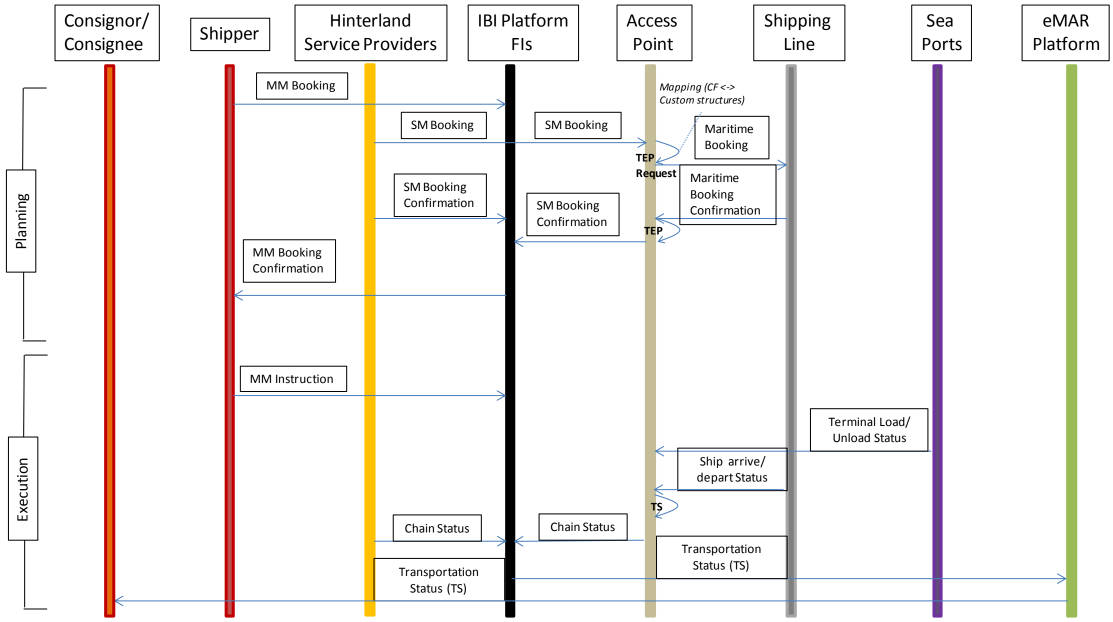
- Support to the business case identification and analysis:
    - analysis/validation of the transport chain processes (including the sea transport, cargo operations in the port and possible transhipment);
    - analysis of the current status of the information flows along the chain (messages exchanged between the actors involved);
    - analysis of the messages formats and structures currently used and exchanged among the actors involved along the transport chain.
- Identification of the main operational and business requirements.
- Testing, trial and validation of the IT solution (eMar platform) output of the project:
    - participation/supervision in the tests trials activities;
    - provision of feedback and comments upon the testing activities;
    - support/contribution to the final evaluation of the solution.

The involvement of the users have been assured through dedicated bilateral teleconferences, working meetings and interviews, where the project activities and progresses have been presented and discussed and the system has been shown.

6.7 Trials of the technical solution

6.7.1 Developments taken place during eMAR

Based on those reported in sections 6.5.1 – 6.5.3 and for the satisfaction of the business case requirements, a set of messages has been developed to be exchanged between the stakeholders using IBI Platform, Access Points and eMAR Platform. The figure below presents the complete set of transactions.



IBI Platform receives a multimodal transport booking from the shipper. The management of the planning operation is performed by the Freight Integrator (FI) who has access and uses the IBI platform. The inland section of the multimodal transport involves the MTO that access IBI platform in order to send a Single Mode Booking message to the Rail Service Provider – for the rail transport from Bologna to La Spezia. Maritime sections of the multimodal transport that involve shipping agents, accessing the system through the eMAR platform, are booked through B2B collaboration between IBI and eMAR platforms and the use of Access Points.

eMar infrastructure allows this collaboration without requiring each peer to change their internal information structures used for B2B collaboration. eMar internally uses Common Framework messages for booking/ booking confirmation, i.e. Transport Execution Plan Request(TEP Request) / Transport Execution Plan (TEP)

In this case the Freight Integrator sends a booking message, using his own structure, (SM Booking) to the shipping agent via eMar. The message is automatically mapped and translated into the message structure of the recipient (e.g. Maritime Booking) using TEP Request as the common information structure of reference.

In the same manner booking confirmations are sent in response from the shipping agents to the FI in their custom format (e.g. Maritime Booking Confirmation). An automatic translation mechanism converts the message to the structure understood by the FI's IT system (e.g. SM Booking Confirmation) using TEP as the common information structure of reference.

In any other case, the FI stakeholders of the demonstrator use IBI platform for booking/ booking confirmation of transport services.

By the end of the planning process, after the transport services for each leg are confirmed, the FI confirms the whole chain to the shipper by sending a multimodal transport booking confirmation.

Similar to the Planning activities, monitoring statuses in relation to maritime transport and port terminal activities are submitted through B2B collaboration between IBI and eMAR platforms and the use of Access Points. In this case statuses are submitted by shipping agents (Ship arrival / departure status) and port terminals (loading/ unloading status) Stusing their custom format. The messages are automatically translated using Transport Execution Status messages (TS) as the common reference structure from one custom structure into another

Finally the consignor/ consignee has access to the latest status information through eMAR Platform and using the web services for monitoring a specific consignment. In order to do this he can use the front end provided by eMar or alternatively the SOAP service to connect this capability directly to his IT solution. The message structure used to provide this information is a Transport Execution Status message (TS).
In any other case the stakeholders of the demonstrator use IBI platform for status messages during transport execution.

6.7.2 Adaptations requirements and savings for the existing systems

One of the main goals of eMAR is the facilitation of the collaboration among the members of the freight community along extended and transnational corridors. Currently, the smooth functioning of a long multimodal transport chain requires substantial investments and operational overhead by the stakeholders involved. This demand leads to significant hurdles especially for SMEs in entering this market which either restrict their business portfolio or function as associates to the key players.

This is even more severe when a maritime leg is involved that traditionally the ICT capacity of the shipping companies and many seaports is quite advanced. The technological differences among the actors not only affects the smaller players but introduces significant overhead for the major ones since in many cases they must adapt to the lower standards of their copartners. Thus this fragmentation frequently leads to lead times, capacity underutilization, higher costs etc.

The major technical/operational problems faced are described below:

- variety of information protocols among collaborating systems. This means that either one or both of the parties must undertake translations of the messages content and structure in order to reach compliance

- variety of communication protocols. This imposes the need for either increased flexibility by some parties in order to meet strict requirements of the dominant side or multiple interfacing capabilities by the more advanced one.
- variety of communication security levels. Since commercial information are quite sensitive for some stakeholders, potential leak in the security framework may have major impacts for the end customer.
- multiple transmission of the same information. In maritime sector, formalities set as prerequisite the submission of same information to different business and administrative bodies in securing the efficient cargo flow.
- multiple standards. Maritime and land based transport do not function under compliant standards thus the two communities, though internally compatible in long multimodal transport chains, face a technological gap at the physical/administrative interface points (i.e. ports).

eMAR ecosystem aims at treating all the above operational difficulties, by smoothing the gaps and ensuring seamless transactions among cooperating actors. Especially for this corridor case, a major demand is the simplified incorporation of the maritime actors in the hinterland network that is coordinated through the IBI platform. Thus, the end solution looks towards eMAR ecosystem to provide an effective interface for all maritime players to become uninterrupted element for the whole transport chain. The same time, the minimum adaptation requirements for the transport chain management system would be a criterion of success and evidence for the eMAR added value in the real business.

Practically, the hinterland side represented by IBI platform has to establish a connection with the ecosystem via an interfacing mechanism so-called Access Point (AP), which undertakes the further establishment of connections with the maritime sector actors. The communication module of IBI platform named Business Interchange Manager (BIM) is adapted to interface with a dedicated AP in order to both deliver and obtain electronic messages.

This interface has been registered in the administration/security system of the IBI platform as a trusty connection associated with a series of messages and interacting parties. Thus every time that the FI aims at approaching a specific maritime entity, it recognizes the AP as the appropriate and secure interface for this communication and vice versa.

A semantics exercise is established in a format compatible with the IBI platform in order to ensure that the related electronic messages are made seamlessly available to the maritime stakeholders. The Common Framework messages considered are those of booking (TEP) and status (TS) which are supported by respective translation/communication tools.

Additionally, since the AP constitutes a secure data transmission vehicle no such demand for any further provisions is required as long as an AP is installed in each actor's environment. Since booking messages may be sent to various recipients, eMAR ecosystem ensures that these transactions take place once in an one to many fashion. Finally, issues related to various standards used in the different transport environments AP is expected handling all of them through related mapping/translation process. These latter aspects demonstrate that no adaptations are needed for some interfacing dimensions since eMAR platform takes care of them.

6.7.3 Presentation of the technical testing scenario

The aim of the testing and trial period of eMAR was to ensure that the integration of IBI and eMAR has been successfully completed. The test and trials took place in both transport phases ; planning and execution.

The focus of the trials was given on the interactions between the IBI and eMAR platforms with the use of Access Points. Thus, from the tables of sections 5.1-5.3 those marked in yellow were at the heart of tests.

Table 1: Detailed message flow per actor during Planning Phase

Message id	From	To	Info exchanged	System involved
1	LSC (Shipper)	LSP (Freight Forwarder – FI)	Multimodal Transport Booking	IBI platform
2	LSC (MTO)	LSP (Rail Service Provider)	SM booking	IBI platform
3	LSP (Rail Service Provider)	LSC (MTO)	SM booking confirmation	IBI platform
4	LSC (Freight Forwarder – FI)	LSP (Shipping Agent)	Transport Execution Plan Request	eMar Platform, IBI platform
5	LSP (Shipping Agent)	LSC (Freight Forwarder – FI)	Transport Execution Plan	eMar Platform, IBI platform
6	LSP (Shipping Agent)	LSC (Shipper)	Multimodal Transport Booking confirmation	IBI platform
7	LSC (Shipper)	LSP (Shipping	Multimodal Instruction	IBI platform

Message id	From	To	Info exchanged	System involved
		Agent)		

Table 2: Detailed message flow per actor during Execution Phase

ID	From	To	Info exchanged	System involved
10	LSP (Interporto Bologna Freight Village)	LSC (MTO)	SP status – Unloading from the truck	IBI platform
11	LSP (Interporto Bologna Freight Village)	LSC (MTO)	SP status – Loading to train	IBI platform
12	LSP (Rail Service Provider)	LSC (MTO)	SP status – Train depart	IBI platform
13	LSP (Rail Service Provider)	LSC (MTO)	SP status – Train arrival (at La Spezia Terminal)	IBI platform
14	LSP (La Spezia Terminal)	LSC (MTO)	SP status – Unloading from the train – TS	eMar Platform, IBI platform
15	LSP (La Spezia Terminal)	LSC (Freight Forwarder – FI)	SP status – Loading to the vessel – TS	eMar Platform, IBI platform
16	LSP (Shipping Line)	LSC (Freight Forwarder – FI)	SP status – Vessel Departure - TS	eMar Platform, IBI platform
17	LSP (Shipping Line)	LSC (Freight Forwarder – FI)	SP status – Vessel Arrival at N.America Port - TS	eMar Platform, IBI platform

ID	From	To	Info exchanged	System involved
18	LSP (N.America Terminal)	LSC (Freight Forwarder – FI)	SP status – Unloading from the vessel – TS	eMar Platform, IBI platform
19	LSP (Freight Forwarder – FI)	LSC (Shipper)	Status of the transport chain based on the individual statuses collected (Multimodal status)	eMar Platform, IBI platform

Based on the above, runs have been organized in collaboration with the in order to test the developed solution. The business case with real data has been uploaded to the IBI and eMAR Platforms. The business case scenario has been tested with IBI to provide support to the main stakeholders to use both IBI and eMAR Platforms.

With emphasis to the integration of eMAR and IBI platforms the testing scenario includes the following steps:

Planning

1. SM Firm booking for maritime services is created by the FI that operates IBI platform
2. SM Firm Booking is sent through Access Point to the shipping line. Through eMar the message is converted into TEP Request and then automatically translated into Maritime booking message sent through Access Point (AP) to the shipping line
3. The shipping line checks his account in the AP and downloads the message locally in his system.
4. The shipping line fills the missing data for the confirmation, saves the file and a Maritime Booking confirmation is created
5. The shipping line sends the Confirmation to AP in eMar. The message is transformed automatically into TEP and then into SM Firm Booking Confirmation. The result is sent to the FI
6. IBI platform/ FI receives the message which is automatically inserted into the system.

Execution

1. The shipping agent creates a status message and uses the AP client to upload the message in the Access Point.
2. The system automatically converts the message into TS and then into the structure that the FI's system (IBI platform) can understand (Transport Chain Status message). The message is then sent though AP to IBI platform

Statuses that are handled by IBI platform are also available through the web service to eMar platform. The message structure used to provide this information is a Transport Execution Status message (TS).

During the trials the aspects that have been monitored follow the users' requirements approach presented in section 4.1 i.e

- Business aspects ; reflecting the operational requirements
- Technical aspects ; reflecting the technical requirements

The users involved in the trials presentation have been prepared and trained in advance, through targeted meetings and/or video conferences sessions, in order to make them able to assess the pilot performance. During this preparatory meetings the users had the opportunity to have a live run of the application, looking to the different services, modules and functionalities supporting their role in this testing phase.

6.8 Users feedback

This section reports users feedback. Having as basis the users' needs and requirements (reported in chapter 4), the users will be asked to comment if eMAR has satisfied their requirements.

The variety of the stakeholders involved along transnational trade lanes, each one with its own IT system and capacity, the related needs, the transport modalities and the number of cargo interchange points make the long multimodal transport chains a very complex environment very difficult to be properly managed and controlled. Thus, as previously mentioned, the identified business scenario of the Italy to North America represents the ideal case for eMar, as it allows the full exploiting of the IT capabilities of the IBI – eMar platforms.

Based on the different roles in the transport chain, each actor has specific needs and requirements to be addressed: from the low level of the LSPs interactions up to the high strategic level of the Freight Forwarder in charge of building and selecting the corridors/transport chains.

The need for information flow integration, systems interoperability, availability of data as well as data quality is definitely an issue for the business sector on a horizontal level, regardless of the roles. At the same time, the visibility and the accessibility of the transport chain, in particular related to the services offered by the different stakeholders are seen as a key aspect.

Focusing more in detail on the Freight Forwarder role, being one of the primary role in the transport chain, in charge for the design, planning monitoring and conclusion of the transport service, the complexity of the daily activities needs support. The eMar framework and platform address completely this complexity, especially as regards the multiple shipments or the large volumes shipments to be managed by the Freight Forwarder: in fact, for the small shipments (1-2 containers) the Freight Forwarder can delegate in total the transport organization to the Shipping Agent, asking to take care also for the inland transport, and relying on its networks of providers (also for the inland part). On the contrary, for medium-large shipments (in terms of number of containers), it is the Freight Forwarder itself that has to directly organize and manage the transport service, interacting with the different LSPs and secondary Freight Integrators. Thus, in particular, the IBI - eMar platforms support the planning activities: design the transport chain, selection of nodes, legs, transport modalities, service providers,…up to the bookings of the services to the different service providers. In this direction, the integration of the two platforms provides an automated seamless path/tool supporting the whole D2D transport service, including the maritime part, reducing the manual paper work.

The single access point provided by the IBI – eMar platforms allows especially the inland business community to communicate and interact with all the other actors involved in the transport chain, facilitating the management of the transport chain and reducing the extra-work currently needed for the communication exchange.

The IBI – eMar platforms become even more effective and useful during the execution phase, tackling the current fragmentation of information and providing the needed visibility to the transport execution phase. The Freight Forwarder put a lot of emphasis on this aspect: being the responsible for the shipment towards the final client it is important to monitor the whole transport chain, being able to offer and provide to the clients punctual and added value information on the cargo status; through IBI – eMar platforms it is possible to collect the info from this single access point (a “Single Window”), avoiding the manual interaction with the various LSPs and/or the scouting of the various track&trace systems offered by each single provider.

6.9 Lessons learnt

It will be the conclusions/findings of the above activities. Main headings of this section will be:

6.9.1 Benefits (for the users)

After the trials activities and the evaluation interviews had involving the users, the main benefits can be summarized below:

- ***Introduction of an established collaboration way of retrieving and sharing information regarding planning and execution of long intermodal chains***
  eMAR introduces a new collaborative model where the involved stakeholders agree to use and exchange information for the planning and execution of the transport chain, using advanced and secure IT infrastructure, without limitations in relation to their internal IT capabilities. With emphasis to the Freight Integrator exchange of

Single Mode Bookings and Booking Confirmation take place using IBI Platform for the hinterland services and eMAR for the maritime services. In this way, the communication is made with structured messages, no matter of the users' technological infrastructure. During execution each stakeholder agrees to provide status messages according to its business responsibility, while receives status messages useful for the preparation and execution of its activities from the other stakeholders. eMAR brings the maritime players in collaboration with the remaining actors of the transport chain tackling the informational gaps during modal change and the fragmentation of long intermodal transport chains per mode specific information.

- ***Users can exploit the capabilities of the two systems (IBI Platform & eMAR Platform) with a single access to one of them***

  IBI Platform users – with emphasis on the Freight Integrator – can get planning and transport status information in the form of standardized messages without necessary being registered and become users of the eMAR Platform. Similarly in the vice versa approach, maritime users of eMAR Platform can receive information for the hinterland transport without being registered in the IBI Platform. This is very important and useful, since all required information can be accessed through a single entrance point.

- ***eMAR provides an effective interface for all maritime players to become uninterrupted element for the whole transport chain.***

  Maritime Players can be distinguished in two broad categories i.e. the Shipping Lines and the Ports and Port Terminals. The sector presents big differences in terms of IT capacity and provision of data information in relation to their activities either because it is imposed by the legislation or as added value services for their clients. It is often, Ports and Port Terminals to have a vast amount of data in their PCS or IT systems but without being able to communicate to other partners involved, interested and authorized to get it due to IT systems discontinuities. eMAR contributes to smoothen the situation by providing to the maritime partners the environment where with the minimum adaptations, agreed information can retrieved and shared in a bilateral communication with the hinterland partners. Furthermore, eMAR can undertake the transmission of messages to multiple recipients, which is commonly required in the maritime business.

- ***Harmonisation – Standardisation of communication and information protocols.***

  The variety of information and communication protocols used for information exchange between the stakeholders involved in the multimodal transport chain creates significant communication problems. Partners (especially SMEs) face difficulties to make adaptations while the more technological advanced partners have to "lower" their standards in order to cooperate. eMAR contributes to this direction by undertaking the messages translation from IBI Platform and transmitting Common Framework messaged to the eMAR Platform (and vice versa). For different reasons “low” and “high” IT partners do not want to get involved with development of electronic messages, application of communication protocols. They wish to provide the structure of their messages and any mappings, translation and transformation to be undertaken by the IT systems.

- ***Establishment of a secure mechanism for information exchange***
  Information security is a big issue, especially when it is about commercial operations. It is quite often to face reluctance by the stakeholders to exchange information because of security issue. The use of Access Points handle successfully the security related matters. AP is installed in each actor’s environment and based on each its credentials the exchange of information is taking place.
- ***Access to larger data bases (facilitating the retrieval/sharing of information) for maritime services.***
  Any Platform oriented system in order to be useful for real business require registered users that are willing to participate and perform their operations through it. This applicable to both IBI and eMAR platforms. The project provides the possibility to merge and interconnect hinterland and maritime actors under its umbrella thus enlarging the membership groups. This facilitates all actors to have access to more services and consequently widen their business opportunities. The increased demand by the shippers for added values services impose the Freight Integrators to seek for cooperation partners willing to share information towards increased visibility, efficiency and credibility.

7 Pilot Study 2: Hamburg – Vienna Corridor

7.1 Introduction and Purpose

In the following chapters the prototype solution for intermodal transport routing and planning specifically related to the Hamburg-Vienna corridor is being described. The technical solution with possible user interfaces and interrelation to external systems e.g. eFreight framework respectively e-maritime strategic framework

7.2 Objectives

From each stakeholder perspective there are different requirements to be fulfilled by the prototype solution. Port community systems as single window for the processes between stakeholders want to have stabile and trusted interfaces to the different systems. This allows them to provide accurate and actual information about the processes at the ports to the connected systems. Transport planners want to have these accurate information available for their back-end planning systems in order to plan, manage and execute their transport chains as well as to generate alternative transport solutions to be seen in the user interface (front-end). Customers, of course, want to have their cargo delivered within the given timeframe with a high level of accuracy. The following solution description is focusing on the planners perspective taking into account the needed interfaces and compliance with the eMaritime strategic framework.

