# IPA Adriatic CBC Program

# **A**driatic **P**ort **C**ommunity (**APC**)

## Deliverable 3

## Port Processes Identification

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# 1 Introduction

## 1.1 Oobjective of this document

The aim of this document is to present the main processes of a Port Community System (PCS) that are included in any port of the Adriatic Sea, to define and to describe the users and the implementation approach of such system. There is a European and a worldwide tendency to realize a strategic alliance between the Port Community System and the Single Window concept, therefore, the ways, demands and specifications of such an achievement have been studied and the outcomes are presented in this document.
The port process analysis is the key factor of the present document in order to better understand the port's operations and procedures by emphasizing on ship traffic, customs operation, safety and security operations, environmental policies and how they are integrated in a PCS.

The significant role of the Adriatic Sea ports due to their key position in South East Europe, in the people and goods transportation and the shipping industry highlights the importance of the Adriatic ports to update their operations and infrastructure and synchronize their communication and interactions via modern automated methods such as PCS, in order to create a competitive network.

All these improvements can be implemented through information technology/systems such as PCS. Nevertheless, these systems need to be developed in such a way that covers all the existent and potential needs of a specific port and/or a specific network of ports, in order to improve their performance and increase their competitiveness. Consequently, the development and operation of a PCS is a complex procedure because it must be designed to handle large amount of data and calculate parameters that many times need to be incorporated and categorized with different ways in order to extract the final solution or to finalize an operation. Consequently, PCS are computer networks that handle automatically many different operations and procedures inside a port or among ports in a synergic; way and link up different port procedures and also port with all the companies that use it, including truck/rail companies, shipping lines, customs offices, haulers (Keceli et al, 2008).

## 1.2 Overview of this document

Considering international legislation and practices and collecting international experience for the needs and tendencies in major procedures of modern ports, this document is referred to a modern port process analysis and users requirements with the scope to be represented with a suitable, effective and automated way through a PCS, developed using the Single Window philosophy.

# 2 Port Community Systems key points

## 2.1 Guidelines of a Port Community System

An Automated Information Port System is an IT system that gathers all the necessary information/documents that are related to the ports processes. It must be highlighted that a port involves many stakeholders (Shipping agencies, Customs, Coast guard, etc) who all communicate with the Port Authority. This system creates a paperless and green environment and tackles the bureaucracy issue. At the same time, automating typical port procedures minimizes the time loss and the cost. Moreover it offers better management and monitoring of the port's procedures. The concept is based on the idea that all information must be entered just once by the responsible party and it serves as the planning tool for real - time control of the administrative and logistic processes. Some features of such a system are:

- Notification of calls
- Reservations and reporting back
- Charging /Invoicing
- Berth/bollard planning
- AIS integration
- Graphical Information System
- FRS integration (SafeSeaNet)
- Verification against Lloyd's register
- National statistics
- National Authority integration
- Agent reporting and ordering
- ISPS rules and security codes
- Internet integrated
- Integrated with financial systems

The automation of all these procedures can be achieved through a simple Electronic Data Interchange and as a complete system through the development of a Port Community System. Port Community System is an electronic platform which enables the exchange of information and optimizes manages and automates port and logistics efficient processes through a single submission of data and connecting transport and logistics chains.

Port Community Systems provide the opportunity to save European Community time, money and effort by demonstrating and explaining the role, benefits and objectives of these systems. A good collaboration between all the parties involved is one of the success factors of a PCS. Distinctive for all PCSs is the link to Customs and port authorities and other institutions veterinary offices and coastguard.

A good collaboration with the key authorities, stakeholders, potential customers and local trade associations, is critical in the setting up of the respective PCS which were – and still are – implemented by means of special training and workshops with the end users. Sensible data exchange over Adriatic ports is in discussion (so join ports are to set up a Port Community System to an already existing PCS of a larger). The Port Community System is supervised by the **Port Community System Operators**. Port Community System Operators (PCSO) are the trusted third parties. Some are 100% publicly owned; some are private-public partnerships; others are privately owned.

More specifically a Port Community System:

- is a neutral and open electronic platform enabling intelligent and secure exchange of information between public and private stakeholders in order to improve the competitive position of the sea and air ports' communities
- optimizes, manages and automates port and logistics efficient processes through a single submission of data and connecting transport and logistics chains

A PCS is a modular system with functionality designed to provide all the various sectors and players within a port community environment with tools specific to them, thus delivering a tightly integrated system. Developed for port users by port users, a PCS encompasses exports, imports, transshipments, consolidations, hazardous cargo and maritime statistics reporting.
PCSs in general provide a huge range of services the key features of, can be summarized as follows:

- Easy, fast and efficient Electronic Data Interchange information exchange, re-use and centralization, available 24/7/365
- Customs declarations
- Electronic handling of all information regarding import and export of containerized, general and bulk cargo
- Status information and control, tracking and tracing through the whole logistics chain
- Processing of dangerous goods
- Processing of maritime and other statistics

With all of these services come many advantages. The core benefits for all the involved parties are higher efficiency and speed regarding port processes, particularly through reduction and automated preparation of the paperwork. In this way, PCSs contribute to the sustainable transport logistics and support the ambitions to meet global carbon reduction requirements.

The functionality is aimed at eliminating unnecessary paperwork which can clog up cargo handling. Using electronic data exchange, the PCS is an effective real-time information system; fast, focused, flexible and multi-faceted, it aims to improve efficiency at all stages of the process of manifesting, through vessel discharge and loading, Customs clearance, port health formalities and delivery in and out of the terminal.

In addition to the above mentioned, PCS offers improved security, cost reduction and potentially more competitiveness for each user.

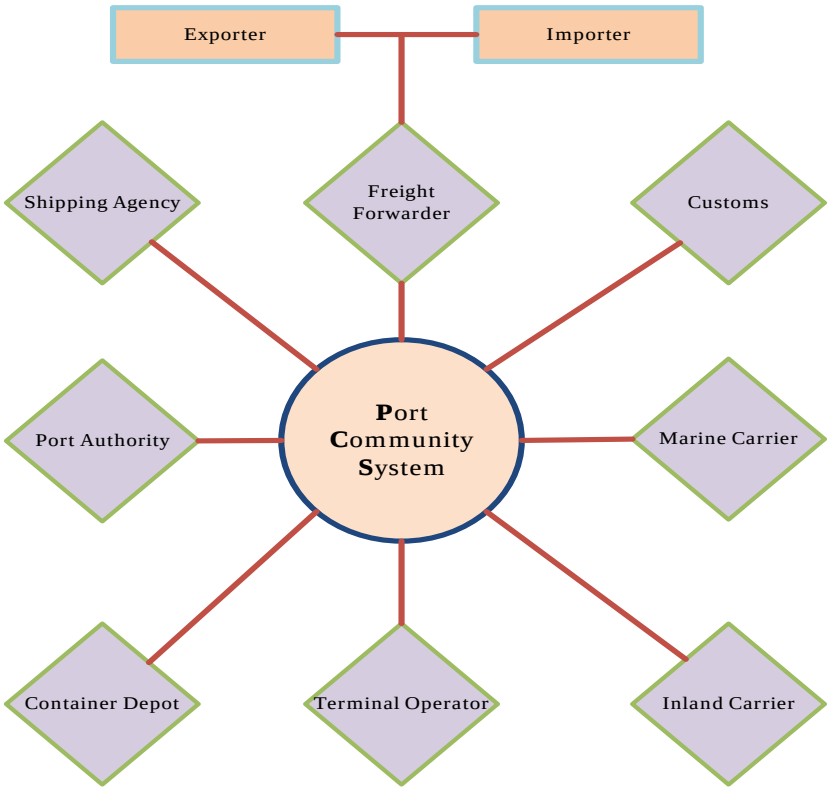



**Figure 1: A general PCS scheme**

### Port Authority

Port Authority is usually a state establishment, which is in charge of the development and promotion of the port's equipment and facilities and also ensures the compliance of the involved parties to the internal operational regulations. Moreover, it collaborates with all the relevant authorities in order to enforce all the regulations regarding environmental, safety and security issues. Ports usually take care of the all process of berth, piloting vessels in and out of the port and also provide other vessel and cargo related services.

### Shipping Agency/ Shipping Line

Shipping Line operates a fleet of ships and other carriers and the Shipping Agent provides the services on behalf of Shipping Lines. Shipping Agent coordinates the arrangements for ship arrival, berthing, discharge/loading and departure of the vessel with the port, customs and other regulatory bodies.

### Terminal Operator

The terminal operator manages the terminal operations on behalf of the Port and they receive, store, load/discharge and deliver the containers/cargo within the terminal. They collect the terminal handling charges and storage charges while the port collects the vessel related charges.

### Container Freight Station (CFS) / Inland Container Depot (ICD)

The container freight station is "storage room" where containers and cargo are placed, till the cargo is released to the importers after de-stuffing in case of

imports and for exports till the cargo is shifted to port after stuffing. In the case of exports, the cargo is brought to the CFS for examination by Customs, stuffed in the containers and shifted to the port for loading on to the vessel. ICD (Inland Container Depot) is temporary storage for import/export laden and empty containers. According to the guidelines of Indian Government, functionally there is no difference between CFS and ICD. While CFS is an off dock facility located near the servicing port, ICD is generally located outside the port towns. In PCS also ICD is mentioned as CFS for simplicity.