7.3 Transport Logistics eMaritime Solutions Description

7.3.1 Port Community System (Hamburg)

The Port community System of DAKOSY (http://www.dakosy.de) is the single window for processes between all stakeholders involved in the creation of paperless export, import and transit processes at the Port of Hamburg. The components of the system can be summarised as follows:

- Export Platform (EMP – Export Message Platform)
- Import Platform (IMP – Import Message Platform)
- PRISE (Port River Information System Elbe)
- VIP (Vessel Information Platform)
- Linescape

Figure 7-1: Framework of Port Community System

For export and transit processes the **Export Message Platform (EMP)** is implemented in order to support all export processes by transferring all required transport documentation in a standardised message format.[9]

All requirements occurring throughout the import process are covered by the **Import Message Platform (IMP)**. This includes all optimisation of overall process from the ship´s entry to the Port of Hamburg through the delivery of the goods at the customer in the hinterland [10]

[9] DAKOSY – the Port Community System, in: http://www.dakosy.de/en/solutions/port-community-system/ [26.03.2013]
[10] DAKOSY – EMP, in: http://www.dakosy.de/en/solutions/port-community-system/export-platform/ [26.03.2013]

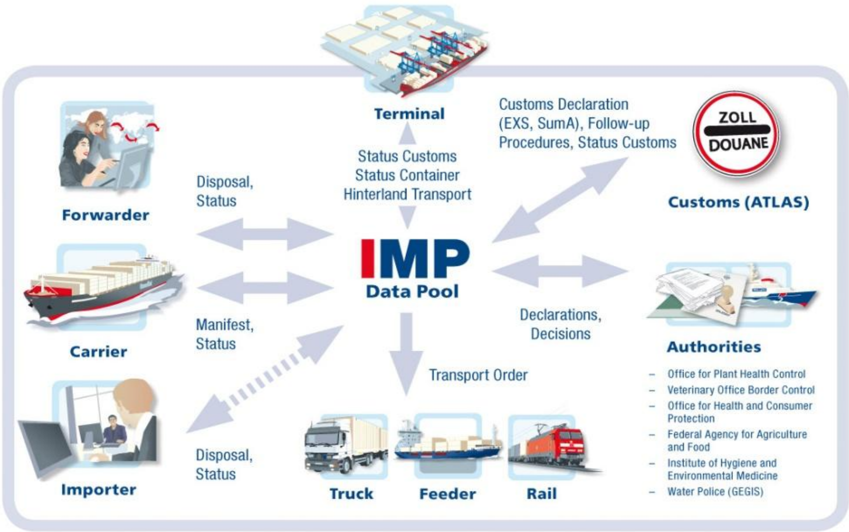


Figure 7-2: Import Message Platform (IMP)

PRISE – Port River Information System Elbe offers an information platform, which merges the existing information from the areas of ship arrival and ship departure and provides it currently for authorized participants - terminals, tug boats, pilots and mooring lines as well as the HPA. This includes scheduling of ship arrival and ship departure and the possibilities of reaction towards short-term events [11]

Further service applications in consideration with processes for hinterland transportations are summarised as River Information Services – details are provided on http://www.rising.eu/.[12]

Figure 7-3: Port River Information System Elbe – PRISE

[11] DAKOSY – PRISE, in: http://www.dakosy.de/en/solutions/port-community-system/prise/ [26.03.2013]
[12] RISing – http://www.rising.eu/ [26.03.2013]

VIP – Vessel Information Platform integrates the Hamburg ship voyages (corresponding to SHIPS) as well as the European shipping timetables of some carriers for all European ports. By the end of the year, the VIP platform is set to be extended with ship voyages for all European main ports. Besides Internet access, all customers are free to integrate the VIP ship voyages into their company's IT landscape via a standardized EDIFACT interface [13]

So far more than 2000 customers include haulage companies, line agents/ship owners, rail transport companies, trucking companies and feeders as well as all involved authorities (customs, harbour police, fire service etc.) along with internationally prestigious trade firms, branded companies and industrial enterprises have integrated interfaces to the Message Platform of DAKOSY.

EDI and Interfaces

EDI Services via DAKOSY (Import, Export)

Transaction	Forwarder	Terminal	Carrier	Rail	Truck	Importer	Exporter	Customs	Authority	Service
Ship Departures	R		S	R	R		R			VIP, EDI
Ship Arrivals	R	R		R	R	R			S	VIP, EDI
Transport Order	S/R		S	S/R	R					IMP, EMP
Export Declaration	S	R	S/R				S	R		EMP
Port Order Export Hamburg	S	R	S/R				S			EMP
Port Order Export Bremen	S	R								EMP
Export Decs Rotterdam	S	R	S							EMP
NCTS Declaration	S		S	S			S	R		ZODIAK
Summary Declaration	S		S	S			S	R		IMP, ZODIAK
Import Declaration	S		S	S		S		R		ZODIAK
Import Announcement	S	R	S/R			S		R		IMP, ZODIAK
Gatepass / Release Order	R	R	S							
R										
					IMP, ZODIAK					
Pre Announcement Truck		R								
R										
					EDI					
Bill of Lading	S		R				S			EMP
Consignment Data	R		R							
		S			EMP					
Booking / Booking Confirmation	S/R		R/S							
		S			UNIBOOK					
Manifest Data			S							
			R	R	EMP					
Codes										
	R	R	R	R	R	R	R			DAKOSY
Gate-In Report	R	S	R							EMP, IMP
Gate-Out Report	R	S	R				R			EMP, IMP
Load-/Discharge Report	R	S	R							EMP
Damage/Repair Report		S	R							EDI
Dangerous Goods Declaration		S	S	S					R	GEGIS
Stowage Plan /										
Bay Plan										
		S/R	S/R							EDI
Invoice	R	S								EDI
Free Formatted Data	S/R	S/R	S/R	S/R	S/R	S/R	S/R		S/R	ALL
Status Messages	R	S/R	S/R	S/R	R	R	R	S/R	R	ALL
Statistical Data										EDI
Load Order Rail	S	R								HABIS
Status Order Rail	R	S		R						HABIS
Rail Customs Declaration	S			S				R		HABIS
Wagon Sequence Rail				S/R					S/R	HABIS

R = Receive , S = Send
source: http://www.dakosy.de/en/solutions/port-community-system/

Figure 7-4: EDI Services and Interfaces[14]

7.3.2 System architecture concept for Intermodal Routing Service

The **'intermodal routing service'** is defined as an assistance and decision support tool for the dispatcher at any reasonable point of the chain. It elaborates possibilities and alternatives for the rest of the transport chain and weights these alternatives according to the routing conception and parameters adjusted by the user.

[13] DAKOSY – VIP, in: http://www.dakosy.de/en/solutions/port-community-system/vip/ [26.03.2013]

The service offers a direct 'door - to - door routing' with consideration of the different modes of transport touched and available. The dispatcher receives proposals for possible combinations of transport legs and service providers. The variety of reasonable 'solutions' depends on the given (physical and service) network and the preferences; the dispatcher has set for the respective transport. Using the routing service she/he has not necessarily to have foreknowledge about operators and service providers (e.g. suitable terminals, organizational and technical background).

A direct relation can be broken by inserting intermediate points, so called via-points, to force stops and also the use of certain modes of transport. Furthermore a feasibility check regarding the linkage of modes of transport should be done automatically (If necessary the user has to be requested to set a further intermediate point, in order to ensure the feasibility of the transport chain). A proposal generated by the rerouting service has to provide all information needed for the dispatcher to support his decision making.

To provide this functionality to the user, on the one hand information on e.g. network, timetables via eMar platform can be interlinked/ connected. On the other a graphical user interface (application framework) is needed.

The following picture visualizes the structured process flow architecture of the intermodal routing service with the main components involved.

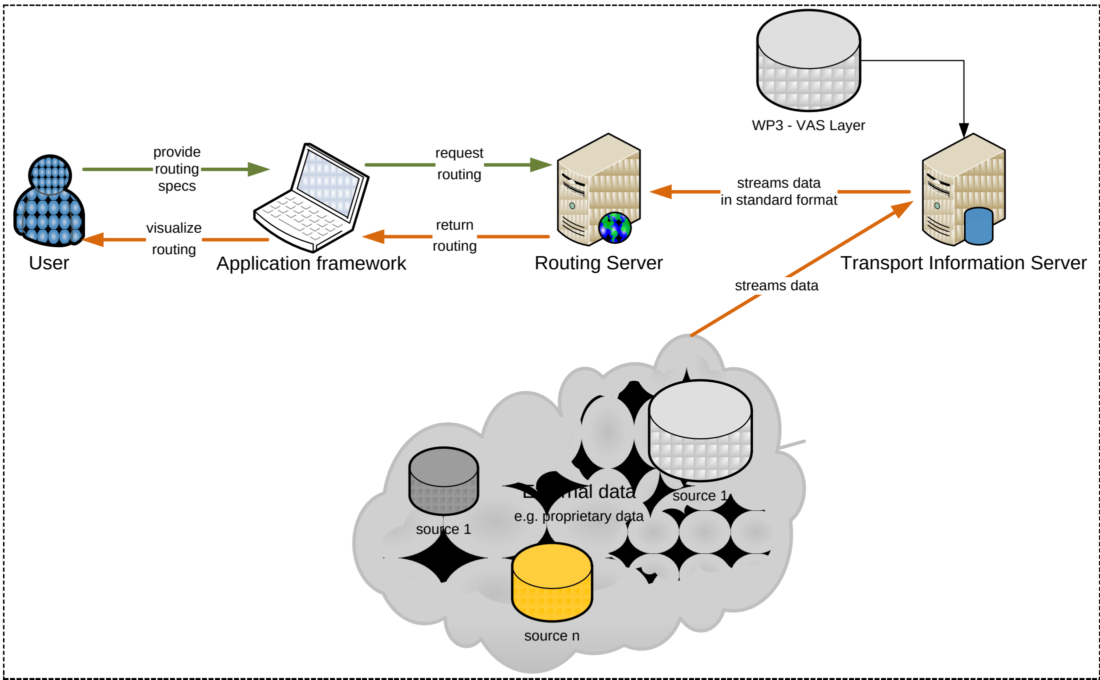


Figure 7-5: System workflow diagram

The intermodal routing service itself is not directly visible to the user. As a matter of fact the service needs to be interfaced via a user friendly graphical interface. Thus the prototype consists of the 'Intermodal Routing Service' following the Software as a Service (SaaS) approach, and a graphical user interface (GUI).

7.4 Business case supported – basic functionalities and use cases

Within the application two main use cases can be processed:

a) Intermodal routing

Door to Door routing from origin to destination showing different routing alternatives regarding intermodal transport chain

b) Intermodal planning

Planning of orders from different origins to different destinations with different intermodal transport alternatives in an optimal way

The graphical user interface enables the user to process routing requests via the Intermodal Routing Service. Furthermore the user can search and visualize terminals listed in the database.

The graphical user interface follows an approach of usability orientation. Therefore the graphical user interface (GUI) aims to limit complexity to a minimum. Simplified workflows should support the user for inserting input, visualizing the overall framework and presenting results; i.e. main functions can be easily accessed.

This approach is meant to address a broad user group (logistic dispatchers and planners alike) to use this framework as a support tool in their daily work flows

7.4.1 User interface for intermodal planning

The **main user interface** is visualized in the following pictures. It consists out of different window frames.

In the default allocated layout, the entry field for user input of location selection is placed in the middle frame. In this input box the user can type in data, declaring origin, via-positions and destination addresses, i.e. the geo-coding quality depends on the granularity level of given input by the user.

A 'map' is adjusted in the top right position. Below is the 'result table' located, presenting routing results in a table view.

The layout of the frame locations can be easily modified by the user, using a drag and drop mouse operation. On the left side the main navigator columns through the system can be seen. Within this application levels the customized view on the different task areas can be defined

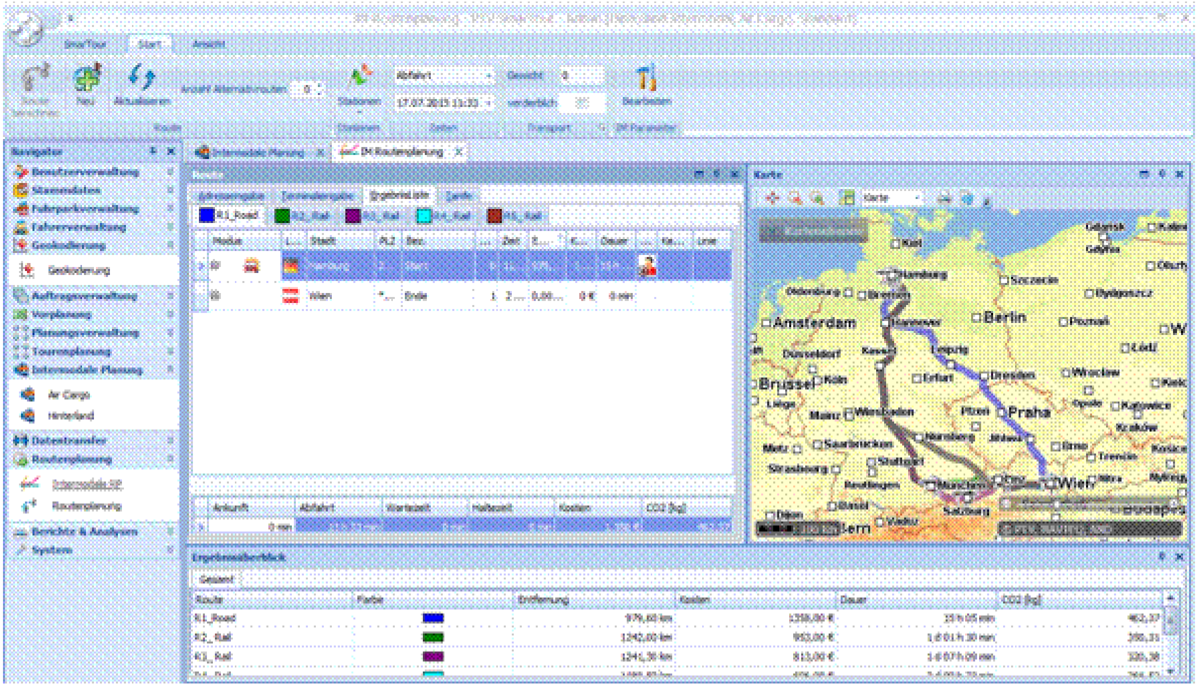


Figure 7-6: Intermodal planning for the corridor – graphical user interface

7.4.2 Terminal Finder Function

One functional component of the graphical user interface is the terminal information aspect. To search a terminal using a radial search, the user has to provide the parameters country and city or respectively a postal code. The service triggers the backend server with a search query for the specific area in the 'Transport Information Server'- database.

The result is presented to the user immediately, listing all terminals in the surrounding area of the given location and presenting each terminal location in a map.

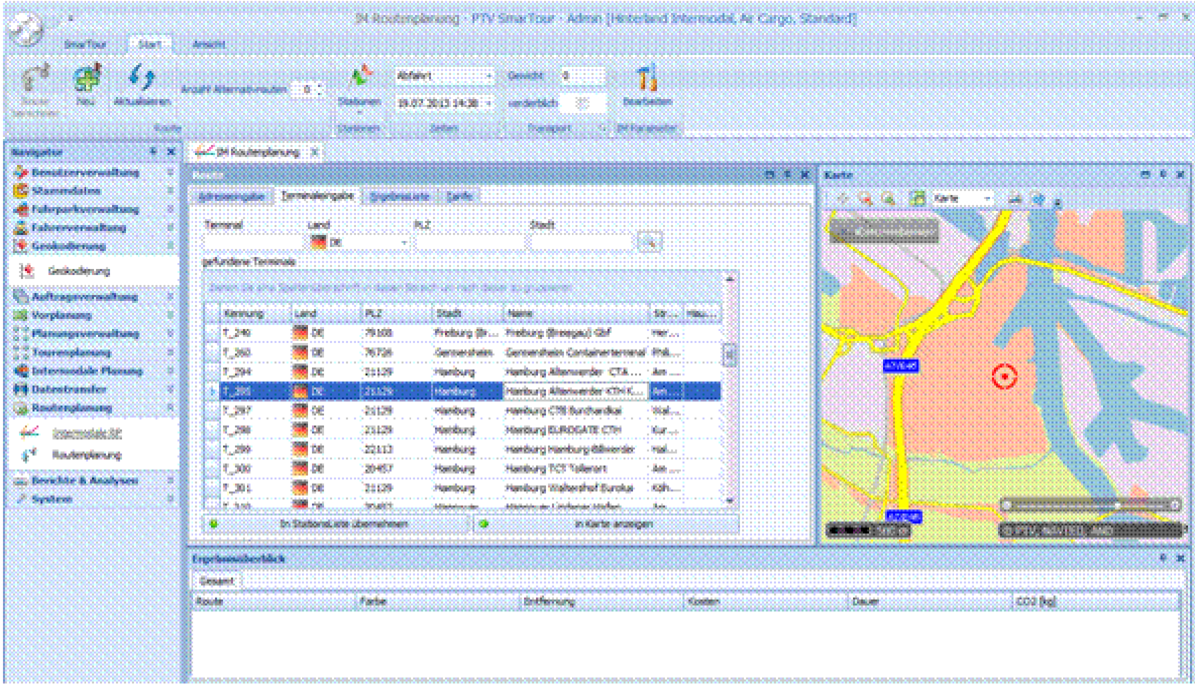


Figure 7-7: IM Route planning – terminal search and information view – map

Additionally, the map function ‘map change’ can be utilized. Maps can be substituted within seconds depending on the user needs. Three different views can be used for demonstration purposes – the regular map based on standard map providers, satellite view based on bing and a hybrid view.

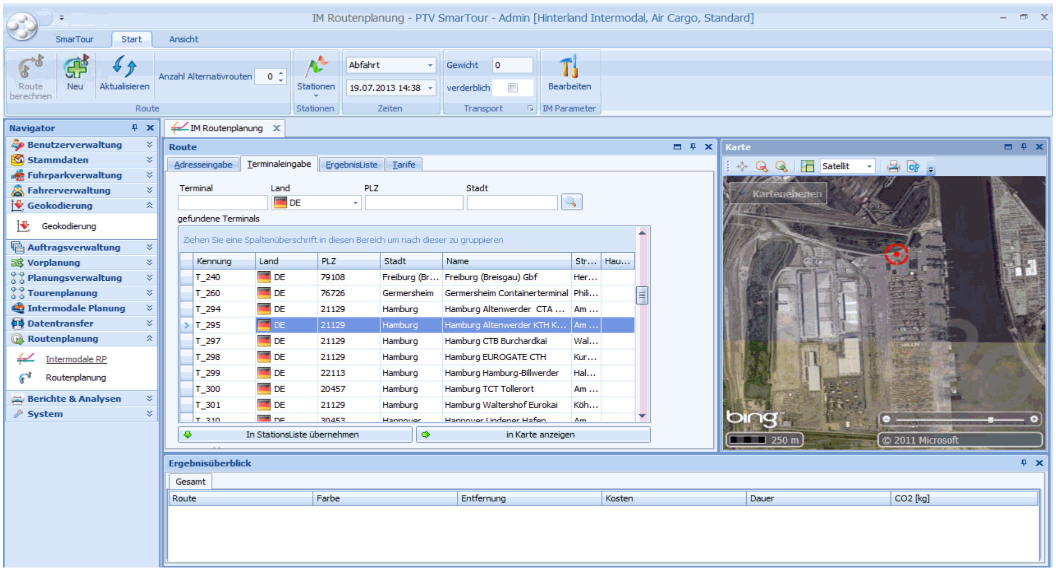


Figure 7-8: IM Route planning – terminal search and information view – satellite

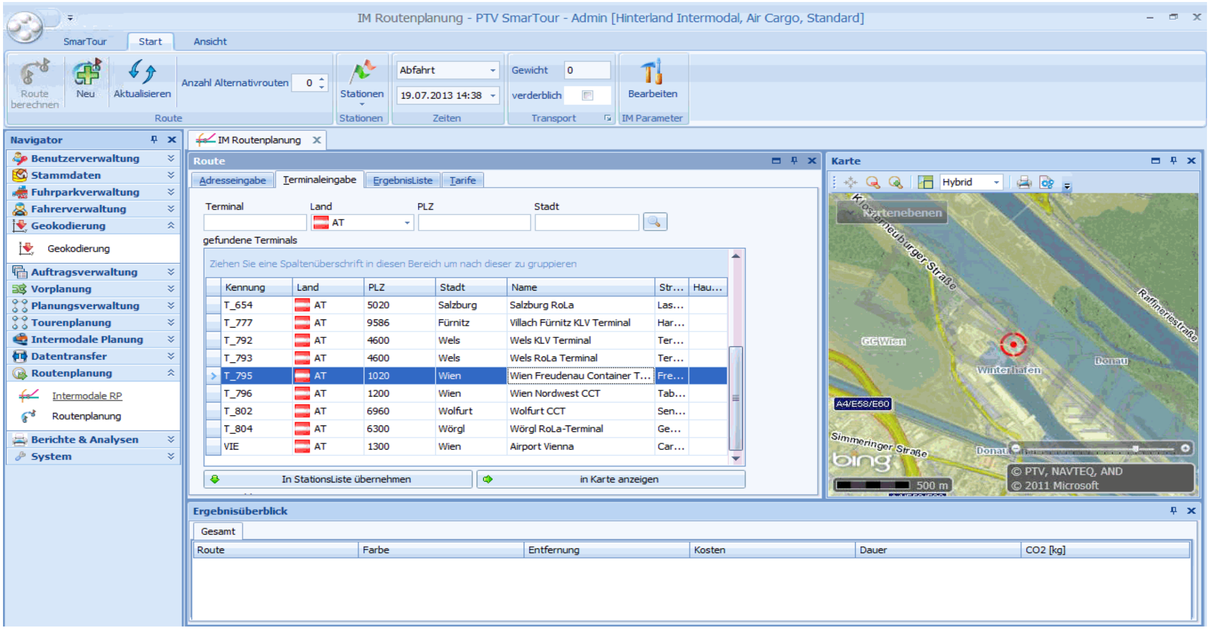


Figure 7-9: IM Route planning – terminal search and information view – hybrid view

7.4.3 Intermodal routing functionality

For use case 1 the intermodal routing function is being shown:

Minimum requirements for the routing are: origin and destination, which has to be entered by the user, 3 different options are being provided:

- exact address input in the entry field (figure 6-9)
- radial search e.g. country and city in the input box (figure 6-10)
- mouse click in the map (figure 6-11)