**Additionally, in PCS others user groups can be included such as:**

**Port Health Organization**

The agency that is responsible for the inspection of hygiene in the ship and the crew, so as to control the spread of infectious diseases from incoming vessels and aircrafts, inspecting food/agricultural products entering the Port, for wholesomeness, fitness and compliance with the country's legislation. The cargo samples like edible oil are inspected by PHO and permitted for domestic use based on lab certification. On arrival, the PHO also issues de-ratting exemption certificate to the vessel.

**Immigration Agency**

The agency that is responsible for applying the immigration laws of the country and providing the needed documents for foreign crew and passengers to embark and disembark.

**Bank**

Bank facilitates the payment of service charges by the stakeholders to the port and other statutory charges like excise/stamp duties and taxes to Customs and other government agencies. The setting of a PCS is commonly a process that takes place through several phases. Depending on the existing level of information technology usage, some steps may not be required with the setting of a PCS becoming a matter of portal development and data interoperability.

**Customs**

Customs is the government department that is in charge of collecting duty and taxes and of the border control. Customs also enforces the provisions of the Customs Act governing imports and exports of cargo, arrival and departure of vessels and prevention of smuggling including interdiction of narcotics drug trafficking. Customs grants entry inward/entry outwards permission for the vessel and clear goods for both import and export.

Customs is the largest and most important cross-border regulatory agency in terms of its intrusion into trade transactions, its information gathering and the spread of its business activity. Therefore, Governments usually see Customs as the natural agency to be the focus of Single Window development. Furthermore it is generally recognized that Customs administrations, have a pivotal role in Single Window developments. The **W**ord **C**ustoms **O**rganization (WCO) notes in its web site [http://www.wcoomd.org/sw.htm]:

> **"**The establishment of the Single Window Environment for border control procedures for conveyance, transport equipment, goods and crew is considered by Customs Administrations as the solution for the complex problems of border automation and information management involving multiple Cross Border Regulatory Agencies. A Single Window Environment sure is a complex technical issue, but it cannot work without the politics and other non-IT issues being examined first.**"**

They introduce the generic WCO Data Model in order to "ensure compatibility among government agencies reporting requirements and enable the exchange and information sharing among relevant government agencies including Customs, resulting in greater facilitation towards Trade" [WCO Data Model, Single Window Data harmonization]

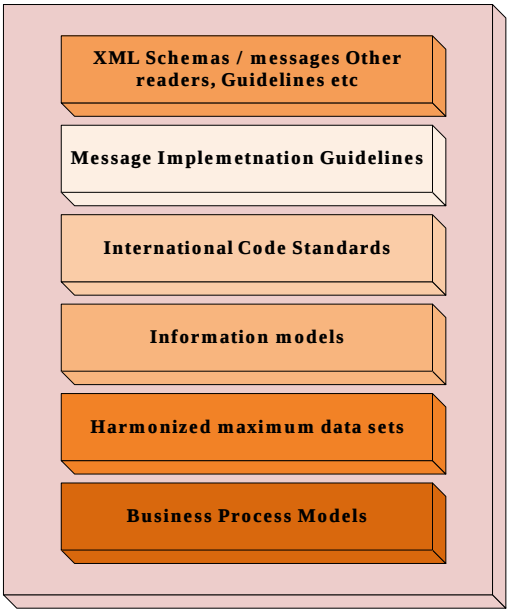



**Figure 2: The WCO Data Model**

In this document it is also recommended that governments considering the development or developing a Single Window environment should initiate the data harmonization and standardization process. It is also recommended that countries that have a Single Window in place and have not implemented a data harmonization would have to conduct such a harmonization. The following guidelines set the forth steps that governments should take in order to implement the harmonization process:

- Identify the lead agency and dedicating staff to conduct the harmonization
- Inventory current trade agency data and information requirements from automated systems and forms,
- Nationally harmonize data and information inventory
- Identify redundancies by comparing data definitions
- Harmonize the information and data requirements inventory to the international WCO Data Model standards.

**Development of key channels**

The first fundamental step concerns the setting of channels with key port users for standard and repetitive procedures in the form of digital documents. They include cargo manifest, customs declaration, vessel call requests and the reporting of dangerous goods.

Once key channels have been created, then the setting of a true PCS becomes possible, particularly by focusing on maritime shipping and inland freight distribution information. More actors are brought in, notably freight forwarders and inland transport firms. The purpose is to build a continuous information chain within the port region that includes the majority of the steps from the ship access to the port facility to the delivery of a container at an inland freight distribution center.

Once a PCS has been established and is effectively adopted by the port users, the next step tries to establish additional; multiplying effects and quality improvements. This implies the further promotion of automation, such as the usage of RFID to favor the seamless movement of cargo, and a complete digitalization of documents so that all transactions take place in a paperless environment. This also implies diffusion of best practices with other ports (and inland ports) with their eventual integration in a wider system. This could eventually lead to a comprehensive integration of information flows along supply chains, from the factory door to the door of an overseas consignee.

One of the key challenges in the setting of a PCS concerns the creation of a consensus among port users that are traditionally disconnected and often competing for a market share. Since many ports already have various IT processes, a PCS does not imply the same template, with substantial efforts being made to adapt to the cultural and operational reality of the locale. The development of web based applications and wireless networks have made the development of PCS an operational reality. The issue is to assess the extent to which they generate added value to the port community through improvements in productivity, quality and reliability.
(http://people.hofstra.edu/geotrans/eng/ch4en/conc4en/port_community_systems.html)

## 2.2 Data and Processes Harmonization

The objective of *data and processes harmonization* compared to the WCO Data Model is to eliminate the redundancies in the required data and the duplication in the submission of trade data to governmental authorities, such as Customs and other regulatory agencies. The ultimate outcome should be one set of standardized data requirements and standardized messages that fully comply with the WCO Data Model. Within cross border transactions Trade will provide the required WCO Data Model data elements by submitting standardized messages to meet government requirements for, export, transit and import. This will facilitate trade, reduce costs and make it feasible to provide more timely and accurate information.

UN/ECFACT Recommendation includes 33 key factors in establishing a successful Single Window environment. All of these factors are critical for the development of a Single Window environment. A strong lead agency is critical to a successful outcome of the harmonization process. It is the lead agency that will be responsible for drafting the planning and committing the necessary resources.

It is best to have a project team executing the data harmonization process. The project's team members must have extensive knowledge of international trade procedures, and specifically in the area of regulatory information requirements. The harmonization project team should also include data architects and Business Process modelers. It is also helpful to occupy a person to serve as a liaison to the participating agencies. This liaison serves as a conduit of information to and from the lead agency. Also, the participating agencies must identify a primary contact to organize the agency's data inventory and harmonization.

The communication of the harmonization policy, procedures, and steps is critical. After organizing the harmonization project team, the next step is to hold a series of meeting and briefings for all participating agencies to clearly define the roles and responsibilities of the harmonization project team. After this "kick-off" briefing the agency's participants should understand the overall process by which data harmonization will be accomplished, the purpose of one-on-one meetings with the data architects and business process modelers. They should also identify the work sessions the agency should participate in and the approach planned for these work sessions. Needless to say that the participants are well aware of the agency's responsibilities.

Data harmonization is an iterative process of capturing, defining, analyzing, and reconciling regulatory information requirements. It is highly unlikely that any government will be able to achieve harmonization of all agencies at one time. Governments should consider prioritizing agencies and agencies' requirements. The prioritization of requirements could be based on volume, revenue, supply chain security, etc. For example, every international trade transaction requires information for Customs, transportation, and statistics and may be considered as the first tier of agencies.

The selection of an agency could be based on its willingness and desire to participate in the Single Window. The important point is that after completing the first tier of agencies, the Data Harmonization process steps have to be repeated as additional agencies participate and as additional requirements are identified.

The Data Harmonization process steps are defined as follows:

- Data Capturing means making an inventory of identified regulatory agencies' requirements. This can be accomplished in a number of ways, such as the reviewing of agencies' forms, automated systems data requirements, regulations, etc. This includes the data element name, data element definition, representation (format or code), when the information is required

(declaration, release, clearance) and citation of the relevant authority to collect, validate and view the information. This information can be aggregated in an Excel spreadsheet or work sheets from any other software tool.

- Defining the information requirement is critical. While information is identified by name, the data element definition -what information is conveyed by using that data element- is more important.
- The process of analyzing the information consists of gathering similar data element names and having a full understanding of the definition and the information required.
- This is the final step in which there is the agreement to use one data element name, a common definition, common code, and standard messaging reconciled with the WCO Data Model standard.