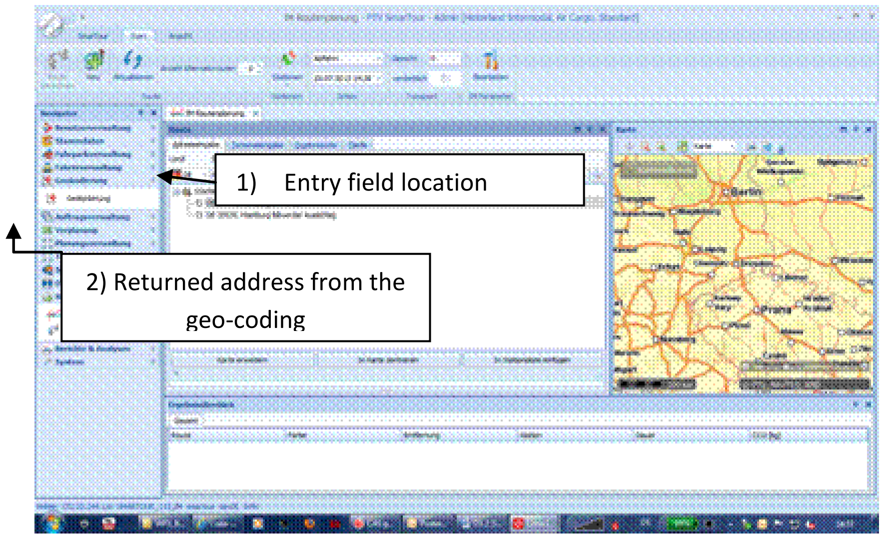


Figure 7-10: IM route planning location selection by address

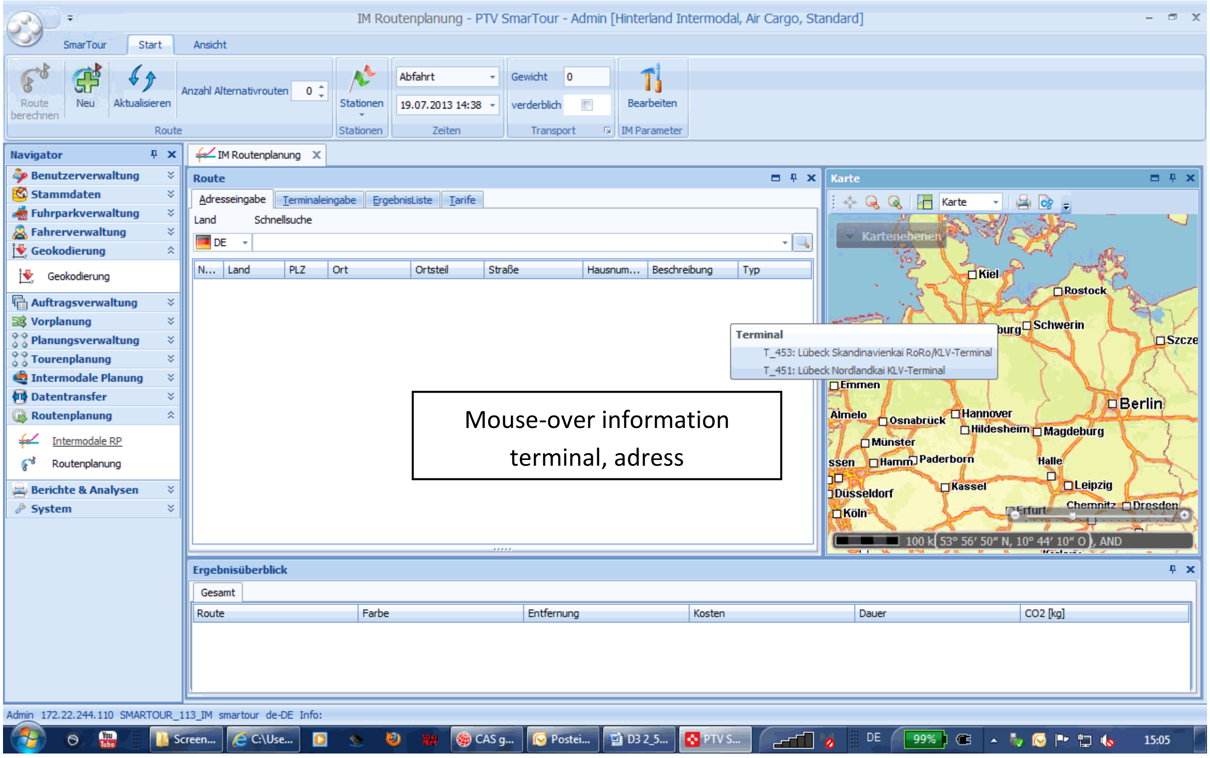


Figure 7-11: IM route planning location selection – mouse over information

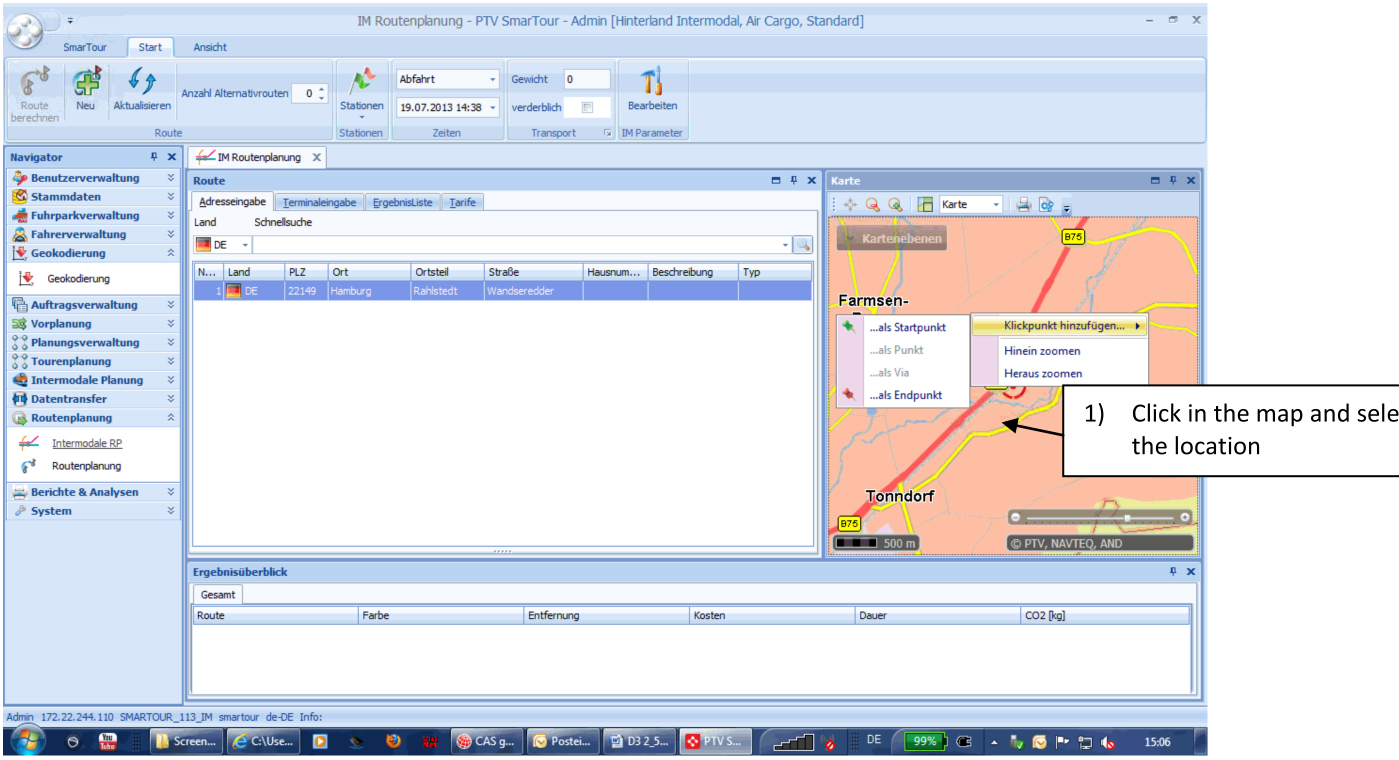


Figure 7-12: IM route planning location selection – setting click point

Additional the routing request can be enriched by including restrictions on date & time and defining intermodal parameters, e.g. usage of transport modes or specific transport operators.

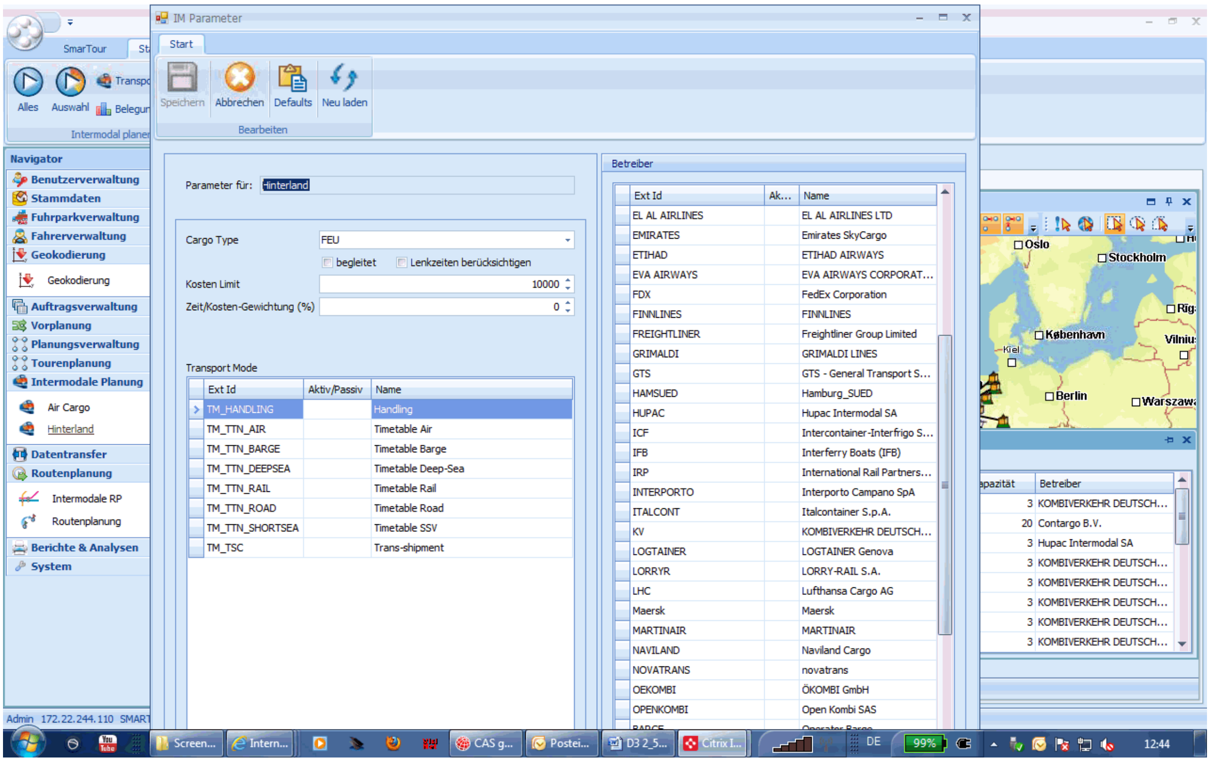


Figure 7-13: Intermodal Routing - restriction parameters

Depending on the intermodal restrictions given by the user, various alternatives are presented to the user in a list and in a map view. The results differ depending on the settings given by the user. Further dependency for quantity of returned results is given by the amount of data available from the 'connected systems.

In general the routing server has been algorithmically adjusted to find physically different routes. Furthermore the user can obtain additional alternatives for a given time, origin and destination by adjusting the optimization ratio of time and cost.

7.4.4 Intermodal planning functionality

The intermodal planning functionality provides planning solutions based on a given dataset of transport orders. In this example transport data from other regions are being shown, however the approach is immediately adoptable to any other kind of data set coming from transport service providers or clients within the Hamburg Vienna Corridor

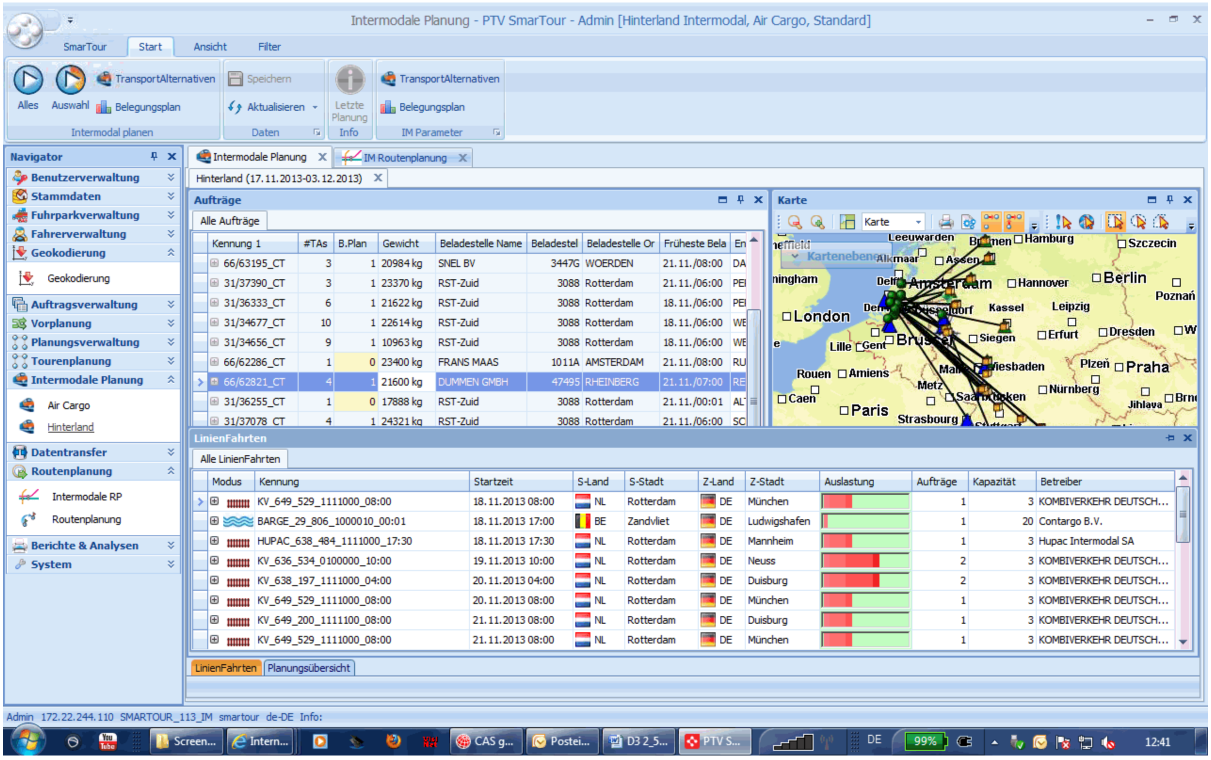


Figure 7-14: Intermodal planning example 2 - Hinterland transport to different destinations

Compared to the routing use case the number of orders to be planned can be seen in the middle frame. The right map view visualizes the different destinations.

In the table below all liner services with start time, locations, use of capacities and number of orders can be seen. The user can then zoom in to the different orders and the related transport alternatives.

The planning system then optimizes via algorithms the allocation of the orders to different transport alternatives

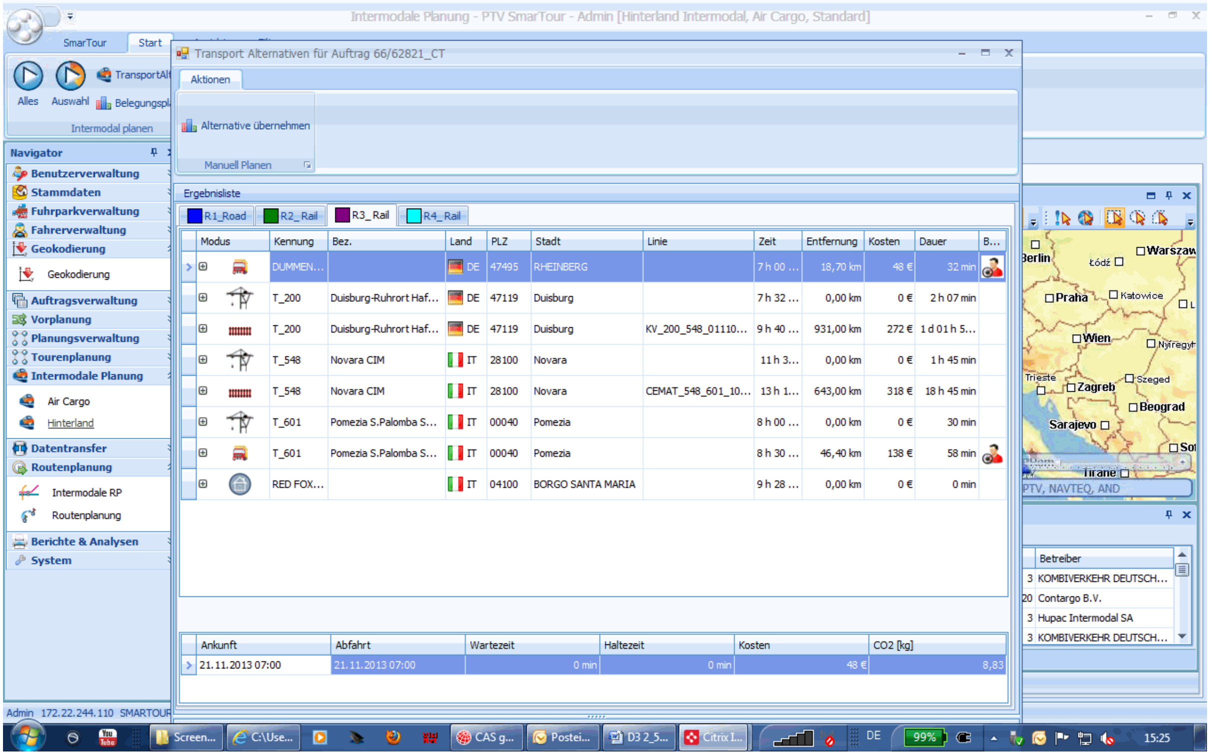


Figure 7-15: Intermodal planning example 2 – detailed view of order related transport alternatives

Within this application the planner can see the most important information related to the orders and the transport alternatives. Changes and adaptations of order allocation or table views can be made individually by the user.

7.4.5 Compliance with EMSF

Based on standardized eFreight messages it is possible to develop eMAR web applications which are capable to provide easy to use services (for instance for routing requests or order entry purposes) and link these via Access points to the platform or another related systems. For intermodal planning it is necessary to connect different services and applications on different complexity levels for the information requests and provision of planning results.

With regard to the EMSF application areas and eMAR processes this pilot is focusing on the transport planning and management between seaport and hinterland transport network respectively final destination. It is related to the eFreight framework and the related standardised messages. On this basis it can be outlined where to allocate the use cases of the pilot study (see below red interfaces).

Regarding the described use cases and approaches the functionalities cover mainly the freight transport related planning requirements and processes before the transport execution, interfaces are needed to different community systems and sea transport related information providers. Hinterland transport on the bottom is being supported via the routing and planning application. Whereas on both sides the intermodal / synchro-modal aspect is in the foreground.

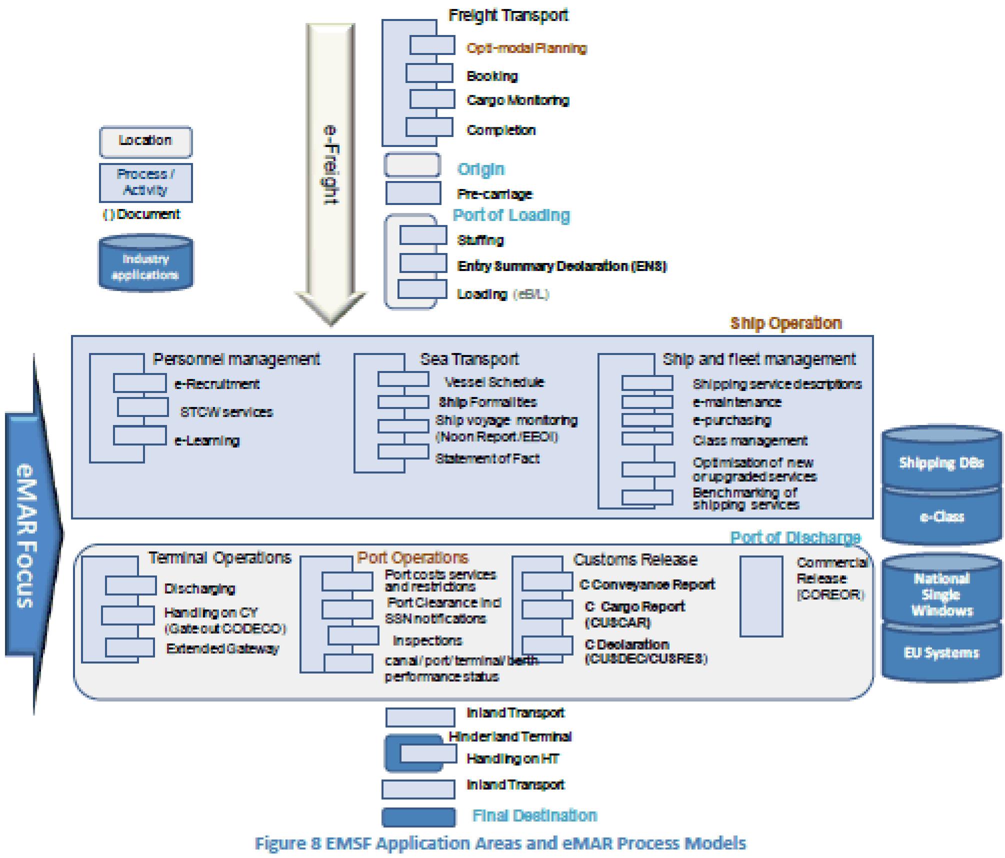


Figure 7-16: Conceptual architecture of planning services and EMSF

Based on standardized eFreight messages it is possible to develop eMAR web applications which are capable to provide easy to use services (for instance for routing requests or order entry purposes) and link these via Access points to the platform or another related systems. For intermodal planning it is necessary to connect different services and applications on different complexity levels for the information requests and provision of planning results.

7.4.6 Interfaces with eMar base Platform

With regard to the previous pilot description the solutions within the Hamburg-Vienna pilot case can be connected with the base platform via Access points. These interfaces can be realised via web services which are capable to handle different requests and responses based on standardized message exchanges (for instance eFreight messages / TEP request/ TEP response).

The information exchange between the applications, the Emar platform and the different stakeholders can be depicted in the following overview:

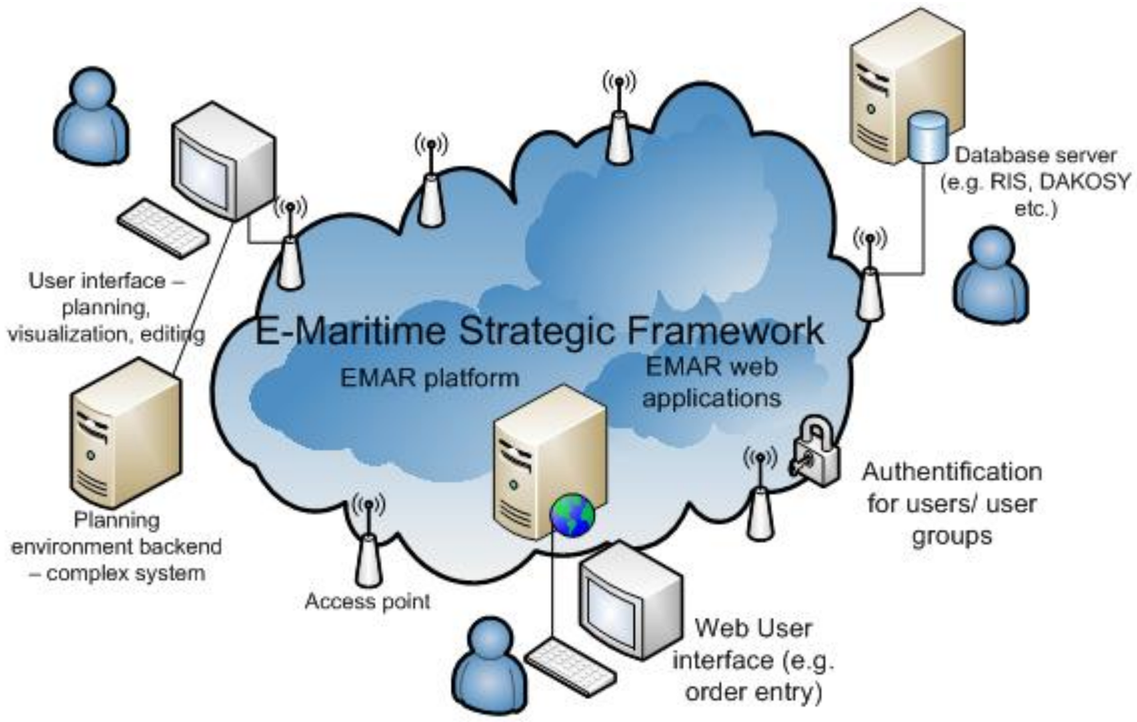


Figure 7-17: Conceptual architecture of planning services and EMSF

It has to be noted that the corridor related solution can cover with the intermodal functionality the whole transport chain from origin to destination which means that based on schedules available timetables and further information on the shipment transport alternatives via maritime transport, sea port operations, intermodal transport hinterland can be calculated and provided to the relevant stakeholders. Within the application it is possible to calculate additional parameters for different transport modes (e.g. Greenhouse Gas Emissions)

For the planning of different transport legs transport service descriptions from different service providers via the databases could be used for the generation of transport execution plans for each transport leg.