## 2.3 Current situation / Restrictions

Regarding the current situation in general about the automation level of different procedures as it was recorded from the international bibliography and the experience already gained from the cooperation with port authorities it was concluded that:

- Many of the ports are using Terminal Operating systems to manage their terminal operations. They exchange EDI messages with Customs. Some of them even exchange few electronic messages with some of the big Shipping Agents and more advanced private Terminal operators. Even though, there are different IT systems deployed by Ports and other different Port Community stakeholders unfortunately these IT systems only provide limited interfaces to others. The community at large has no single point of information consolidation and retrieval. Shipping goods and passengers from one port to another port in Europe makes it even more difficult for the stakeholders since they will have to liaise with multiple systems to do transactions over different ports.
- In general, documentation and processing is still manual (and in the best case they use email attachments) for most of the stakeholders and facilities in the port's community, only few of the busiest international port hubs in Europe have modernized their system. Therefore, exchanging data or information, getting status updates from trading partners or business transactions with other members of the community take place manually resulting in re-entry of data into their internal systems resulting, among others, in the increase of the dwell time for the vessels visiting the ports.
- The different standards/format used during the document exchange between some of the stakeholders make the electronic document exchange (if exists) of little use to the partner.
- There is no centralized system that can do the conversion from one standard format to another and make the information available to all the involved parties.
- Import and Export Document goes through lot of small changes / amendments consequently, it is not easy for the stakeholders to carry out the amendments.

- Since Vessel schedules and details are not published on real time basis, daily berthing meeting between Port officials and Shipping Agents becomes necessary for confirming the berth allocation to give transparency.
- It is quite difficult to locate a container in many ports since no yard plan is strictly followed currently (if there is any) when the containers are shifted from the original location to another.
- Port users are not getting the details about the yard planning and container movement.
- Stakeholders still need to submit paper documents in multiple inport stakeholders, as there is no link between various existing systems implemented in the Ports.
- Shipping Agent and other stakeholders need to directly enquire with the Port regarding Vessel Arrival/ Departure information and other vessel, cargo and container movement status as there is no real time status update or checking option available in the current system
- Currently, there is no reminder or notification mechanism in place if there is a delay in processing or approval.
- The Port systems are not currently programmed to provide information about the cargo once it leaves its boundaries i.e. when the cargo is transported out by rails and trucks.
- Gate in and gate out in the port is quite difficult and time consuming due to the manual verification of the document in the gate. A good amount of time will be saved by streamlining the gate in/out passes issuance and verification of the passes at the gate.
- Vessel Call Sign (VCN) is not unique and in some ports it is used to uniquely identify the vessel. Also, if a Vessel is used for both Import and Export, Different VCN numbers are used for Import and Export separately in some ports.
- Data is submitted twice, first to the customs and then to the ports by CHA as some of the EDI messages that are currently being sent from Customs to Ports (CFS) cannot be interpreted by the Port systems.
- Yard report/register is still paper based in some ports and the messages sent from the container management to move the empty containers are not made electronic yet.
- Some cargo is considered normal to some ports while in others, the same cargo can be classified as hazardous.
- Cancellation and amendment in the shipping bill should be made electronic.
- PCS should provide the online immigration application that checks for blacklisted crew. Also, immigration passes are not uniform in formats in different ports.

## 2.4 Port Community System Expectations - Objectives

The expected benefits of a PCS are based on a network effect and are exponential according to the number and role of the logistic agents that are connected to the system. The information is entered into the system only once and it is managed from then on electronically, which prevents errors and dramatically reduces paperwork. In turn, this makes the port more efficient and easier to work with.

From an information transaction point of view, working with different companies is easy because they all share a common "front-end" to send and receive structured information and business rules, data quality and overall "port procedures" are enforced and followed by all participants. In terms of visibility, having a PCS in place drastically reduces the opaqueness of the port. Each new information transaction that is performed in the system provides an updated view on the location of the cargo. If you interpret each transaction as a "track and trace" event, each relevant agent in the logistic chain can safely deduct the location and status of the shipment. For example, a freight forwarder or importer could know if a container has cleared customs or if it is waiting for physical inspection, or if it has not been loaded onto the ship on which it was supposed to be loaded.

Additionally, the authorities get the information from different parties at different stages from different viewpoints. Therefore, if a party has incorrectly declared any detail of a shipment (such as failing to declare hazardous materials), it is easy to detect any data inconsistencies.
Characteristic features of the activities in a PCS are:

- The user will be able to file documents for any port from anywhere in the country
- The user will be able to monitor and track the activities through the web
- PCS provides both web forms as well as message exchange options
- Provides gateways for payment, SMS, E-mail, etc. centrally
- Minimizes hardware, software procurement and maintenance cost by avoiding the duplication of resources at each Port Community
- Better security, redundancy and providing for Disaster recovery
- Building of a repository of information for endless query options and a variety of needs including statistics and research
- Over a period of time when the repository of information gets built up the past data can be quite valuable

Establishing a Port Community System improves the efficiency, the management and the finance of a port by providing immediate control and automated procedures among all the involved parties. Suggestions in order to overcome the barriers and to pave the way to establish a PCS in a Port:

- Shipping agents who haven't made the payment for the provide port services should be blacklisted and prevented from using the port services and alert other ports.