7.5 Pilot description

Based on the user requirements related to the Hamburg – Vienna Corridor and the technical solutions which are available for different use cases in the field of Hinterland transport planning the demonstrator can be outlined for the scenario. The scenario should show which kind of features, benefits and planning results the solution can provide. Therefore example data will be used for the generation of results.

The demonstrator should enhance the following processes and planning steps:

- Better planning results of transport flows (optimization)

- Better information availability of intermodal transport alternatives
- Cost calculation and CO2 emission calculation on the specific transport legs
- Visualization
- Interfaces and compliance with eMar platform and EMSF

As described above the pilot covers two general use cases:

- Intermodal routing alternatives
- Intermodal planning solutions

Within the intermodal routing service the different available transport alternatives for rail, road and barge are being shown between Hamburg and Vienna.

The Picture below visualizes a routing from Hamburg to Vienna. The prototype database provided five intermodal alternatives in the hinterland.

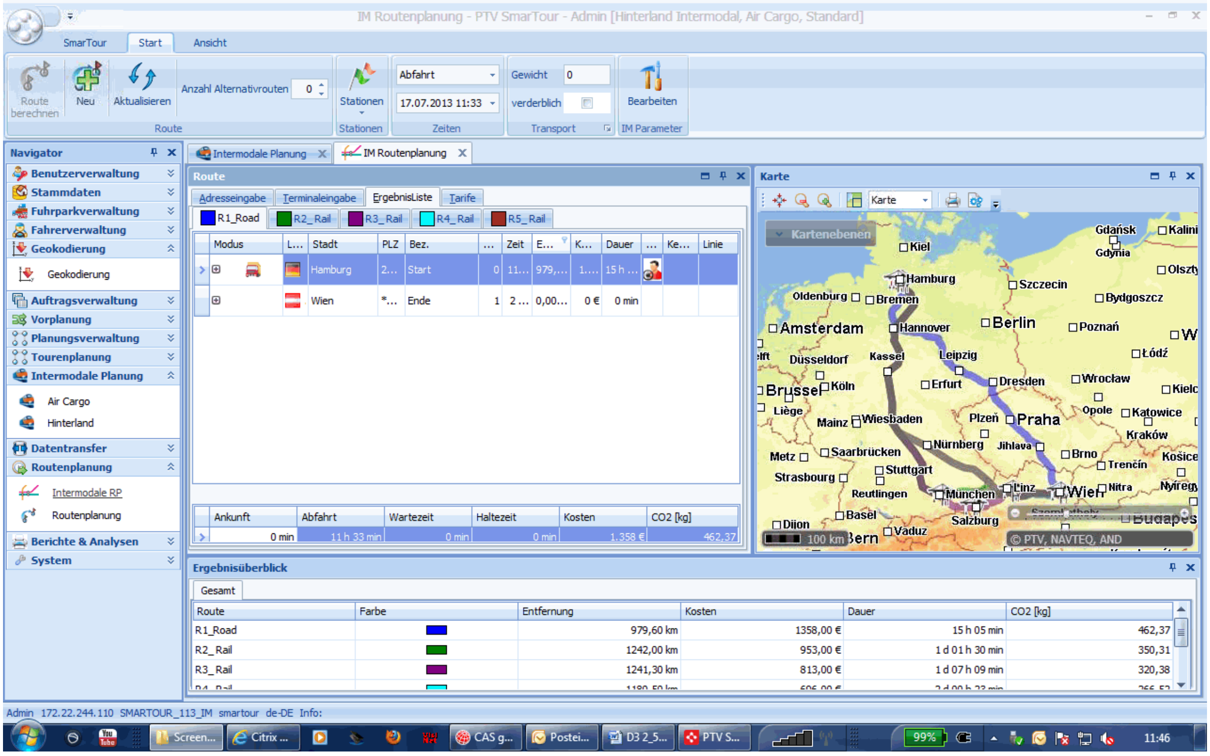


Figure 7-18: Intermodal Routing alternatives between Hamburg and Vienna – overview

Detailed information on each alternative is presented in a table view. Information listed: transport mode, time, distance, costs, location, accompanied transport and service. Information presentation in the result list can be modified by the user.

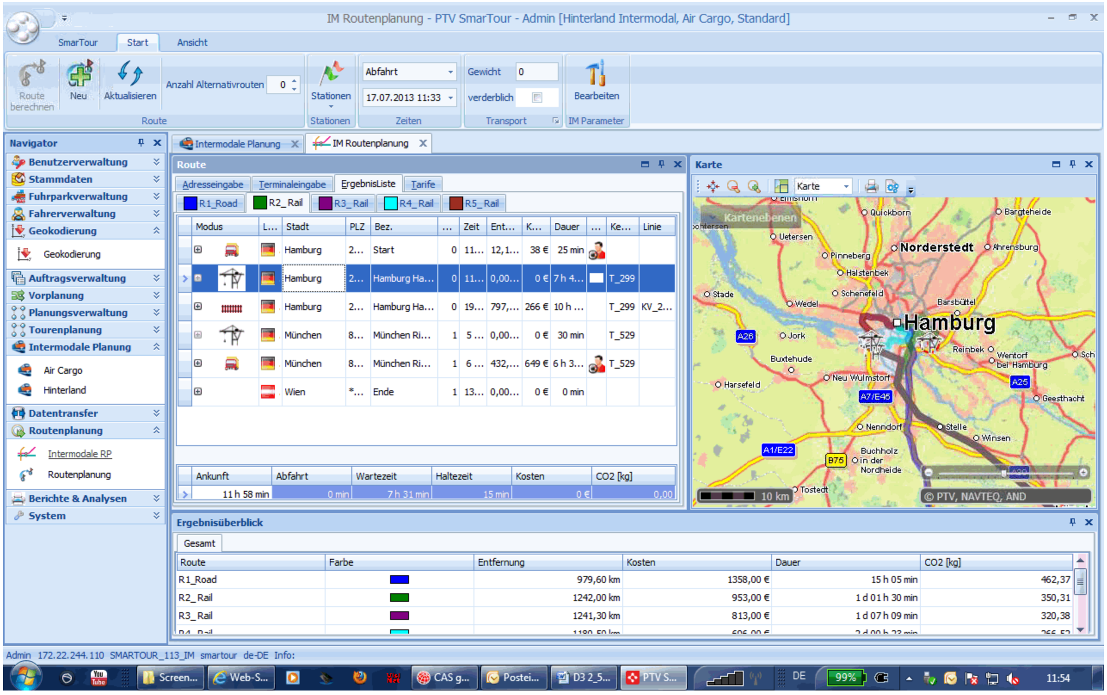


Figure 7-19: Intermodal routing alternatives – details from origin perspective

Depending on the user settings, various alternatives, tackling different transport modes, can be presented and finally be compared by the user. Next use case being covered is the intermodal planning of a number of orders to be transported. The approach is to optimize transport orders on different routes with different destinations using different transport modes considering the capacities and time schedules of the corridor related transport services.

For further realization of scenarios respectively calculation of realistic planning use cases more practical data would be needed. Therefore a questionnaire has been elaborated to approach potential interested stakeholders in this corridor.

The questionnaire is being structured in three general sections

1) General information about the company
2) Intermodal planning scenario, requirements and specifics
3) Interfaces, information flow

In the next steps further information and data could be gathered from these stakeholders to assess possible benefits from the pilot study and future related requirements for further scenarios.

7.6 Testing and trials

7.6.1 Testing of the Business scenario

The business scenario relates to the corridor use case described for the hinterland transportation between Port of Hamburg and port of Vienna. In this corridor there are several intermodal routing options possible which can be considered for the intermodal planning calculation.

The testing of the business scenario can be depicted as technical trials of the developed components. Stakeholders are being involved in different ways.

Interfaces to data and service providers are important for the enhancement of planning and processing of intermodal transportation chains.

For the road transport legs it is of great value to incorporate different traffic information as well as incidents, different routings should enable more accurate ETA calculations. This can be done currently by using the PTV TI Demonstrator.

The different routings for the transport modes can then be compared and double checked with the transportation processes of the stakeholders (terminals, ports, service providers).

The testing is being done by using the interfaces with the data providers e.g. schedules of railway services and barge services.

The intermodal routing and planning application is available as web service, interfaces have been implemented with different stakeholders. The transportation planning model lying behind has been set up with references to the Common Framework.

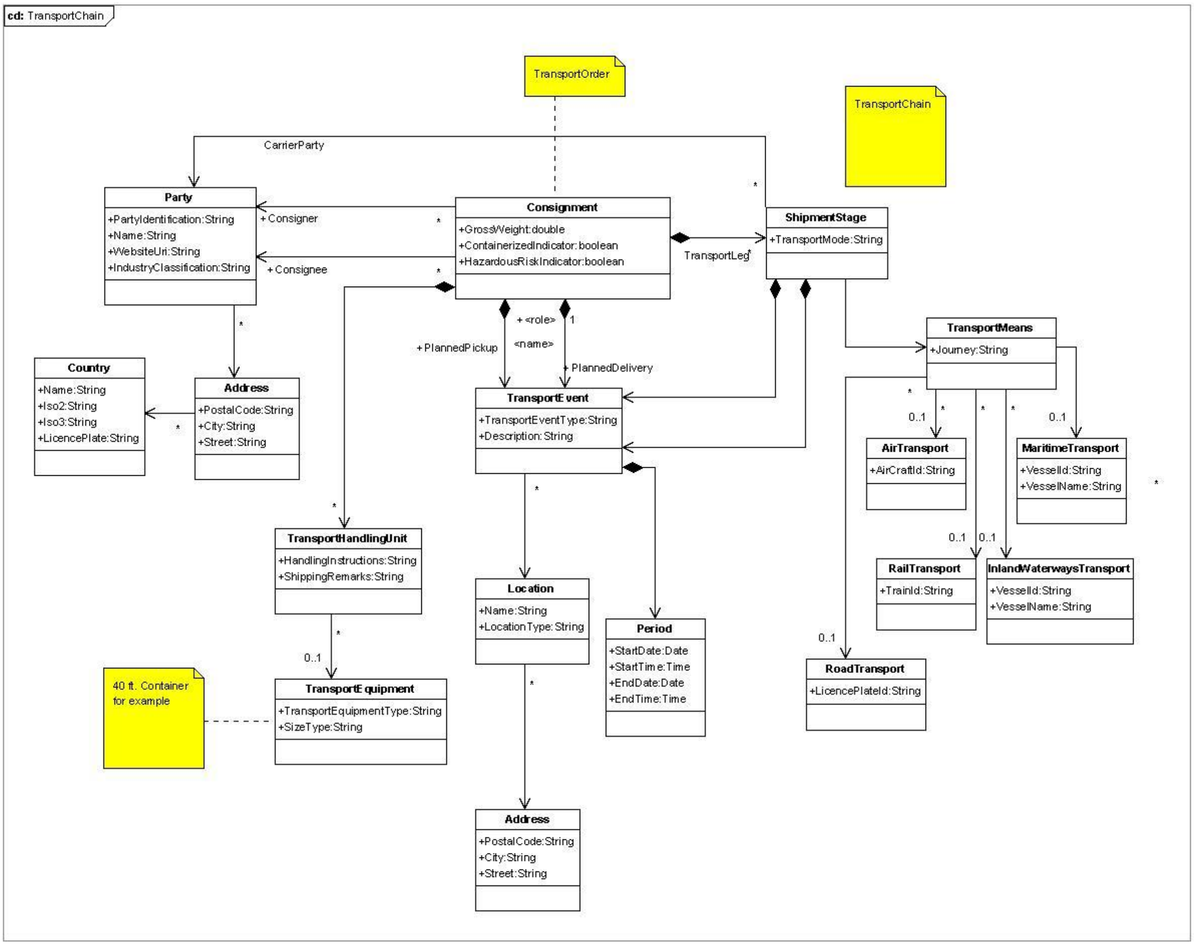


Figure 7-20>: Overview intermodal transport planning model

Exemplary stakeholders are being involved in the way that expert sessions by looking at the system and working on the questionnaire have been undertaken.

7.6.2 Trials of the technical solution

The developments of the components and applications have been done in the following fields:

- Further development of intermodal planning towards web based service
- Consideration of eMAR specific and scenario related requirements
- Enhancement of routing and planning components in terms of performance and data integration (traffic network related)
- Specification and realisation of interfaces with different data providers (schedules and services
- Setting up the data model with regard to EMSF

The enhancements of the different components refer to better and faster intermodal routing, the data aggregation from different sources support the different planning use cases.

The testing is done by running the system, checking the performance of interfaces and the calculation engines. The data integration and creation of planning results are being analysed regarding accuracy and practical relevance.

As additional data supply traffic/ infrastructure related information can be incorporated in the routing service.

The additional approach was to determine specific routing related time information (e.g. waiting times) around relevant locations like ferry terminals or ports. The data analysed for this approach came from truck FCD which were operating in Europe over a certain timeframe.

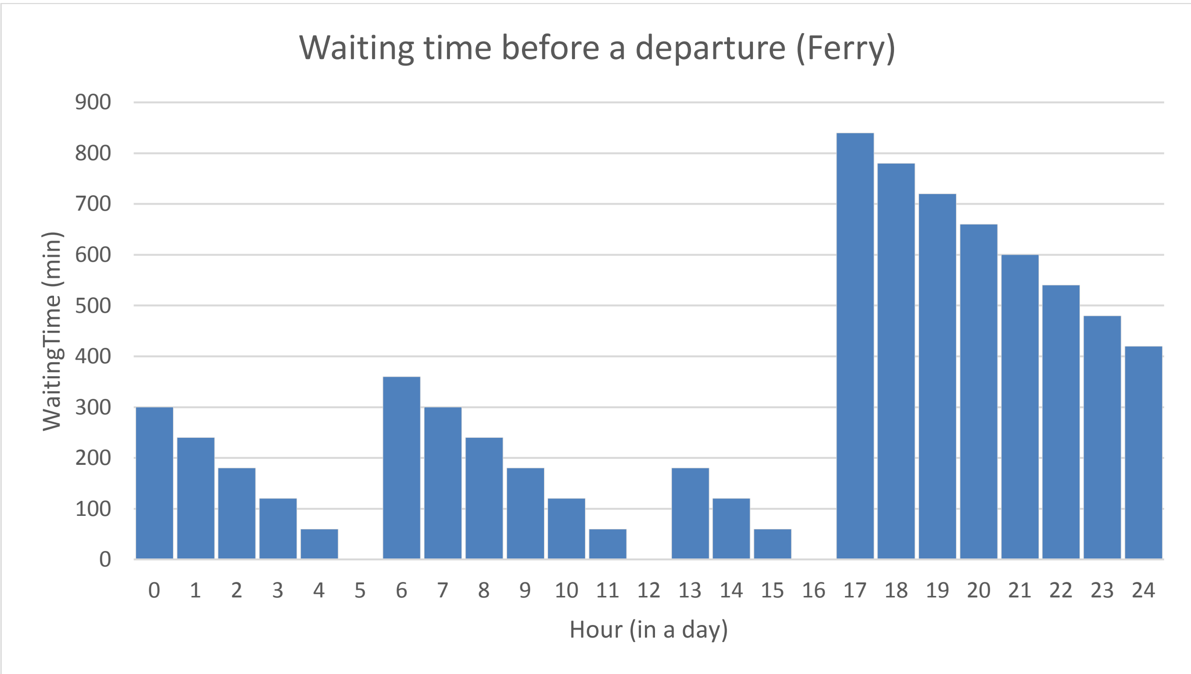


Figure 7-21: Analyses of waiting times at ferry port in relation to daytime

The processing of truck speed patterns based on the truck FCD and the related analyses of the different speed values on the network segment require innovative technical solutions.

Speed patterns are basic data for routing calculations. They consist of different speed values per network segment and daytime. For truck-routing dedicated data from heavy truck fleets are needed to process such speed patterns. The short- and midterm events like before known construction sites can be considered through the process of actual-speed-patterns which can be overlayed to the standard-speed-patterns.

These actual speed pattern represent specific traffic situations which can occure over a certain timeframe for instance due to construction sites or weather situations with repeating congestions.

Example: Actual speed pattern

The principle of speed patterns is being described on the basis of an exemplary network segment of a Highway.

The Autobahn-segment A8 between Pforzheim Ost and Heimsheim has been chosen because of the longterm construction site before 2012. From the data between 10/2013 and 12/2013 a specific speed pattern could be elaborated. The green pattern is based on different truck sources whereas the red line comes from one fleet until the beginning of 2012 (reference: eFreight project).

A significant difference between the two lines can be seen, which can be explained by the finalization of the construction side and opening of the full capacity of the highway. In the mid of 2013.

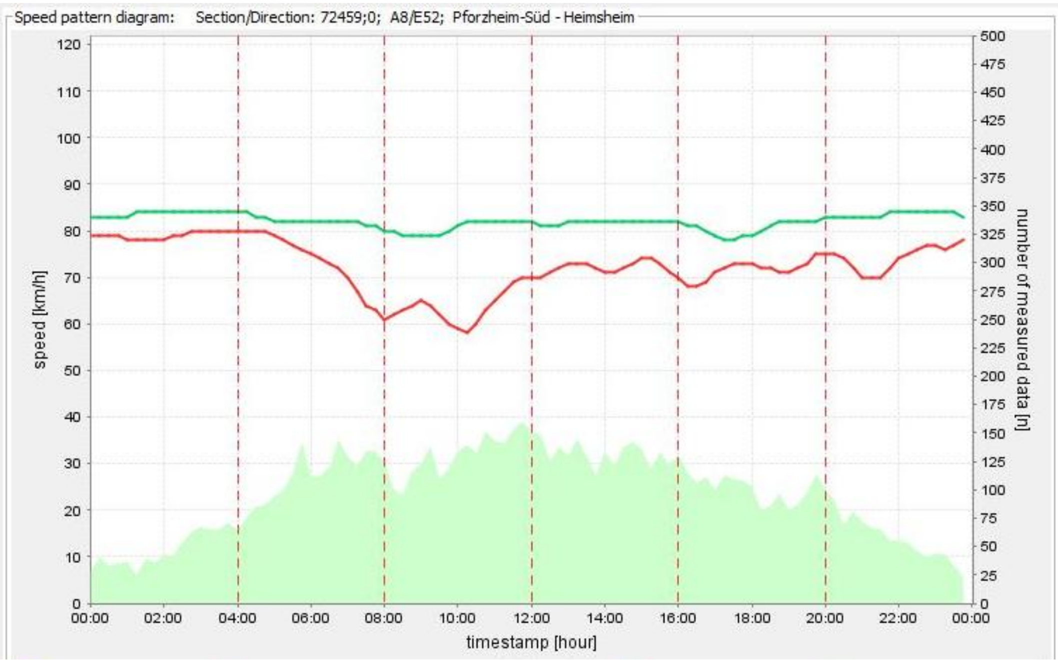


Figure 7-22: speed patterns during (red) und after construction site (green)

Such influences on speed values can be considered in a stabile manner by producing actual speed patterns.

System trial and stakeholder perspective

System tests regarding the planning of intermodal transport chains resulted in the following expertise based on the expert session with a German platform for intermodal/ combined transport with over 100 members. As described the questionnaire has been used for a structured interview.

At the moment no other tool for intermodal transport planning / routing for combined transport is known for being in use at the different stakeholders. Planning perspective is rather different when looking at terminal operator or service provider. Large enterprises usually have more strategic level of transportation planning. However the duration of the contracts between customer and combined transport provider tend to become shorter. The trend is going from 12/ 6 months contracts to 3 months timeframe. So the planning perspective is getting more short-term. Smaller enterprises focus more on the operational level like scheduling of shipments.

By using such a system a huge benefit could be to enhance the transparency and visibility of possible multi-modal transport chains. Another important issue is the significant difference of IT integration level at the stakeholders especially in the Hinterland. Inland waterway terminals for instance cannot be compared with Seaports in terms of data integration, information availability and interfaces.

In terms of rail transport it could be of value to determine possible chains on different corridors based on the available schedules. In this context short-term/ spontaneous transports of single waggons have become more and more irrelevant due to the transhipment possibilities and high organizational and financial efforts of rail operators and the delays within the process. The requirement for intermodal planning in this mode therefore is not so much operational but more tactical or even strategic.

The support for members or interested stakeholders regarding intermodal transport possibilities become more and more important. The provision of intermodal map information and terminals is a recent activity which could be even connected to the intermodal planning service provided by PTV.

An actual planning change or re-planning during the execution of intermodal transport is not often happening or if without notification of customer, transportation times and delays are not that critical due to types of goods and pre-planning processes of buffer times.

Another important issue is tracking& tracing of containers throughout the entire transport chain. Currently proprietary systems are in place for certain legs of transport, a cross-mode tracking independent from system environments is not possible at the moment. The need for that is well-known for many years, however in some parts of the chain transparency is not the main objective to be realised.

Crucial for the decision for intermodal transport are in most cases not environmental but more financial and safety and security.

The need for enhanced intermodal/ multi-modal transportation planning can be summarized:

- Enhanced ability for pre-planning at terminal side
- Tactical planning for road transport service providers
- Better knowledge about the used loading units and the status
- Overview about planning possibilities and available capacities
- Routing options, visualization of transportation options with additional information on costs, alternatives

Another reference to a research project can be mentioned here, the ISETECII project KOKOBAHN is working on standardized an enhanced data availability and transfer for the rail transport operators and seaports especially in Germany.

Important would be here to make sure the developments are in line with the European initiatives about standardized interfaces, intermodal transportation etc.

More detailed user/ stakeholder feedback is being described in the following sections.

7.6.3 Users/ stakeholder feedback

Regarding transport logistics and supply chain management four key elements were identified, that shall be integrated in the eMAR reference model:

- multimodal corridor design and monitoring
- intermodal transport chain planning
- chain monitoring & control
- performance management and benchmarking

The business case evaluation and the corridor analysis give an insight view about the information complexity and different information demand of various stakeholders and actors involved in the supply chain. In EMSF all relevant information were defined - regarding hinterland and corridor services it is essential to provide

- access to
  as well as
- interfaces for

data exchange and information transfer. The need for information, data and quality of data varies throughout the stakeholders in the supply chain, depending on their operational roles, their responsibilities and the processes and tools in use.

Opti-modal planning and Intermodal routing functions were identified as major functionalities regarding transport logistics services. As the hinterland connections of ports are differently organised depending on the corridor and the organisations and companies involved, general evaluation criteria need to be applied.

The evaluation of user needs and requirement is based on the different demands due to the planning, steering and monitoring of intermodal supply chains. Out of the user's point of view, a distinction is necessary concerning

- strategic perspectives
- tactical perspectives and
- operational perspectives.

The strategic perspective addresses the transport relations that are operated and the transport modes offered for logistics services. Also the contract capacities and contract durations are part of the strategic dimension.

The tactical perspective addresses the pre-routing or routing of transports in specific corridors and the frequency of transport services. Essential in this stage is the cost calculation which is based on the availability and quality of data and information.

Real-time disposition, on-trip tour planning and monitoring represent the main operational functions in the intermodal hinterland supply chain. Changes and cancellations in single processes stages are the reason for problems, especially when information is not available in time. Supporting services shall offer information about potential causes and shall provide opportunities to react.

As procedures and sequences of intermodal transport planning differ, a common framework shall be adaptable to a wide variety of use cases. Stakeholders in the supply chain would benefit from consistent information flows, but a single source or platforms were data are provided seems to be essential.

Interfaces, information flows and requirements towards ports regarding intermodal hinterland supply chains need to be collected from different stakeholder groups providing a basis for further development of logistics services connected to eMAR applications.

The following questions have been developed to evaluate business and testing scenarios with individual stakeholders. The evaluation of the users' feedback provides qualitative input that shall be considered in the development process.

Evaluation guideline for users / stakeholders feedback:

Evaluation Guide for Business Survey: "Corridor analyses Intermodal Planning"
Index
Company name:
Contact details of the person interviewed:
- Name:
- Position:
- Phone:
- E-mail:
A) Corporate information
1. How many employees work at your company?
2. Do you have a company owned fleet?
3. If so, is the fleet running for intermodal transport?
4. For what reasons do you organize intermodal transport?
(customer requirements, costs, environmental issues)
B) Multimodal hinterland transportation Planning
Please list in bullet points transportation planning activities that you perform in your business. Please refer to the different levels of transport planning
5. Strategic: eg purchasing capacity
6. tactical: eg handling of inquiries
7. operating: eg scheduling of shipments
Strategic *issues for intermodal transportation planning:*
8. Relations which are operated using intermodal transport?
9. Which mode of transport do you include in the intermodal transport planning? (Rail, inland waterways, short sea, others)
10. Does your capacity belong to long-term contracts and / or are you looking for short term capacity?
Questions for ***tactical*** *intermodal transport planning:*
11. Do you have pre-planned transportation chains via the corridor Hamburg-Vienna?
12. How often do you get requests for intermodal transport?
(Daily, weekly, monthly)
13. How much is the cost to complete a request/ offer?
Questions about ***operational*** *transport planning of hinterland transport:*
14. Frequency and reasons for changes in planning:
15. How often do you see changes / cancellations after installation of intermodal transport planning?
16. What are the common causes for changes?
a) before the execution of the transport?
b) during the transport execution?

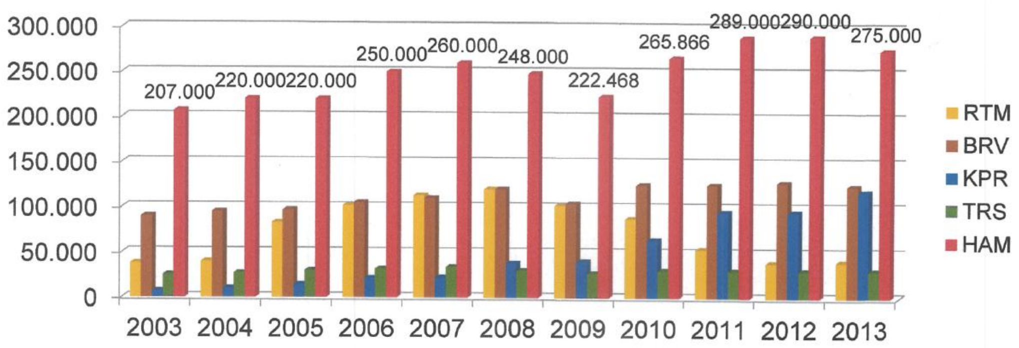
C) Procedure and sequence of intermodal transport planning:
17. Do you use a special tool, which enables an automated or partially automated transport planning?
18. If so, which one and what steps are being planned with the tool (strategic, tactical, operational)?
19. Does this tool also include intermodal processes?
20. Please mention key criteria which are crucial for your decision for an intermodal transport.
(e.g. cost of the entire chain, times, utilization contracts, capacity utilization own vehicles - indicate priority of possible)
D) Questions for obtaining information:
21. What data and information are needed for intermodal planning?
22. Who is providing this information?
23. How is the information collected and what systems or technical devices are being used here?
(E.g. system interface to the customer / booking system on the Internet ERP system: own + foreign, information services / telephone / fax / computer: Internet, e-mail programs: Access, Excel, forwarding program / other)
24. Are there differences in the form of information gathering at the tactical and operational transport planning?
E) Questions about problems and gaps in the current approach in the intermodal transport planning
25. Where do you see gaps and problems in today's approach regarding planning of multi-modal transportation?
26. What must / should / can be improved in this regard?
(e.g. processes / data / tools)
27. What would you expect from a planning tool for hinterland/ multi-modal transport chains?
28. What kind of minimum functions should such a planning tool have?
(e.g. route search / route proposal, optimizing function, data / info timetables, map-visualization - prioritize if possible)
29. Which kind of features would be additionally necessary?
F) Interfaces, Information flows and requirements towards ports regarding intermodal hinterland supply chains (refer to example Hamburg if possible)
30. What kind of services and information do ports offer for the intermodal planning?
(What is your interface to port community services, if there is any?)
31. What kind of services and information do ports need from the organizer of hinterland transport (operator, carrier, forwarding agent).
32. Where are problems and restrictions because of insufficient information (e.g. efficiency, legal issues, security …)
33. Are there any current developments ongoing which will foster the better and improved planning and execution of intermodal hinterland supply chains (Systems, platforms, legal ect.)? If so which?

34. Which kind of technical solution supports the planning and execution of supply chains at ports in the best way, which is the most needed one?
• Strategic (e.g. one year ahead)
• Preplanning/ tactical, well in advance (e.g. monthly)
• Operational planning (on a day to day basis)
• Information exchange / interface between different systems
• Real time information/ telematics, tracking and tracing
• Event management, reaction and event handling
35. Do you have any other suggestions?

7.6.4 Lessons learnt

Hamburg is the most important port for Austria concerning hinterland container transports. Especially the corridor Hamburg-Vienna is of high value, providing the connection of hinterland businesses to the world market. Most of the volume is transported via train, only high-value and urgent transports are done in truck pre- or posthaul transports, inland waterway is of less importance and not highly requested by industry.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
RTM	38.000	40.000	83.000	101.900	113.000	120.000	102.000	87.500	54.000	39.000	40.000
BRV	90.000	95.000	97.000	105.000	110.000	120.000	104.000	125.000	125.000	128.000	124.000
KPR	7.000	10.000	14.500	21.500	22.200	38.000	40.000	64.000	95.000	95.000	118.000
TRS	25.000	27.000	30.000	32.000	34.000	30.000	27.000	30.000	30.000	30.000	30.000
HAM	207.000	220.000	220.000	250.000	260.000	248.000	222.468	265.866	289.000	290.000	275.000
insgesamt TEU Austria (*	367.000	392.000	444.500	510.400	539.200	556.000	495.468	572.366	593.000	582.000	587.000



Quelle: HHM

Figure 7-23: Container volumes between Austria and various port destinations (Source: port of Hamburg)

The focus in the Hamburg-Vienna corridor is on container trains, where services have increased highly in the last years, regarding both, quantity and quality.

There are four main stakeholders involved in the supply chain:

- The ship owner

- The port or terminal operator

- The train operator

- The forwarding agent

Usually the implementation of new hinterland connections has to face a chicken-egg-problem in the start-up phase. The main problem is, that there is no long-term contracting anymore, so clients change their preferred train lines due to their businesses, the offered services and short-term prices even several times a year. Therefore in the start-up phase of new connections, the risk of low occupancy rates has to be taken by the train operator and/or the forwarding agent.

Concerning the routing there is the traditional way through Germany, but growing importance has the route through the Czech Republic via Prague. There have been gains in efficiency and services level in the last years, the travel time has been reduced by around 25%. Nevertheless it is the most effective measure to raise efficiency, to have complete block trains from a hinterland terminal to a destination quay at the port and vice versa. Until five years ago, nearly every train in the corridor Hamburg-Vienna was routed via the shunting yard in the city of Maschen (Germany). As the volumes in the corridors were not coordinated, there were only a few waggons for each quay in each schedule slot. There trains were split up and put together, due to their destination quay. Nowadays all operators and forwarding agents try to organise block trains to only one quay destination in the port. These block trains are operated as shuttle services, using the same waggon material each running.

Ship owners usually have contracts with specific quay sites, so usually the quay destination and the arrival of the ship are known quite well in advance. But also ship owners and shipping companies have alliances, so it can happen that the use other gates or quays, which is sometimes a short-term decision. There is a high demand for this kind of information between the stakeholders in order to optimize the supply chain.

If containers do not arrive in the forecasted time, and if they miss the hinterland connection via train, the empty waggons are used for other containers. This is also done, if the containers are foreseen for another quay destination that the train is going to. In this case, the train is also operated as a full block train to one final quay destination, but the post-haul for the containers to other quays is done via truck. This is more efficient than splitting the train, but additional information about the status of the train, and the status of each container is necessary. As this happens quite regularly, the operators and forwarding are keen to have actual information available in order to optimise their operative planning. It is necessary for train operators, to have an occupancy rate on each train of at least 80% in order to cover cost and cut the break-even point.

For the planning of train hinterland transports the information about size and weight of containers is also very important. A train is limited by two factors:

- Length
- Weight.

To optimise the usage of train equipment and resources, a well-suited mix of containers (20 ft container, 40 ft container etc.) has to be planned. It is also intended to have a good mix of heavy and light containers (e.g. empty containers) in order to use the maximum train weight capacity. New and lighter waggons have been developed and implemented within the last years, offering another efficiency effect of around 10%.

From the strategic point of view regarding train operators, train hinterland transports are planned in one-year periods, going along with the ordering period of a train path. The forwarding agents in contrary operate very flexible on the market, and do rarely commit to long-term agreements.

In general, the operation of exports (transports from hinterland to ports) is easier than the operation of imports (transport from ports to hinterland). Planning in advance is possible for exports, whereas imports do depend on the arrival time and the arrival quay of the ship, the available train capacities and the business connections and alliances in the supply chains.

Another planning parameter in the whole supply chain is the fact, that currently (for the corridor Hamburg-Vienna) there is surplus of exports regarding the volume of imports. Therefore empty containers are needed in hinterland terminals, and therefore connections with other hinterland destinations in other countries need to be operated.

The seaport-hinterland interaction plays an increasingly role in shaping supply chain solutions of shippers and logistics service providers. In terms of reliability of transport solutions, seaports and hinterland corridors take up a more active role in supply chains. Hinterland connections are thus a key area for competition and coordination among actors.

Port hinterlands have become a key component for linking more efficiently elements of the supply chain, namely to insure that the needs of consignees are closely met by the suppliers in terms of costs, availability and intime freight distribution.

This is why it is important to concentrate more on web based services/applications in the course of (supporting) intermodal planning in order to ensure a better information integration/exchange and an optimization of the supply chain.

With the interfaces between stakeholders and the related eMar activities a major contribution to fostering the hinterland transport connections and intermodal transportchains can be provided. Testing and exchange of approaches and solutions with relevant stakeholders within structured interviews helped to identify future needed developments and requirements.

Due to all these issues, and the complexity in optimisation of hinterland supply chains, operators and forwarding agents do regularly work together. They switch and shift loads in order to optimise trains, and to have full block trains to one port quay destination. The information about incoming and outgoing ships and their schedules are available in quite good quality, further and detailed information about the actual status of containers is circulated between the stakeholders. Actually there are deficits concerning this information, due to the different stakeholders involved, each of them using individual systems and interfaces. Here additional platforms and services would provide added value for the stakeholders in tactic and operative planning processes.

8 Pilot Study 3: East West Transport Corridor

8.1 Introduction

VGTU main aims of the EWTC pilot study:

- To provide the information on applications and their interfaces between each other for freight operations along EWTC;
- investigate application to application integration across a EWTC, improved interoperability with administrations and other networks particularly serving the entire logistics chain;
- Investigate possible interface of transport logistics applications with the eMAR platform to develop EWTC by providing enhanced e-Maritime services that will improve efficiency and service quality along the corridor;

Exploiting the capabilities of existing technical solutions for EWTC and Transport Chain Management, the port community actors and services to be integrated with the hinterland actors and services in the proposed Klaipėda Port single-window integrated architecture pilot case.

8.2 Objectives

From stakeholders point of view there are different requirements to be fulfilled by the Port single-window integrated technical scheme (architecture) solution for Port community, especially in harmonization for the processes and interfaces between stakeholders. As it allows providing detailed and correct real time information about the processes at the terminals (port/hinterland) to the connected systems for *transport chain operators/customers (users).*

The users involved in the VGTU proposed pilot represent a list of stakeholders acting in multimodal transport:

- Freight forwarders;
- Stevedoring companies (port terminals);
- Customs;
- State Veterinary Service;
- State Plant Protection Service;
- Ship agencies;
- Klaipeda Public Health Centre;
- Fishery Department;
- Klaipeda State Seaport Authority;
- State Border Guard Service;
- Lithuanian Railways;
- Vessel Traffic Service;

- Port Dispatch;
- Ship owners;
- Port Charterer;
- Customs brokers and declarants;
- Multimodal Transport Operators;
- Road Haulers;
- Consignor;
- Consignee.

The common objectives of the stakeholders can be summarised as follows:

- Multi-modal transport information and management system, increasing the reliability and accessibility of intermodal freight transport solutions through One-Stop-Shop booking, reporting and payment services;
- Develop support for end-to-end supply chain security by ensuring integrity of the entire supply chain and prompt risk assessment through data sharing and Single Window services for interaction between authorities and commercial stakeholders in the EWTC;
- Freight monitoring system (including possible services providers in relation to the progress and other activities) for the transport chain along EWTC;
- Secure information exchange between the ICT solution users.

8.3 Transport Logistics eMaritime Solutions Description

This section gives a description of the logistics applications and their interrelations that will be available to eMAR platform. The Interrelation in the Lithuanian transport sector presented in Figure 8 1: . The port community system KIPIS (chapter 8.3.1.) is the basis of the port single window, as its main function KIPIS is transferring and processing information on freight movement via the port of Klaipėda (for processes between all stakeholders involved in the creation of paperless export, import and transit processes at the Klaipėdas Seaport).

The components (application to application integration with KIPIS) of the port community system across EWTC in links/nodes can be listed as follows:

- **KROVINYS (Cargo system of JSC "Lithuanian Railways");**
- **e.KROVINYS** (**JSC "Lithuanian Railways"**) seeks to ensure the information links between hinterland and the port (via IS KIPIS);
- **Ship Information System** (LIS) – system of Klaipeda Seaport;
- **LUVIS (under development)**(system of Klaipeda Seaport) the system will ensure efficient cooperation between port offices and ship agents, owners/freighters and skippers; it will reduce the necessity to coordinate inter-communication among

different port players/services and the impact of human factor on navigation management processes.

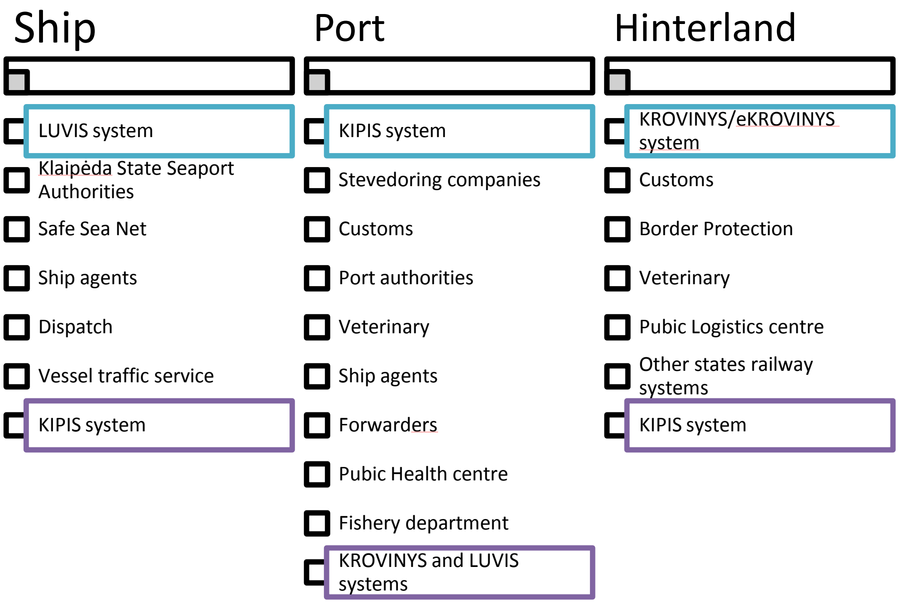


Figure 8-1: : Interrelation in the Lithuanian transport sector

8.3.1 Port Community System - KIPIS (as a basis for the system)

KIPIS is not the only ICT system to be included in the eMAR platform. IS KROVINYS (of Lithuanian Railways) and a new project e.KROVINYS (Lithuanian Railways) seeks to ensure the information links between hinterland and the port (via ICT KIPIS). PMTS (Port Traffic Management System), KROVINYS (e.KROVINYS) and NCTS (New Computerized Transit System of Customs) integration comply with the eMar objectives. KIPIS serves as the basis for formation of the eMar platform.

Constitution of the Klaipeda Port Community

- Over 60 ship agencies
- Over 150 freight forwarding enterprises
- Over 15 stevedoring enterprises
- JSC “Lithuanian Railways” (main carrier, 70% of cargo.)
- Lithuanian Customs
- Klaipėda Public Health Centre
- State Plant Protection Service
- State Border and Transport Veterinary Service
- State Border Guard Service
- Fishery Department under the Ministry of Agriculture
- Klaipėda State Seaport Authority

For Klaipėda port community KIPIS(it could be considered as one of the main elements for the construction of ICT of the port community system) is designed for transferring and processing information on freight movement via the port of Klaipėda.

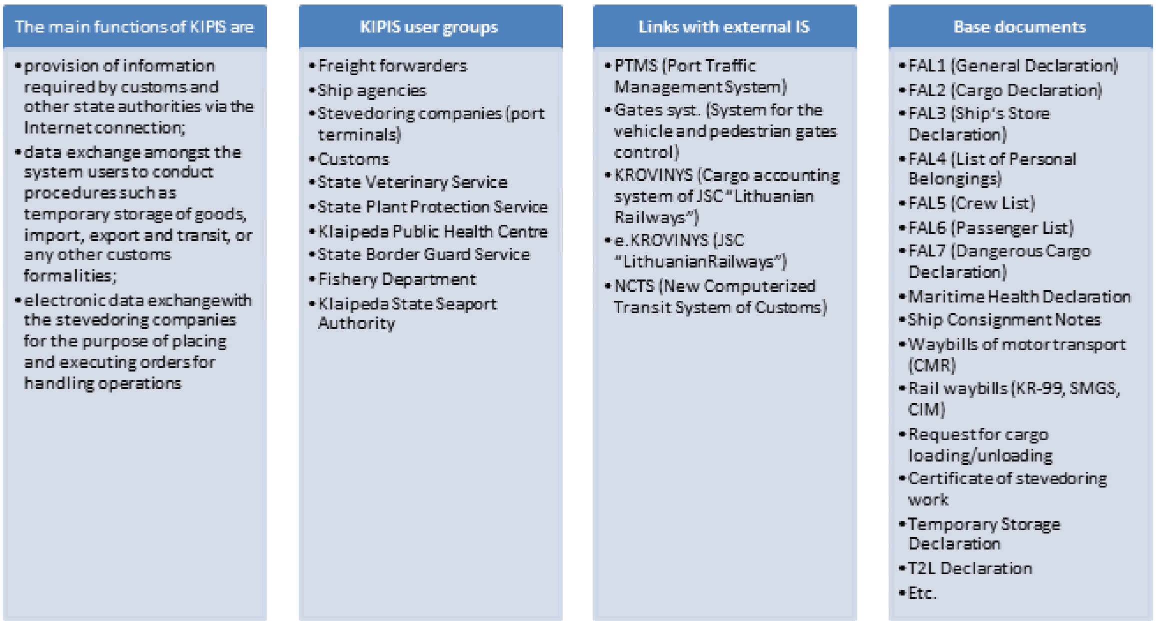


Figure 8-2: Klaipėda port community KIPIS

More than 16 500 documents per month (May 2012), *source- Klaipėda State Seaport Authority, 2013*

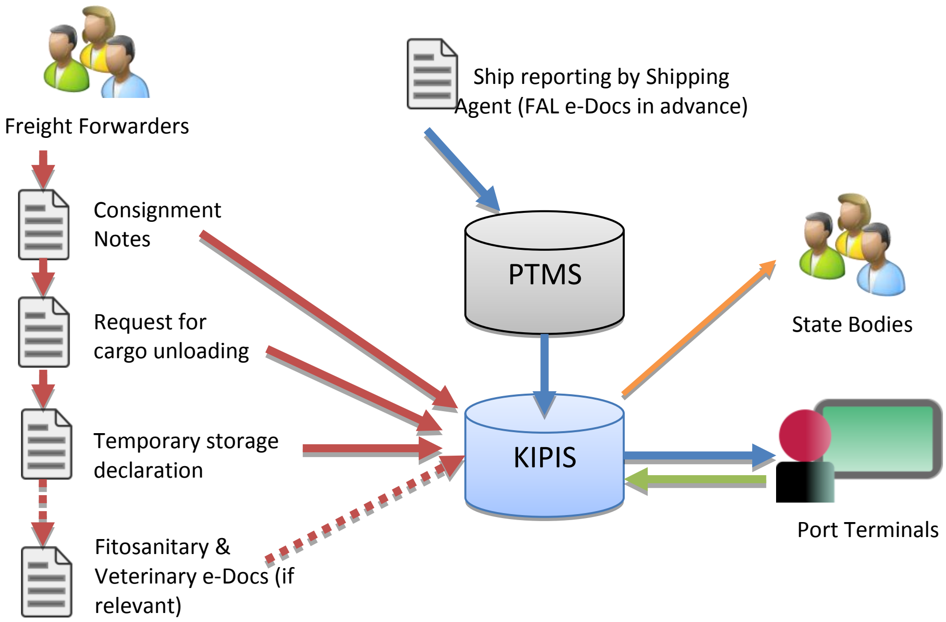


Figure 8-3: KIPIS data flow, Source: Klaipėda State Seaport Authority, 2012

General benefits

The KIPIS system accelerates the exchange of data and information between various participants in the logistics chain, and provides the conditions to enhance the competitive capacity of the port of Klaipeda. The Port Authority obtains statistical information, which it is obliged to provide to the Statistical Office of the European Commission (EUROSTAT) pursuant to the European Council Directive 95/64/EC on statistical returns with respect to carrying goods and passengers by sea. KIPIS also generates other reports and accounts needed for the Port Authority to make decisions related to strategic port management.