- Bills / Invoices should be standardized into a common international format across the ports although the tariffs by different ports may be different.
- It was recorded a clear need for the port users getting detailed information about the yard planning and container movement.
- There must be a direct communication and information exchange among ports, bank and stakeholders. Also, bills/invoices should be standardized into a common international format across the ports even if the tariffs by different ports may be different.
- Vessel movements should be transparent and notified to each shipping agent every time and whenever there is vessel Shifting.
- Cancellation and amendment in the shipping bill should be made electronic.
- The list of all banned cargo should be published through PCS.
- Port terminals and yard plan reports should be graphical and published on-line
- History of the ship need to be kept and be available to the port users are interested in.
- PCS should provide online immigration application that checks for blacklisted crew.
- Cancellation and amendment in the shipping bill should be allowed.

All the above mentioned can be included in a modern intelligent Port Community System (PCS) that will provide a single window approach for the port community of Adriatic region to allow a secure exchange of the documents and information electronically across its involved stakeholders in the maritime transport and logistics chain including the trading partners and government agencies. It will also provide global visibility and access to the central database to all its stakeholders through internet based interfaces. The key components of PCS can be the following:

- A centralized intelligent messaging system for the stakeholders to exchange messages in XML, UN/EDIFACT and proprietary standards in multiple protocols.
- A centralized database to provide effective track and trace facility to all stakeholders and also acts as data repository for research, analysis and reports.
- A web based application that acts as a single electronic window for ports and stakeholders to access and maintaining the central database.
- Automatic pdf paperwork creators to ease the paperwork submission and classification.

# 3 Port Community System Processes

Building a Port Community System requires at first level to make the **plan of all the processes involved in the port as well as all the shareholders**. A PCS deals with commercial document transactions, and also with the administrative requirements through a Single Window approach. The objectives of a Port Community System are to develop a centralized and intelligent electronic message switching facility to and from the community members, to maintain a centralized database to improve track and trace efficiency and shipment/service visibility, to become a data repository for research and analysis, to develop web-based application to access and support the information of the central database in secure fashion, and also to become the single source of information exchange with links to the systems at the port and other trading partners.

The usual stakeholders involved with the port are:

- the Shipping lines,
- Shipping Agents,
- Custom House agents
- Importers/Exporters,
- Stevedores,
- Container Freight Stations,
- Customs, Transporters,
- Surveyors,
- Immigration,
- Coast Guard
- and to some ports the Banks as well.

All these stakeholders interact with the multiple agencies through the centralized Port Community System. The communication among them is accomplished by the establishment of a Single Window. The Single Window is the mediator of the messages. The created and transferred messages might be in the form of XML or UNEDIFACT. The platform of the PCS can be either web-based or not and the all the required security measures will be taken in order to guarantee the safety of the transported messages.

The directories in a PCS are based on the National and Global Standards, these could be regarding to Unit Quantity Codes, Package Codes, Port Codes, Product Codes, Hazardous Item Codes, Country codes, State Codes, Vessel Directory, Currency Codes, Tariff Directory for ports, Warehouse Codes, Custom House Codes. While the directories of the stakeholders could include the Ports, Shipping Agents, Stevedores, Importer/Exporter, Surveyors, Transporters, Container Freight Stations, Customs House, Immigration offices.

Concluding, the procedure of establishing a PCS results in the following benefits: establish a Single Window System; have Common Information to Multiple Agencies; standardization of Information Exchanged; convenience of 24/7 submission; centralization for IT operation for stakeholders; Timely Alert during exceptions on e-mail, SMS, etc.; On-line request for services; On-line payment for

services; Flexibility in submission of information in multiple formats; Management Information System for reporting; Cost Saving for all; Statistical Analysis of Data generated for improving the services; and Enhancement in the Trade.

There are some key issues in the implementation of a PCS that should be considered and managed accordingly. Such are the Non-uniformity of message Formats, the level of Automation, the Non-standard directories and codifications schemes, the lack of Standardization of the Procedures, the legal requirements for bringing hard copies, the unstructured form of information exchanged, and the active participation of the stakeholders.

The information flow in a PCS varies according to each port's needs. Depending on the involved stakeholders a PCS will follow a specific scheme of information flow.