In October, 2010 the Directive came into force. Pursuant to it, EU Member States can accept paper documents until June 1st, 2015. Afterwards only the electronic documents will circulate. In this directive there are points on compulsory documents needed to be declared before the ships arrival (about 8 types of FAL convention documents).

Klaipėda seaport is already prepared for this: all the agreements have been signed and all the ship agents already have the technical solutions required for this. LIS (sea port information system) is also working. Nobody sends paper documents to the captain of the port – he gets the electronic information.

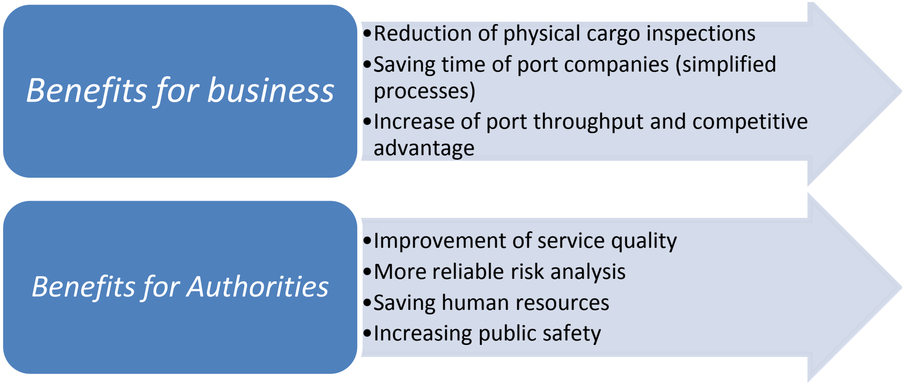


Figure 8-4: KIPIS benefits

Needed developments

Elimination of document duplications, integration of different IS, integration of all port community partners (a possibility to connect the common port information system) are directly related to the objectives and tasks of the eMar project. Finally, these are the measures necessary to implement the national single – window principle.

Identified problems in data exchange among partners of Klaipėda seaport community, the following bottlenecks in developing port community were identified:

a) Not all the structures of port authorities have access to KIPIS, so the process which could be facilitated via KIPIS is handled manually at the current moment. It is obvious that KIPIS cannot eliminate all documents; some of them are needed in the cross border customs clearance. But another problem is that not all institutions accept documents from KIPIS (printed out).
b) Some institutions don't have common guidelines for all the employees especially when the method of work changes two or more times a day.
c) Human factor also makes some incompatibilities and misunderstanding between port authorities and companies. For example, KIPIS shows that company can unload cargo ships and no commission visits are required, but still there is a possibility to get penalty for unloading ship before the visit of the port control.
d) Ship information system (LIS), which is dedicated to ship agents and port authorities to gather information about a ship, crew, the last ten ports, trash etc. works separately from KIPIS and others port **ICT.**
e) Customs Declarations Processing System (MDAS) covers (duplicate) approximately 10% of KIPIS. Those systems are not connected.
f) Other problems in data exchange:
   - Some documents contain duplicated records/data
   - Different authorities have to be provided with the copies of the same documents
   - Information delays affecting delays in cargo handling

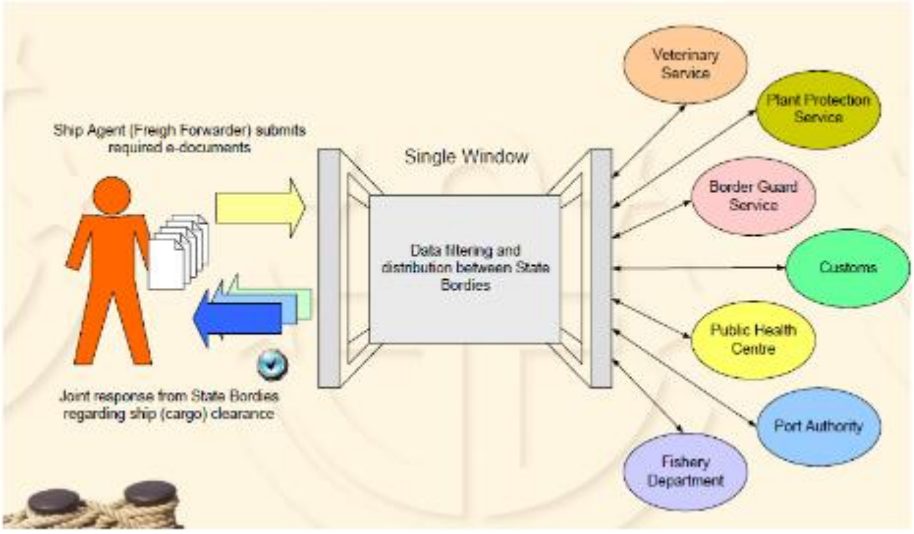


Figure 8-5: Single Window concept, Source: KlaipėdaState seaport Authority, 2013

8.3.2 LUVIS

The newly created system LUVIS will facilitate:

- Sending e-messages to the port (together with the accompanying documents) on the anticipated ship arrival time, re-berthing or departure;
- Sending the electronic general, interim and departure declarations to the port, as well as freight and dangerous freight manifests;
- Submission of applications to the port on the issue of various certificates, and receipt of the certificates via the portal of e-services;
- Revision and payment of the bills for port services;
- Use of interactive port duties calculator by simulating “virtual” ship’s entrance into the port;
- Submission of messages to ship agents, owners and skippers;
- Submission of automated data to the information systems of other stakeholders;

The system will ensure efficient cooperation between port offices and ship agents, owners/freighters and skippers; it will reduce the necessity to coordinate inter-communication among different port players/services and the impact of human factor on navigation management processes. The system will create the conditions to organise vessel traffic more rapidly and more efficiently, eliminate the risk of transportation of dangerous cargoes and enhance quality of services rendered to ships.

Currently existing Ship Information System (LIS) is linked with the KSSA financial management system and KIPIS, it also transfers data to the European Maritime Safety System.

Together it evidently appears (in the LIS activity): limited functionality, lack of efficiency, duplication of information, requirement to submit paper documents and etc.

The above mentioned shortcomings will be eliminated after establishing and implementing LUVIS under a modular principle. It will allow to separate process management, accounting of port duties and other port functions into the functional modules, and will provide a possibility for port services to focus on their specific tasks. Moreover, the system will reduce the necessity to coordinate inter-communication of relevant services determined by the information system. Efficiency of the system will ensure higher effectiveness of the port services and will reduce the likelihood of errors.

Target groups of LUVIS project: port dispatchers, employees of the Port Navigation Safety Service, employees of the Port maintenance Service, and Port economists

Advantages:

- Automated data transfer and arrangement procedures, calculation of port duties and navigation processes will ensure effective work of KSSA workers and save their time; information system will be precise and of high quality;
- Ship agents/owners/freighters will have less administrative work since part of documentation will be submitted online; the orders of port services, simulation of ship entrance procedures, supervision and payment of bills and receipt of relevant information (messages) will be available in the e-service portal. This will save time, ensure effective ship handling in the ports and better quality of services;
- Data from LUVIS to be transferred automatically to the information systems of stakeholders. This will ensure integrated implementation of the navigation management and safety assurance measures: precise, comprehensive and timely data for the evaluation of situation, the need for safety measures and efficient decision-making procedures.

Upon implementation of the Project it is anticipated to achieve the following indicators for monitoring the Measure VP2-3.1-IVPK-03-V of Priority 3 „Information Society for All“ under the Economic Growth Operational Programme:

- Two years after the introduction of e-services the share of consumers of e-services of the total number of consumers will increase by at least 50 percent.
- Two years after the introduction of e-services the share of consumers positively evaluating these services will account for at least 70 percent.
- It is anticipated to introduce 6 new e-services.

During the Project implementation period it is envisaged to implement LUVIS system designed for the automated management of navigation processes of large and small ships and accounting of port duties. This system will also be beneficial to information systems of data of other institutions and to rendering e-services under a “single window” principle. It will also provide for separation of the **real-time management** of the navigation processes from process accounting functions; development and implementation of e-services ensuring effective communication of port services and ship agents, owners/freighters and skippers; and elimination of “traditional” information exchange methods.

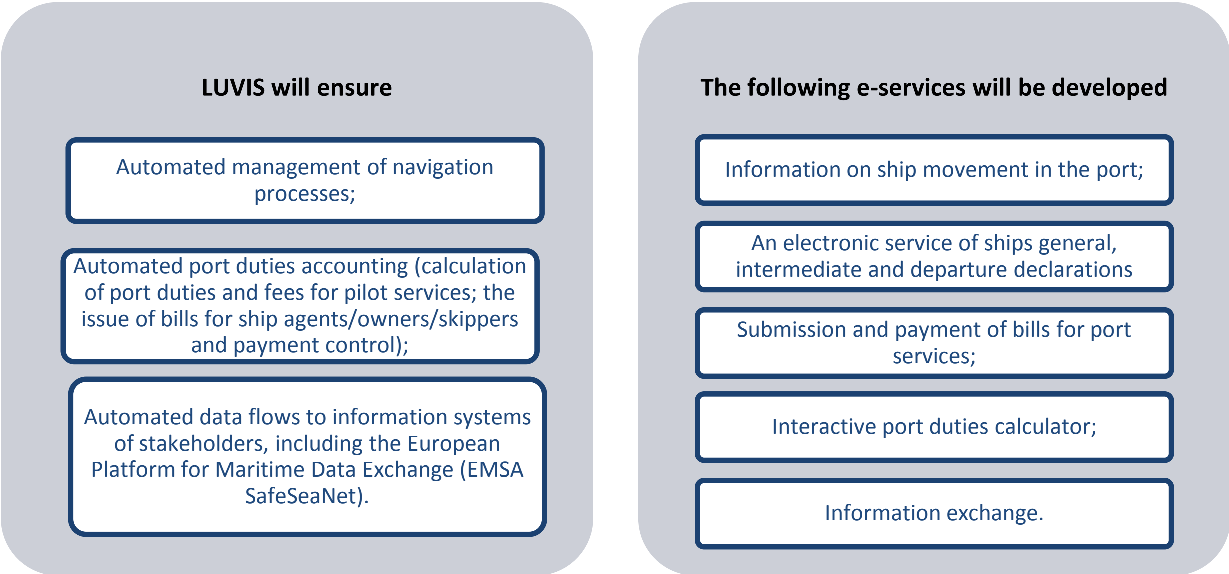


Figure 8-6: LUVIS implementation

LUVIS will be capable of eliminating the obstacles existing in the LIS system by applying a new approach toward organisation of the navigation processes with the help of information technologies.

Principles of LUVIS logical architecture:

- The principle of separation of internal and external users;
- „„*Loosely coupling*“ principle

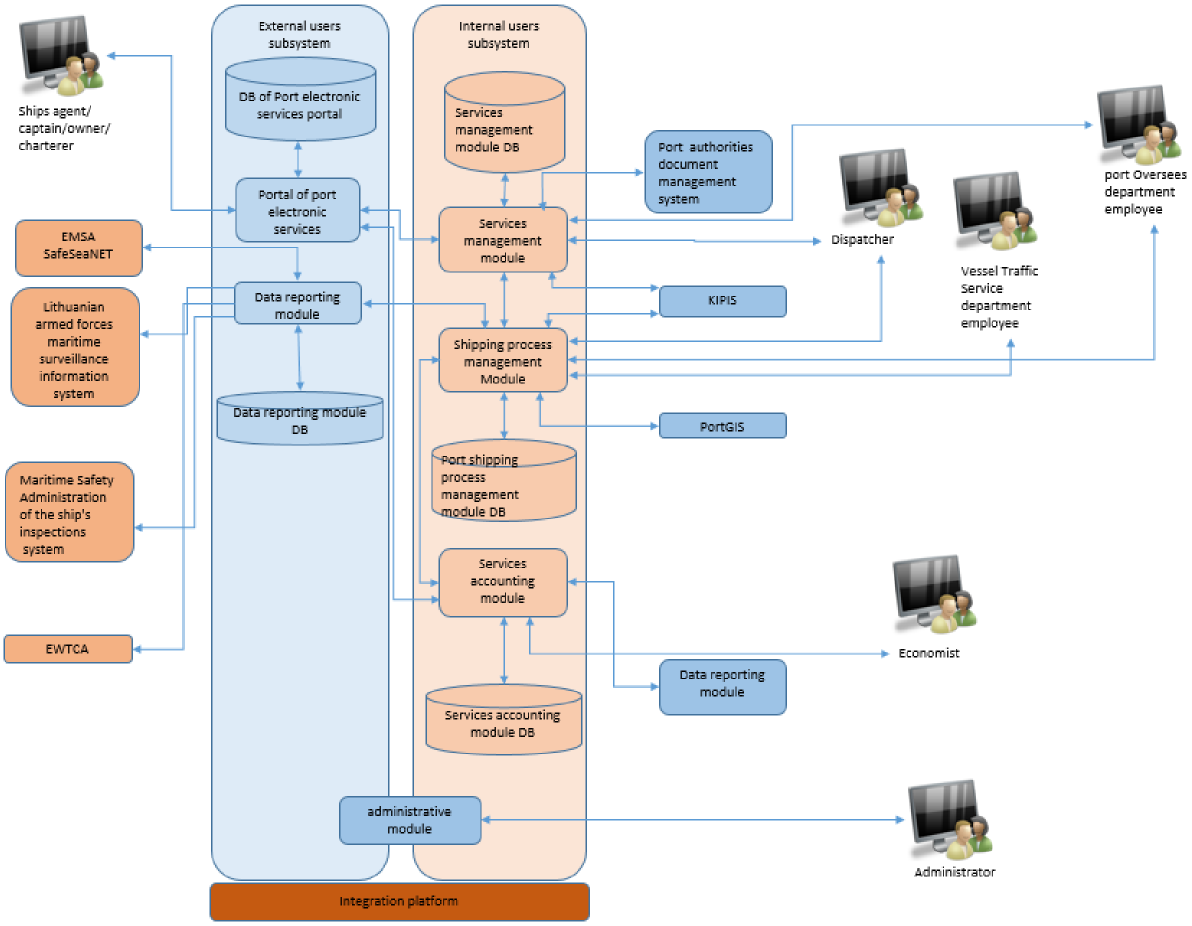


Figure 8-7: LUVIS logical architecture. Source: KSSA information

8.3.3 IS KROVINYS (ICT FREIGHT)

Lithuanian Railways established and developed the information system KORIVNYS for freight transportation by railways. This system has been established since 2003 and from the first day of the Project it was directed toward the needs of Lithuanian Railways and toward computerisation of the processes pursued by Lithuanian Railways.

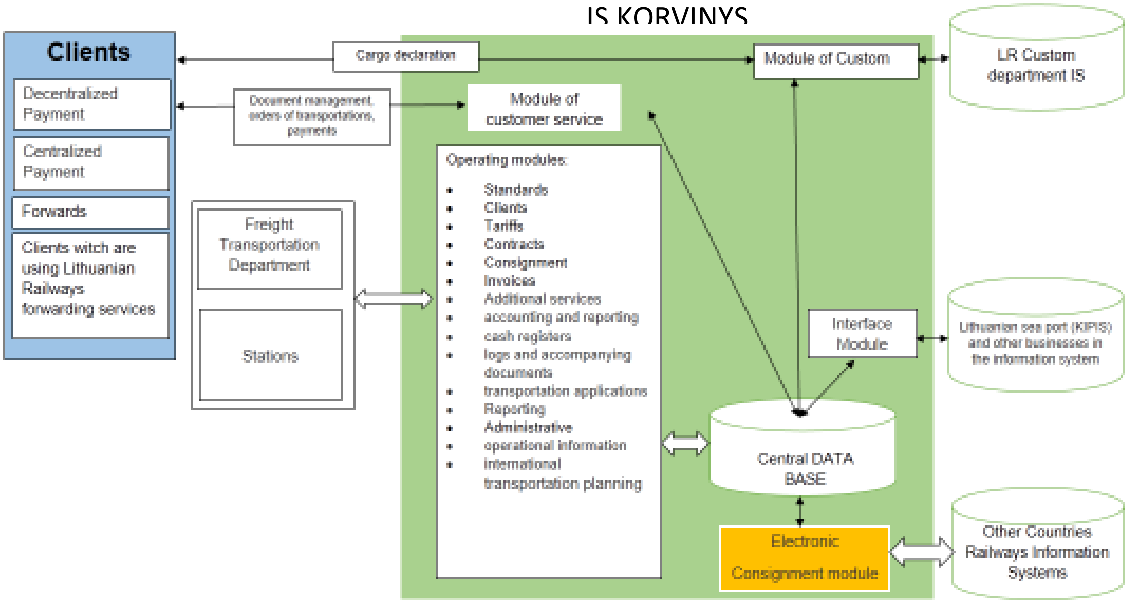


Figure 8-8: IS KROVINYS, Source: Lithuanian Railways, 2013

This information system is dedicated to collect all main freight transportation documentation into one central database, receive relevant information and print the documents in all workplaces. The system includes: data management on all freight carriage cycles, data collection (starting from the freight transportation contract with the customer to the VAT invoice for the provided services, and accounting control.

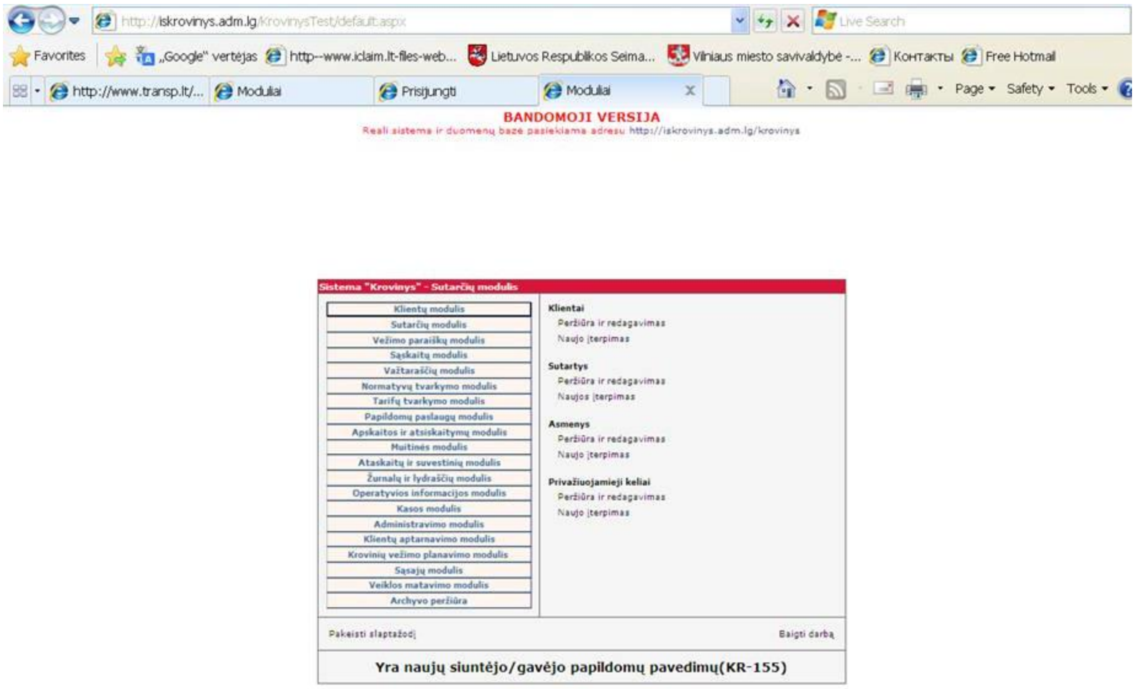


Figure 8-9: Online IS KROVINYS platform, Source: Lithuanian Railways, 2014

The main functions of IS KROVINYS include:

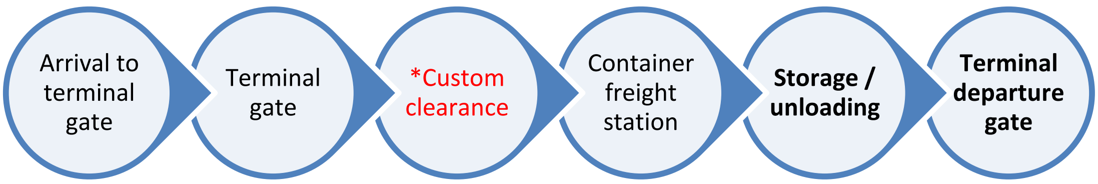
1. Preparation/management of freight documentation.
2. Preparation/management of documents on the provided additional services.
3. Management and accounts of journals and the accompanying documents.
4. Tax calculation for services provided by AB „Lithuanian Railways“.
5. Invoicing.
6. Customs procedures and preparation of pre-arrival customs declarations.
7. Preparation and coordination of international and local freight carriage applications.