## 3.1 User characteristics / stakeholders / actors

- Base User
- Bank User
- Customs Agent
- Customs Officer
- Inland Carrier User
- Shipping Agent
- Administrator User
- Pilots Office User
- Immigration Agency User
- Coast Guard Office User
- Terminal Operator User
- Receiver / Consignee
- Tug Office User
- Barge Office User
- Veterinary Office User
- Linkage With Other Ports
- Freight Forwarders User (Inland/overseas)
- Inland Container Depot User
- Port Health Organization User
- Waste Collection Office User
- Port Authority User

### 3.1.1 User Descriptions

**Base User**

| | |
|---|---|
| short description | This represents a user with basic functionality in the port Authority System. The available functionalities will be user authentication, password change, messaging with other users etc |
| role in the Port Authority System | None |
| examples | There will be no real user of this level. All the users in the port authority system will implement the functionality of the base user. |
| relations with other actors | None |

**Administrator User**

| | |
|---|---|
| short description | The port authority representative who will maintain the port authority system should have a system administration user in order to maintain short and long term system support. Also he will be responsible for real time error correction and database backup. |
| role in the Port Authority System | The port authority will be responsible to choose and evaluate the respected responsibilities given to a person as a system administration. Having a system administrator will prevent the system from inconsistencies and possible real time key operations. In the long term the administrator should intervene whenever a system user uses the platform with a wrong way. |
| examples | • Whenever we need to register a new user to the system, the administrator will cross check the registered info and he will attach the appropriate role to the new user.<br>• If a system user forgets the authentication password to the system, the system administrator should be asked to reset the password.<br>• The administrators will have special privileges in order to perform real time monitoring, load monitoring and browse various system statistics.<br>• The dynamic content showed on the front end of the system would be editable only from the system administrators after special / off line process. |
| relations with other actors | extends the actor **base User** |

**Waste Collection User**

| | |
|---|---|
| Short Description | The waste collection office will have a user who will receive information regarding the waste from vessels. |
| Role in the Port Authority System | The user will evaluate the requested waste collection and perform the appropriate actions. He should pass the information to the waste collection staff in order to successfully and efficiently collect the wastes. In second time he should update the system with the actions that took place and possible relevant notes (e.g. underestimated or overestimated waste quantity from a vessel). |
| Examples | Just before berthing a vessel should indicate if he needs waste collection or not. In case the waste collection service is asked then a special 2 hand process should start from the ship representative and the port authority system. The port authority system will inform the waste collection office for the asked services. The user from the waste collection office should take the appropriate |

| | |
|---|---|
| | initiatives and reply accordingly to the ship representative through the port authority system. |
| Relations with other actors | extends the actor **base User** |

**Tug Office User**

| | |
|---|---|
| Short Description | The user from a tug office will receive for immediate and scheduled tug services from ship representatives. |
| Role in the Port Authority System | The port authority system will provide the option for a tug office to participate in the port authority system. The tug office user should reply accordingly to each demand so the port authority system generates the corresponding acknowledgement message to the ship representative. |
| Examples | Whenever a ship needs a tug service, the ship representative must initiate a tug demand process to the port authority. The appropriate acknowledgement message will be replied according to the tug office availability and the tug office user actions. |
| Relations with other actors | extends the actor **base User** |

**Barge Office User**

| | |
|---|---|
| Short Description | The user from a barge office will receive for scheduled barge services from ship representatives. |
| Role in the Port Authority System | The port authority system will provide the option for a barge office to participate in the port authority system. The barge office user should reply accordingly to each demand so the port authority system generates the corresponding acknowledgement message to the ship representative. |
| Examples | Whenever a ship needs a barge service, the ship representative must initiate a barge demand process to the port authority. The appropriate acknowledgement message will be replied according to the barge office availability and the barge office user actions. |
| Relations with other actors | extends the actor **base User** |

**Port Authority User**

| | |
|---|---|
| Short Description | The port authority has users correlated with multiple system processes. Such processes are:<br>• ship berthing<br>• ship departure<br>• financial transactions<br>• ship notification for:<br>o port reasons<br>o nautical reasons<br>o security reasons<br>o customs reasons<br>o etc |
| Role in the Port Authority System | The port authority should provide to his staff special access to the port authority system in order to easy the port transactions. |
| Examples | |
| Relations with other actors | extends the actor **base User** |

**Pilots Office User**

| | |
|---|---|
| Short Description | The user from a pilot office will receive for immediate and scheduled pilot services from ship representatives. |
| Role in the Port Authority System | The port authority will arrange the use of pilot service and will supervise the flawless communication and financial transactions. |
| Examples | A ship representative according to estimated arrival date and time may schedule and reserve a pilot service. Scheduled pilot services in a port with high in port traffic activity will crucially promote the quality of pilot services. And will reduce the berthing delays due to pilot availabilities. |
| Relations with other actors | extends the actor **base User** |