8.3.4 Container process management and intermodal terminal (using IS “KROVINYS)

Container handling management in intermodal terminal (IT) involves the following process:

- Container arrival to IT by road transport
- Container departure from IT by road transport
- Container arriving by rolling stock
- Container departing by rolling stock

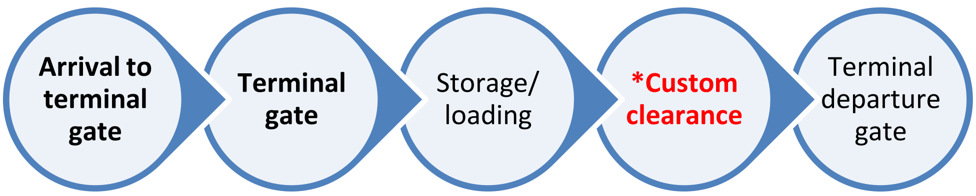
Container arrival to IT by road transport



Point	Actor and operation	Documents and information	Comments
Arrival to terminal gate	Terminal gate dispatcher checks	Shipping line of freight forwarders provided invoice in IS KROVINYS Electronic message (EDI)	Freight forwarder provided information at IS KROVINYS: Freight forwarder (drop off or pick up) company name, container ID no., vehicle or trailer’s registration no., Drivers name and last name, Custom document no. (for handled container), container seal’s no. (for handled container), Container transfer to agent in IS KROVINYS, Cargo declaration, custom document for temporary storage (container loaded not in European

			Economic Community)
Terminal gate	Terminal gate dispatcher authorize entrance to terminal	Update container status in IS KROVINYS to “entered to terminal”	
*Custom clearance	Custom check	Freight forwarder or shipper provides container documents and container to inspecting institutions. Custom officer authorize permission to unload container and accept the container registration in IS KROVINYS Declaration and freight invoice uploaded in IS KROVINYS	
Container freight station	Container receiver checks registration form (cargo invoice in IS “KROVINYS”)	Issued container storage ticket	Exterior of container inspection
Storage / unloading	The driver sent to storage area, crane operator unloads container	Crane operator confirms on IT management and gate control system location of container storage area	
Terminal departure gate	Departure gate dispatcher	A driver leaving through departure gate provides gate dispatcher container storage ticket, gate dispatcher prints out and provides the driver with the container receipt for acceptance	

*Container departure from IT by road transport (*NOT EUROPEAN ECONOMIC COMMUNITY)*

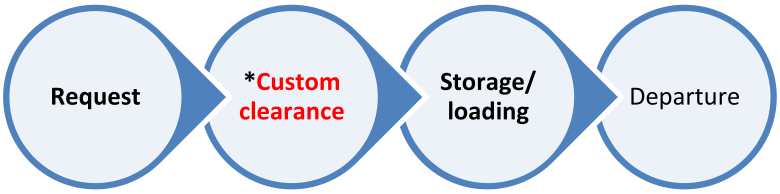


Point	Actor and operation	Documents and information
Arrival to terminal gate	Gate dispatcher checks the vehicle documents provided by cargo forwarder	Checked documents: The consignment note in IS “KROVINYS” Set out in the form of an electronic message (EDI system) Gate dispatcher verify that the registration of freight forwarders “KROVINYS system coincides with the facts and documents
Terminal gate	Terminal gate dispatcher authorize entrance to terminal	
Storage/ loading	Container receiver checks storage container location and road vehicle and driver data, directing the driver to the container storage / loading site. The driver goes to the storage area privided in container ticket where crane operator confirms loaded container to IT managment and gate control system	
***Custom clearance**	Customs and other agencies cargo inspection. The driver of the vehicle provides cargo to the customs inspection terminal. Customs document and other documents accompanying the consignment are provided for customs officials. If a customs officer authorize the exit of the container, the confirmation is made in IS “KROVINYS”, the invoice in the system is saved and forms the loading bill.	Gate dispatcher checks the vehicle and container numbers in "KROVINYS" system approved by the customs registration, if the information matches the vehicle and container is registered for the exit (gate crossings) form IT
Terminal departure gate	With a loaded container driver leaves toward gate, before providing storage are document to the container receiver. Inspection by container receiver. If the inspection is made without any discrepancies container receiver provides driver the container receipt for acceptance container-making - and directs the driver towards the IT exit gate.	Container receiver: inspect the vehicle and container numbers in IT managment and gate control system, exterior of the container data meets the data in IS „KROVINYS“, approves container loading on vehicle and formes loading document (on IS „KROVINYS“), prints out receipt for acceptance.

*Container arriving by rolling stock (*NOT EUROPEAN ECONOMIC COMMUNITY)*

Point	Actor and operation	Documents and information	COMMENTS
Arrival	Freight forwarder and IT manager receives information from railway dispatcher the time of arriving container wagon	Freight forwarder provides request in IS "KROVINYS" system to unload container	In IS "KROVINYS" provides following information : Container freight forwarding company name; Container number Wagon number Customs document (for loaded container) Manifest, customs document for temporary storage of container (loaded container NOT in EUROPEAN ECONOMIC COMMUNITY)
*Custom clearance *	The loaded container, which requires a detailed inspection of the customs	Freight forwarder provides customs office with SMGS / CIM invoices and other documents; Customs officer by authorization of container handling confirms in IS "KROVINYS" the request of container forwarder to unloading container and confirm SMGS consignment note	
Railway station	Container receiver and railway station manager inspects arrived wagons in the IT area.	Forwarder in IS "KROVINYS" provides request to unload that is approved by the customs, the container receiver generates and submits handling document in IS "KROVINYS" and container arrival to the terminal. The crane operator registrates the container storage location.	

*Container departing by rolling stock (*NOT EUROPEAN ECONOMIC COMMUNITY)*



Point	Actor and operation	Documents and information
Request	Freight Forwarder provides request to IT manager the date ant location of loading container on rolling stock . Terminal manager forwards the request to railway station dispatcher, who orders required number of rolling stock.	Freight forwarder provides in IS “KROVINYS” request for container loading and carvo invoice for container departure by rolling stock.
*Custom clearance	If container loading is authorized on rail rolling stock, the customs officer approves the request in IS”KROVINYS” and SMGS consignment note.	For loaded container, which requires a detailed inspection of customs, freight forwarders provides SMGS consigment and other documents.
Storage/ loading	The shift manager provides wagon number for container. The crane operator confirms the loading on the wagon. Loaded containers are inspected by container receiver and a railway station receiver.	Jei sąlygos įvykdytos, sutampa su faktu konteinerių priėmėjas suformuoja ir pateikia krovos darbų aktą. If the conditions are met, in line with the fact the container receiver forms container-handling document.
Departure	Container receiver inspects custom’s confirmed SMGS and if the conditions are met, and coincides with the fact of IT management and gate control system registrates container departure.	

8.3.5 KROVINYS and KIPIS interface

The integration platform established during performance of the project **e.KROVINYS** shall provide interactive e-services to the users of railway freight transportation services. The following **interactive e-services** shall be developed during the Project:

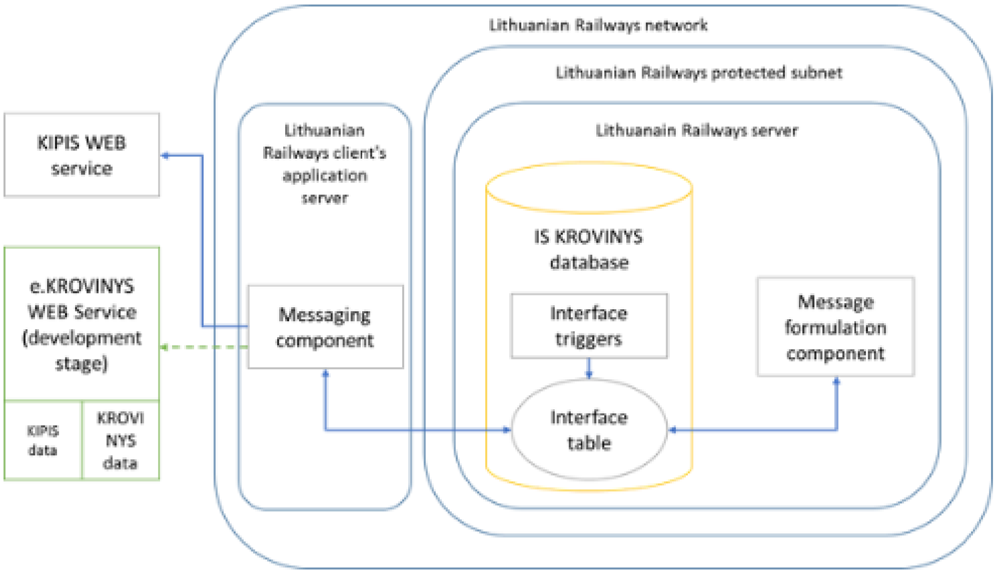


Figure 8-10: KROVINYS and KIPIS interface, Source: Lithuanian Railways, 2013

- **ES.1 (e-services) Order (reservation) of railway freight transportation services.** Through this e-service, the clients of railway freight carriage services shall have a possibility to order railway freight transportation services. They shall receive electronic information on the capacity of the providers of freight transportation services. These services shall include: collection of information on freight handling capacities and wagon demand; and forecasts on the possibility to deliver wagons for freight transportation by railways.
- **ES.2 supervision of the procedure of freight transportation by railways.** The users of this service shall receive timely information on movement of their freight by railways in the territory of the Republic of Lithuania, on the planned duration of freight transportation; they can also receive information on wagons supply, the journal of rented wagons, relevant standards, the signed contracts with the LG and other information related to the provided services.
- **ES.3 automated preparation and submission of railway freight transportation documents.** The users of railway freight transportation services shall have a possibility to prepare (via the Platform tools) and submit declarations, consignment notes and other documents related to the initiation and pursuance of railway freight transportation services, to put an e-signature and receive written responses.
- **ES.4 automated preparation and submission of railway freight handling documentation.** The users of railway freight transportation services shall have a possibility (via the Platform tools) to submit declarations, consignment notes and other documents relevant for the initiation and pursuance of handling works.
- **ES.5 automated preparation of declaration and its submission to the customs office.** The users of railway freight transportation services shall receive partially completed preliminary NCTS declarations managed by the automated tools IS FREIGHT and KIPIS.

The above interactive e-services shall be realised at least at the cooperation level, shall be accessible via the portal of the Platform and have the tools for authentication, information and monitoring.

In order to ensure the data exchange between the users of railway freight transportation services and providers of freight transportation services, the Platform shall contain the tools providing for the exchange of the data of freight and handling documentation, the data on wagons supply, the journal of rented wagons and on relevant standards.

Main problem currently it is a one-way exchange of information: from the Lithuanian railways to KIPIS. Obtaining information from the ship using KIPIS would be useful for Lithuanian Railways.

Another KIPIS problem is related to the absence of databases for the past data; there is no statistical data or residual value.

In order to optimise the process of freight transportation by railway and maritime transport by developing the integrated freight transportation electronic services, currently preparations commenced on e.KOROVINYS (e.Freight) project ”draft model for the integrated freight carriage by maritime and railway transport, preparation of documentation for the development of electronic services, establishment and implementation of information platform and modernisation of KIPIS and is freight systems”.

8.3.6 Business case supported

The governance structure for the continued development of the EWTC is built on the EWTC Association. The association is the key driver of further development, promoting the EWTC for stakeholders in the corridor and by giving support to the partners through the secretariat.

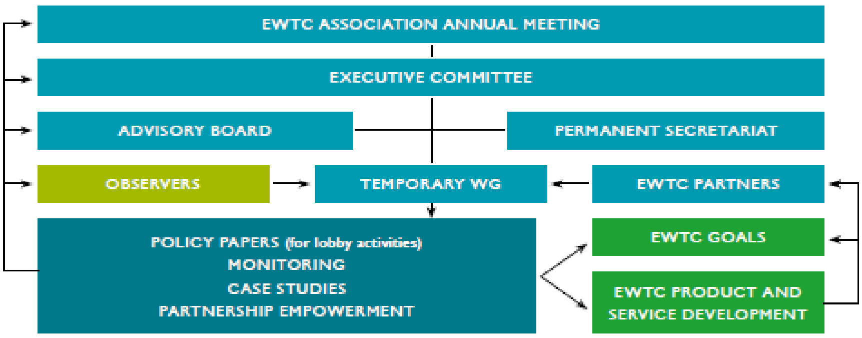


Figure 8-11: EWTC management structure, source: EWTC strategy and action plan, 2012

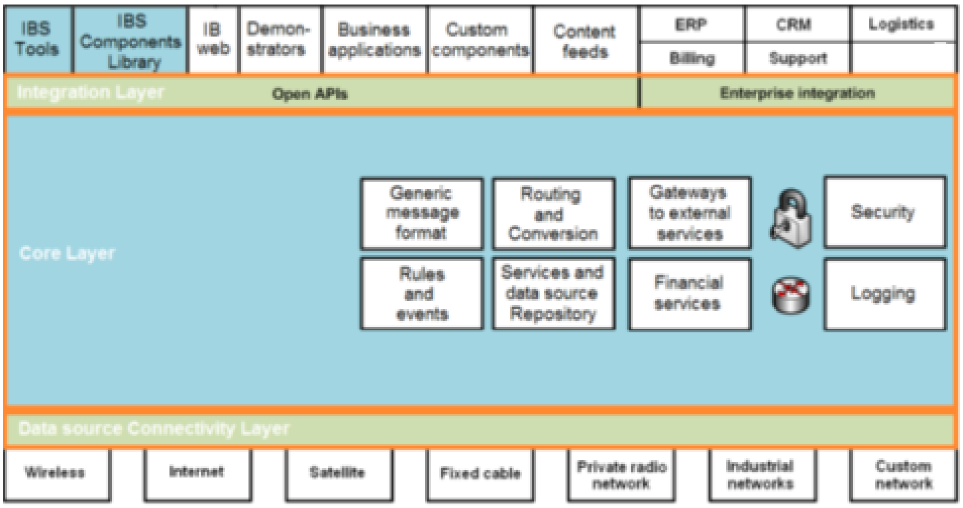


Figure 8-12: EWTC the Information Broker system components, source: EWTC II project Final Report Information Broker, 2012.

The Information Broker System should support system management, technical support and testing, including the list of functionality:

- User management;
- System performance monitoring;
- Central security management;
- Data source management and device configuration;
- Central repository (data sources, users and other system objects);
- Search functionality (users, data sources, etc.)

Broker is a tool significantly reducing the cost for: Integrating information sources and hardware from any vendor with any type of IT systems used by the commercial actors.

Exchanging real-time information with any other actor in the corridor. This includes information in business systems, vehicles, containers, GPS, sensors, and any other type of technical device or machine.

8.3.7 Compliance with EMSF

Regard to the EMSF application areas and eMAR processes this pilot model is focusing on integrated ICT of the transport planning and management between seaport and hinterland transport network.

Because of a specific EWTC situation, when cargo is delivered to/from the European **Economic Area**, the best way would be to transfer data to the system from the moment of crossing the EU border (in order to obtain confirmed information complying with the EU laws and regulations). Consequently the information would reach the eMAR platform via a integrated port single-window system KIPIS. There might be several exemptions depending on mutual agreements of the EU Member States and neighbouring countries; e.g. the agreement between Lithuania and Belarus concerning the container train VIKING . Thus, all information about cargo could be transmitted via integrated port ICT to the eMAR platform.

In summary it can be stated that the tie-in with EMSF possible using standardized communications with individual one-stop systems. Web applications (solutions)) through the national single window systems can guarantee the safe and easy to use eMAR platform services. All systems operating in the corridor contain information which can „feed“ eMAR system. The only unsolved issue is recognition of the provided data. Given case of Lithuanian transport systems, either way have compliance with EMSF, whether we will implement the pilot scheme of NSW or existing port single window system, but still quite a bit hitches communicating business and controlling authority.

8.3.8 Interfaces with eMar base Platform

Single window integrated architecture will be adjusted to the eMAR platform and used as the basis in integrating the systems of EU Member States. During the integration process each individual case will be subject to specific modifications:

- Integration in the platform via embedded applications;
- Establishment of the embedded applications is based on the open code system;
- Embedded applications are developed together with the representatives of an integrated system.

Advantages of embedded system:

- Improvements/modifications of any system effect a parallel operating system;
- It is more easy to unification formats of the transmitted data;
- Integration of an open-source based embedded systems into eMAR platform is less costly.
- The same system can be used for integration of all NSW/PSW with only minor modifications.

Although the integration of the platform have to be prepared and made some coordination and programming, VGTU proposed integration model or direct integration with a single window port is available. It is important to note that the integration, using national single window system, to eMAR platform is covering all relevant areas of the industry: logistics, port, rail, logistics centers, etc. this information in a centralized processing platform eMAR should significantly affect the logistics processes in the EU.

8.4 Pilot description

VGTU proposed Klaipėda Port single-window integrated technical architecture is presented in figure 8-13 and it will facilitate optimization and scheduling of multimodal logistics operations including port activity and ship, rail and track movements along EWTC, providing Business Applications for port, shipping, logistics integration domains.

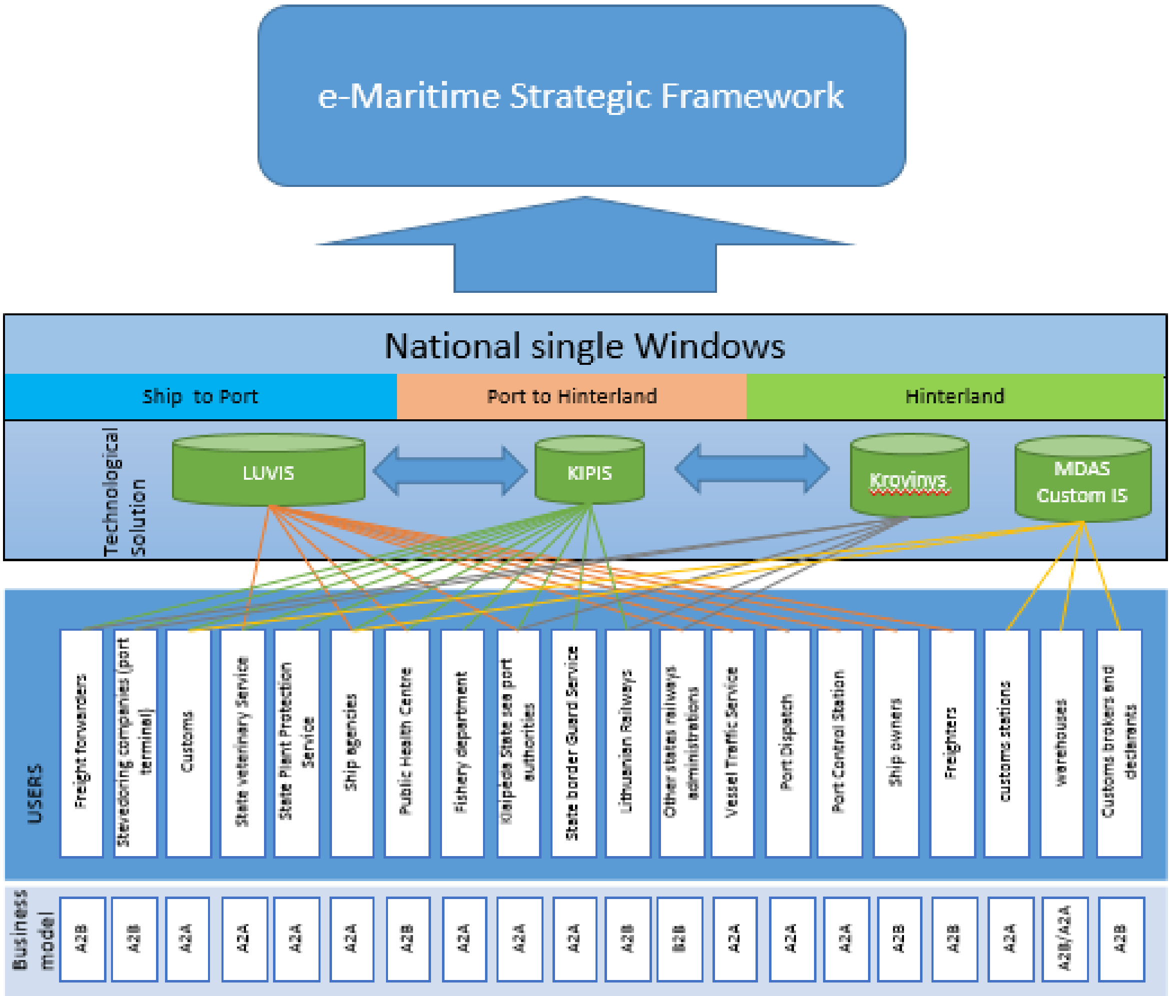


Figure 8-13: Port single-window integrated scheme(technical architecture), Source: VGTU CCITL 2014

Klaipėda Port single-window integrated technical solution scheme (architecture) consisting of the following components:

- e-Maritime applications for Klaipėda seaport operations improvements and investigated application integration, interoperability with administrations and other networks;
- Integration with eMAR platform allowing the exchange of information at corridor (the sea-port, port-hinterland connections) planning and execution stages;
- Compliance with Access point for the interfacing, thus supporting the “flexible interoperability and interconnectivity";
- eMAR platform for corridor and supply chain management;

- Elimination of document duplications, integration of different ICT, integration of all port community partners (a possibility to connect the common port information system) are directly related to the objectives and tasks of the eMar project.

Together proposed technical architecture (scheme) -model allows to possible ways of integration of the current information systems KIPIS, LUVIS, KROVINYS, e-KROVINYS.

8.5 Testing and Trials

8.5.1 Short presentation of the implemented business scenario

EWTC is one of the main corridors in the Southern Baltic Sea Region stretching from Esbjerg (Denmark) and Sassnitz (Germany) in the West to Vilnius (Lithuania) in the East. The Eastern part of the corridor is a gateway to and from the Baltic Sea Region connecting it with Russia, Kazakhstan and China to the East of Belarus, Ukraine and Turkey to the South-East. (See figure 3-1: East-West transport corridor in the Southern Baltics area).

When looking at the current rail freight flows through the EWTC corridor, the largest flows are with Russia, as well as between Klaipeda on the Eastern shores of the Baltic Sea. In the Western part, the largest flows are between Scandinavia and the European Continent, via Denmark. (See figure 3-2: Asia – Europe trade flows – 552 billion euros, EWTCII (SWECO)

Global Study on Trade and Transports in the East West Transport Corridor was aimed to map current trade and transport flows in the corridor and analyse its future potential. The market share of the EWTC in global perspective was estimated to 2.3 percent as of 2010. That is an approximately 2.3 percent (from 552 bill. Euros) of the trade between countries in east and west with potential to use the EWTC as a transport link was transported through the corridor in 2010. The potential for the future transport development showed an anticipated increase of about 100 percent of GDP in the countries until 2030, which in turn means that the transport flow likely will double.

EWTC stimulates the economic growth of the region:

- Through international cooperation. The aim of the project is to develop and work for the efficient, safe and environmentally friendly handling of the increasing amount of goods moving toward East-West direction in the South Baltic Region.
- Through joint forces of stakeholders in the region to enhance sustainable transport planning and innovative solutions in the field of transport.
- Through developing skills and qualification of logistics specialists along Asia- Europe connections, as well as through establishing the networks and platform of researchers.

The EWTC connects the Trans-European Transport Network (TEN-T) with the networks in the neighbouring countries (Belarus, Russia, Ukraine) with focus on the development of the Baltic – Black Sea transport link.

In Klaipėda Seaport is an important gateway for the Baltic Sea Region linking the Western and Eastern part of the Baltic Sea Region and extending further to the East and South-East. Several routes lead freight volumes to the corridor via Vilnius and further to Klaipėda.

In response to the changing trends in global goods flows, companies operating within the East-West Transport Corridor and the concerned states respond to the market changes and seek to adjust their infrastructure capacities in order to meet market needs.

Since the EWTC transport corridor is the sum facilities supplied and offered through partnership, the core of the product of the EWTC Association is quality of cooperation between the EWTCA partners and the extension of partnership: the wider and better the cooperation and the better the integration of provided services, the better is the product.

It is important to highlight the procedure of the EWTC actors' survey (source: TransGovernance project, 2014) that focuses on the development of the operational management model to best serve the development potential, operational conditions and users' expectations in the EWTC.

EWTCA highlighted the supporting of the IT system as one of the key priorities. In the operational guidelines of the Association the respondents identified the following two main activities:

1) Develop support for end-to-end supply chain security by ensuring integrity of the entire supply chain and prompt risk assessment through data sharing and Single Window services for interaction between authorities and commercial stakeholders in the EWTC;
2) Implement a co-modal transport information and management system, increasing the reliability and accessibility of intermodal freight transport solutions through One-Stop-Shop booking, reporting and payment services.

These two priorities are more related to the management of Association and to its activity. Below the respondents enlisted the priorities directly related to the research performed by VGTU CCITL within the eMAR Project:

1) Make an inventory of all existing ICT systems used in the EWTC including identification and analysis of challenges that should be addressed by ICT solutions;
2) Develop a framework for information exchange in the EWTC by identifying key interfaces for interoperability in a feasibility study

VGTU CCITL formed Interrelation in the Lithuanian transport sector. (See figure 8 1: Interrelation in the Lithuanian transport sector).

The port community system KIPIS was identified as the basis of the port single window (or its main function). KIPIS is transferring and processing information on freight movement via the port of Klaipėda (for processes between all stakeholders involved in the creation of paperless export, import and transit processes at the Klaipėda Seaport).

The components (application to application integration with KIPIS) of the port community system across EWTC in links/nodes are as follows:

- KROVINYS (Cargo accounting system of JSC "Lithuanian Railways");
- eKROVINYS (Lithuanian Railways) seeks to ensure the information links between hinterland and the port (via IS KIPIS);
- Ship Information System (LIS);
- LUVIS; the system will ensure efficient cooperation between port offices and ship agents, owners/freighters and skippers; it will reduce the necessity to coordinate inter-communication among different port players

8.5.2 Stakeholders involved

The users involved in the VGTU proposed pilot represent a list of stakeholders acting in multimodal transport:

- Freight forwarders;
- Stevedoring companies (port terminals);
- Customs;
- State Veterinary Service;
- State Plant Protection Service;
- Ship agencies;
- Klaipeda Public Health Centre;
- Fishery Department;
- Klaipeda State Seaport Authority;
- State Border Guard Service;
- Lithuanian Railways;
- Vessel Traffic Service;
- Port Dispatch;
- Ship owners;
- Port Charterer;
- Customs brokers and declarants;

- Multimodal Transport Operators;
- Road Haulers;
- Consignor;
- Consignee.

8.6 Trials of the technical solution

The goal of research executed by VGTU CCITL is to prepare proposals on how to effectively build the port community (on the basis of information technologies); improve the interface between the maritime transport and hinterland transport; and build port community by applying scientific instruments. One of the main tasks is to analyse intercommunication systems of various services and institutions in order to reduce paper work and prepare simplified standard virtual space cooperation documents and instruments facilitating port operations and contributing to the formation of a common new EU maritime transport policy. It is necessary to note that there are several options of the integration system, i.e. by applying the principle of the port's single window system, the port's community system and the national single window system.

In order to implement a single window principle, Lithuania needs to clearly define priority goals and functions to be performed via a single window system. In view of this, in pursuing research VGTU CCITL proposes a pilot single window scheme which consists of possible interface connections between the existing and to be implemented systems operating in the "sea-Klaipėda Seaport" and in the interface between "Klaipėda Seaport and hinterland".

During the first stage of the survey the efforts were made to clarify which single window model could be the most appropriate for Lithuania. The second stage was aimed to specify functions of the national single window proposed during the first stage of NSW implementation.

In developing a pilot integration platform it was defined which model (PSW, PCS, NSW) would be most effective in connecting all actors of the transport sector, in shortening cargo documentation procedures and reducing paper work.

The response was fairly evenly distributed. The actors of port community want to use the platform including the already operating IS (without building new IS). This would help develop a virtual space for information exchange between the port companies, public authorities etc. Development of B2B, A2A and B2A business relations via IS requires to use not a single (PSW or NSW) but their combination.

Since the opinion of respondents was mainly the same, it would be possible to apply PSW+NSW which could operate under SW (single window) principle, i.e. to integrate PSW (port single window) in NSW as one of its composite parts. This would help to develop a uniform transport sector platform by connecting not only the "ship-port", "port community" system but by connecting also the level "port-hinterland".

In the pilot prototype of a single window system the focus is given to the application of the existing systems and information circulating within the systems. This model has the capacity to collect, accumulate, process and transmit concise information. Information is obtained via business connections with supervising institutions (in separate areas and programmes). Finally information on cargo could be accumulated in one place.

Based on the key NSW principle (connection of separate systems into one system) VGTU CCITL presents the model providing a possibility to connect separate information systems. Each information source (separate IS) connects to the model proposed by VGTU CCITL via separate channel (in parallel to other systems). Thus the transmitted information is protected from the commercial point of view.

The majority of the existing and connected (into one system) systems are not compatible with each other. In view of this an interface of S2S systems is suggested for data selection and transmission and for other interconnection operations. This would allow applying two systems for data exchange without interfering into programming codes.

8.6.1 Presentation of the technical testing scenario

VGTU proposed Klaipėda Port single-window integrated technical architecture and it will facilitate optimization and scheduling of multimodal logistics operations including port activity and ship, rail and track movements along EWTC, providing Business Applications for port, shipping and logistics integration domains. (See Figure 8-10: Port single-window integrated scheme(technical architecture)).

Testing of the pilot model proposed by VGTU was carried out by interviewing the stakeholders: supervising public authorities, port community, IT companies, and road/railway carriers.

- Practical goal of the first questionnaire is to find the ways of integrating the existing information systems (KIPIS, LUVIS, KROVINYS, MDAS) into one integrated information system under the model of eMAR platform.
- The second questionnaire of the eMAR project is designed for representatives of Lithuanian transport sector. It is aimed to specify functions and tasks of the proposed single window prototype; to specify structures which should be connected to this system; and identify the needs and expectations of users, as well as the anticipated weaknesses of the prototype.
- The third questionnaire is aimed to identify technological solutions applied in Lithuania's information systems; and to create the interface with the IS of other countries. Technical questionnaire of VGTU CCITL is designed for Klaipėda State Seaport Authority as the administrator of KIPIS system; to the Customs Department

of the Republic of Lithuania as the administrator of MIS system and creator of UAB BlueBridge – Krovinys, eKrovinys systems.

8.6.1.1 Connection to the system

In data accumulation systems the access to users is provided via ID and authentication of the Internet IP address. For distance connections safe connection tunnel is provided for data receipt/loading (VPN).

A description of various requirements (with regard to data receipt, conversion and processing) is prepared for the connections between the systems of various countries or companies. Data is transmitted via SSL protocol and after user authentication.

8.6.1.2 Data protection

Programme security is ensured by applying SSL coding in data transmission. Access to the system is provided only to the authenticated users upon their identification by ID, computer IP address, network and physical place. VPN tunnels are used for distance connections.

8.6.1.3 Software platforms

Data servers – licensed software, SQL Oracle database systems – are used for the collection, protection and processing of data in the information systems. The applied software often depends on IS functions and users‘ needs. This software – Oracle, MS SQL server – is capable of ensuring the highest security level. When selecting software it is important to evaluate software capacities and system needs.

8.6.1.4 Use of WEB applications

WEB applications are used for the connection of one system components in the data cloud. Usually they are used for data entry in the systems. The use of such applications simplifies system developments, data entry and does not require connection to one physical place for work with the system. WEB applications operate as data output measure; data are visible but their corrections are not authorised. It is important to note that other actions are not possible via this measure.

8.6.1.5 Data exchange with community members

Data exchange is executed via secure EU‘s Common Communication Network by connecting it with the national systems via CSI *Common System Interface*. In Lithuania such systems are applied for system connections with the information systems of European Commission, information systems of customs administrations of the EU Member States and safe navigation system.

8.6.2 Users feedback

The main functions to be performed by the National Single Window System (NSW) during the initial stage of its implementation

According to all respondent groups, priority functions of the National Single Window system should be directed toward simplified cargo transportation procedures:

- Data transmission;
- Authorisations;
- Single point data entry;

These priority functions identified by the respondents would have direct impact on the improvement of effectiveness of cargo transportation.

More or less the same distribution of opinions of all transport stakeholders demonstrates they realise the need of such a system and specific tasks to be performed by the above system.

With regard to the positions of separate respondent groups, there is light difference in priorities (views), but their opinions on key priorities coincide.

- **Institutions which should be covered by NSW during the initial stage of its implementation**

All the respondents, irrespective of companies or institutions they represent unanimously identified supervising institutions as priority institutions in the National Single Window system. Connection of these institutions to NSW system is also important because of the envisaged modernisation of operations of the connected institutions, including the amendments to their legal basis; moreover the institutions which so far didn‘t have common data exchange system with transport system will also be connected; besides, this sector needs to have these connections (B2A) to make services more effective and improve business environment. Respondents also indicated that apart of supervising institutions NSW system should also cover all the companies related to operations of Klaipėda State Seaport and cargo transportation and, thus involve the entire transport sector. However, connection sequence is based on business companies most frequently met in job practice or on business needs of a respondent. In conclusion it could be stated that both public and private sector will mostly benefit from implementation of NSW and from connecting to this system the supervising institutions, and all the remaining composite parts in the logistics chain.

- **Business model data exchange**

Data exchange by all connection channels. This was the opinion of all the respondents of II-e-MAR project survey. Despite minor variations in respondents‘ views customers did not give priority to any of the presented connections. This means that future NSW users would like to see all possible business case options in the system.

Fourth communication B2B model (business case) was also suggested to respondents, but implementation of this business case in NSW system would be appropriate. Therefore this B2B connection has least priority although it received 7 points out of 10. This leads to an assumption that within NSW system there should be a space or instrument for making, searching for or development of business relations.

- **Main criteria for a successful implementation of the National Single Window (NSW) in Lithuania**

According to the majority of respondents, successful implementation criteria include: clear goals, cooperation and establishment of legal environment. These are the three main guidelines necessary for implementation of NSW project. None of the presented guidelines received less than 6 points; this shows the importance of all guidelines for NSW implementation. The importance of cooperation is also realised. Respondents realise the importance of cooperation between business and public authorities. Both, representatives of business and public sectors indicated the same conditions for successful implementation of NSW in Lithuania: political will and favourable legal environment. Common views of all respondents demonstrate understanding of potential obstacles and preparation to eliminate them.

- **The use of the IS integration model prepared by VGTU CCITL as a prototype of the national single window system in implementing NSW**

In evaluating results, a conclusion could be made that such an alternative to NSW is possible and the model based on Klaipėda State Seaport information system KIPIS (we refer to the implemented Project eMAR) could become a temporary alternative to NSW and perform the followinf functions:

- *Ensure functional capacities of single point data entry;*
- *Form standard reporting and data exchange messages;*
- *Ensure constant data exchange;*
- *Coordinated with similar international systems.*

Support of these functions is possible because this alternative is based on Klaipėda State Seaport Authority information exchange system KIPIS which is already operating and exchanges data with other national systems KROVINYS, MIS. Implementation of such a model today would solve the problems related to lack of NWS, yet improvement of the existing systems requires costs, more time and financial resources. Therefore it is important to develop an action plan and identify main functions in due time. Then it would be possible to perform communication functions via NSW or other systems complying with NSW functions by June of 2015.

8.6.3 Lessons learnt

It will be the conclusions/findings of the above activities. Main headings of this section will be:

8.6.3.1 Benefits (for the users)

According to the analysis of users' expectations with respect to the proposed system, respondents could be divided into:

1. Business representatives;
2. Representatives of public sector;
3. Associations.

Representatives of business sector are interested in accelerating movement of cargo in order to generate higher added value (shorten vessel/cargo clearance times and improve cargo handling procedures). They expect that the proposed integration system will be simple, not bureaucratic or complicated. They also suggest proper use of the existing and developed systems; development of one more system is doubtful. Business representatives also suggest better mutual integration between the already operating programmes, and connection with more IS operating in the country.

The majority of respondents expressed their expectations related to better integration of public authorities and business in the space of e-services which could facilitate work of economic operators. Better engagement of institutions and companies in the system is necessary, but this should be the interest of not only the port but of all transport sector; this would accelerate cargo handling. It is expected that a new system will bridge the gaps existing today between the public institutions operating in the port.

Representatives of the business sector wanted to transfer as many as possible documents in the e-space. Taking account of dynamic processes, it is necessary to ensure rapid and effective elimination of troubleshooting and flexibility to business needs.

Public institutions are of a similar opinion toward the connecting platform for they are also interested in the engagement of other public institutions in this platform, e.g. participation of the State Tax Inspectorate (STI) in the Port community system. Today it is not a technical obstacle but an issue related to the acknowledgement of data accumulated in KIPI within the STI system.

They also expect that this platform will ensure higher quality of e-services for business. Stevedoring associations representing stevedoring companies operating in the port and facing various problems, expressed their specific expectations for a new system. They also expect to have a possibility to transfer all information from the information systems of a stevedoring company (terminal) to other institutions (their information systems) via one standard communication channel without creating integration interfaces for each separate information system. In Klaipėda Seaport more than half of goods are excise goods, and the existing port information systems are not integrated with the information systems of the State Tax Inspectorate. But in Lithuania the control areas in customs and STI are separate, and these institutions practically have no data exchange. Such an integration platform could also embrace not only customs but also the EU's Excise Movement & Control system and STI's information system AIS. This could bridge the gap in inter-institutional data exchange.

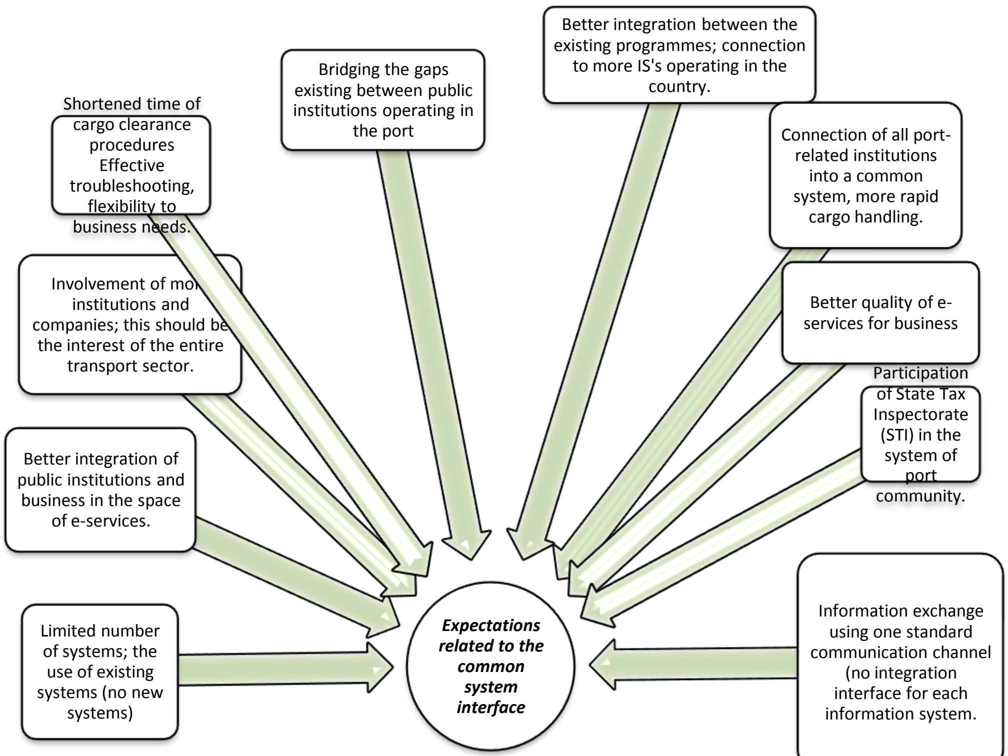


Figura 8-14: Respondents' expectations with respect to the common system interface, VGTU CC

8.6.3.2 Proposals for full scale implementations

One of the main proposals of the respondents concerning implementation of this platform is commercial security of information and data protection.

Respondents also indicated that differences of technical possibilities in separate countries (different levels of readiness, different achievements of states in the IT sector) could become integration obstacles. This might cause incompatibility with the existing EU systems. Moreover, data incompatibility is also possible due to differently interpreted operational processes at national level.

Technical data security and administrative disorders of one system might affect operations of all the ports. System incompatibility and data leakage is also possible, or software obstacles during the system integration. Respondents also indicated inability to coordinate corrections (changes) in separate message exchange integration platforms and insufficient influence in initiating changes in the EU system, including long implementation of these changes).

Another important aspect identified by respondents as a possible obstacle for integration is compatibility of legislation and other legal issues (e.g. implementation of e-Manifest initiative in the EU has stuck because this concept is incompatible with the current Customs Code). This will determine amendments to legislation.

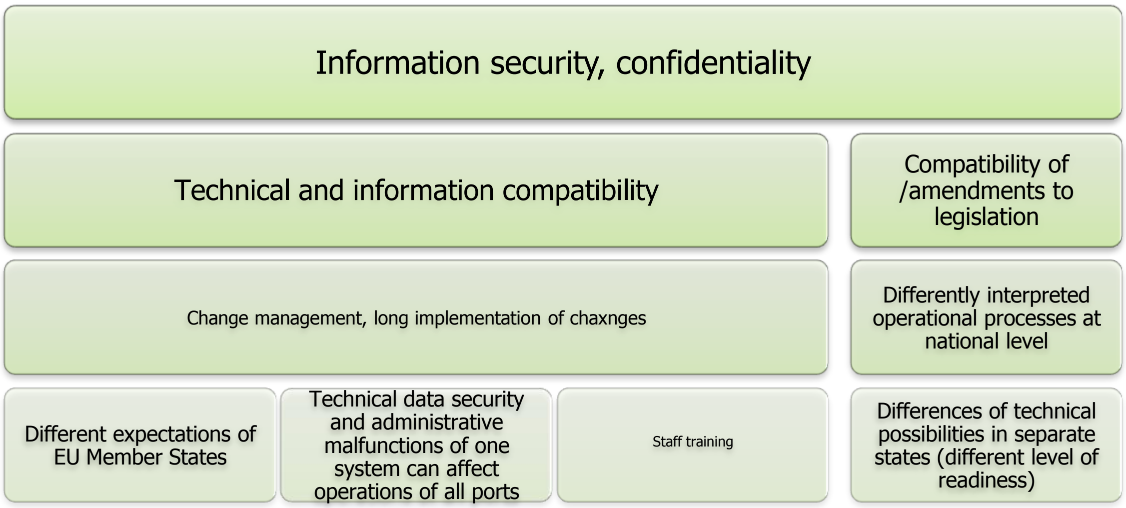


Figura 8-15: Obstacles in integrating existing systems into one European platform (top to bottom priorities)

Further Development

Before starting the exploitation stage, the EWTC pilot case results, including VGTU proposed NSW model, were presented to the international conference of the maritime transport and logistics experts in St. Petersburg (Russian Federation), Dalian (China) and Kaunas (Lithuania), as well as during the round-table discussion in the Ministry of Transport and Communications of Lithuania. These presentations and the following in-depth discussions served as the basis for generation of new ideas linked to further development of the VGTU NSW model (scheme) into the Corridor Single Window (CSW) along EWTC. The architecture of CSW connecting MSW, PCS and NSW functions are presented in the picture below.

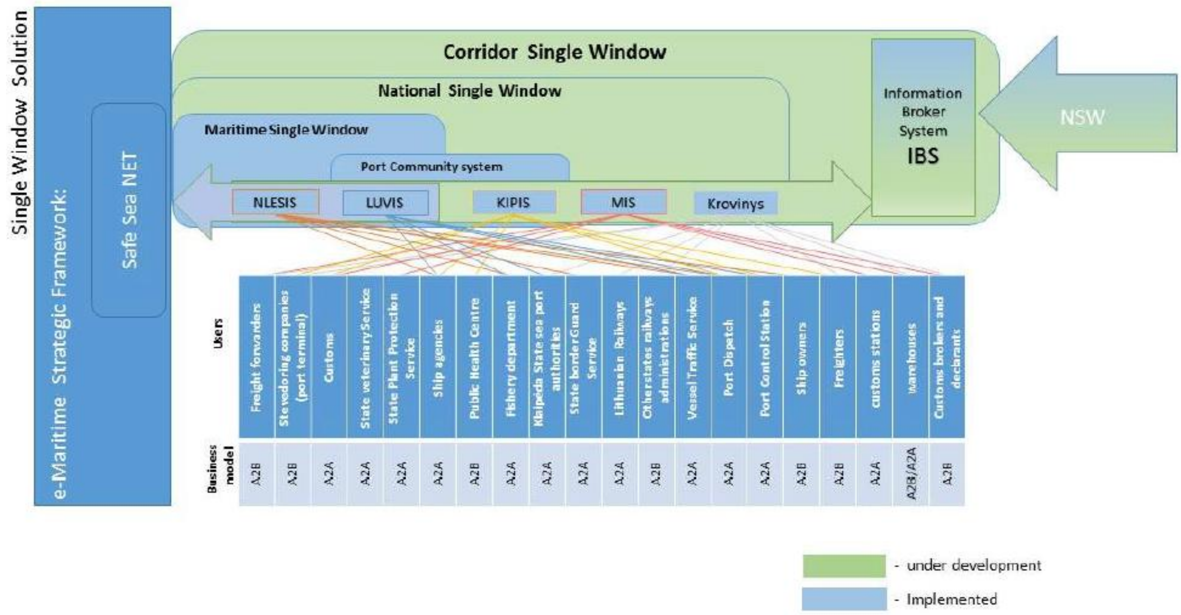


Figure 8-16: Further development of the VGTU NSW model to the Corridor Single Window (CSW)