**Linkage With Other Ports**

| | |
|---|---|
| Short Description | This is a service that will provide automated or semi-automated vessel related data for linked Ports. |
| Role in the Port Authority | This typically would be a system service which will be able to communicate asynchronously through a web platform with other |

| | |
|---|---|
| System | third party port authorities. |
| Examples | Whenever a passenger ship is departing for a linked port the port authority of the system will send the passenger list of the vessel to the linked port. |
| Relations with other actors | **None** |

**Immigration Agency User**

| | |
|---|---|
| Short Description | The immigration agency may be present in some berthing occasions. The ship representative according to the supplied passenger list may trigger such instances. |
| Role in the Port Authority System | The immigration agency has a passive role on the system and will mainly get notifications from the port authority systems and they only have to acknowledge the message receipt the action taken.etc |
| Examples | In the event of a shipwreck with illegal immigrants, the ship that will collect the passengers when it makes a request for berthing the immigration agency should be present. So the port authority system will automatically generate the appropriate message exchange. |
| Relations with other actors | extends the actor **base User** |

**Coast Guard Office User**

| | |
|---|---|
| Short Description | The basic roles of the Coast Guard Office are law enforcement in sea, search and rescue, marine safety, pollution prevention in sea, fishery patrolling, prevention of the illegal immigration, drug interdiction, security of port facilities and vessels. |
| Role in the Port Authority System | The coast guard office has a crucial role whenever public safety emerges. In case of ordinary daily activities, the coast guard office receives live reporting and daily reports for port activities taking place through the port authority system. |
| Examples | The coast guard office user may login to the port authority system and monitor daily port activities. The information offered from the port authority system helps coast guard staffing schedule and work schedule adaptations. |
| Relations with | extends the actor **base User** |

| | |
|---|---|
| other actors | |

**Bank User**

| | |
|---|---|
| Short Description | The bank user will confirm the payment that take place within the port processes. In most of the cases a bank representative (normally from a phone bank service) will promote useful information regarding money exchange. |
| Role in the Port Authority System | The bank user may help to confirm offline payments. A passive role to the system will take place and no direct use of the system will take place. |
| Examples | Whenever a ship berths to the port, prior to departure he must have financial clearance from the port authority. The port authority system calculates the total expenses from the port services and notifies the ship representative. In most of the case's a bank user should clarify the payment status. In some occasions a credit card pay system may speed up the process. In such case a web service take place to the bank user. |
| Relations with other actors | **None** |

**Shipping Agent**

| | |
|---|---|
| Short Description | Shipping agents, also known as cargo and freight agents, are responsible for overseeing both incoming and outgoing shipments for transport companies. Their work is overall to ensure that shipments arrive in a timely manner and in perfect condition. |
| Role in the Port Authority System | Shipping agents assist with shipments by figuring out an appropriate route and organizing all the necessary paperwork. They then schedule the shipment's pick up and arrange its transport to the loading platform. Shipping agents are also responsible for maintaining records of each shipment, including the type, weight, destination and date. In some cases, they make note of damaged or missing items. Besides, shipping agents establish shipping rates for cargo and any other necessary charges. They also ensure that international shipments have the appropriate customs paperwork as well. In addition, shipping agents respond to customer inquires about the status of shipments and track cargo and this information exchange can be done electronically. |
| Examples | |
| Relations with | extends the actor **base User** |

| | |
|---|---|
| other actors | |

**Receiver / Consignee**

| | |
|---|---|
| Short Description | Each item on a cargo ship, from a little box until a container, has an owner who usually is the consignee of it. Whenever missing paperwork or special authorization is asked, the freight representative must contact the consignee for further notification. |
| Role in the Port Authority System | The receiver / consignee never login to the port authority system. |
| Examples | A shipper that user ordinary national post to send a small 5Kgr box with no paperwork attached, may be forced for extra paperwork for customs clearance. In such cases the consignee must supply the paperwork and until this is done the box is stuck to the port. |
| Relations with other actors | **none** |

**Inland Carrier User**

| | |
|---|---|
| Short Description | The inland carrier user is responsible about inland movements of cargo between vessel for terminals for stowage and/or transit. |
| Role in the Port Authority System | Inland carrier user is in close cooperation with terminal operator and container depot user in order to transit the cargo from vessel to the appropriate terminals and vice versa. The terminal operator managing the whole procedure of transit, the inland carrier is responsible for the condition, operation and the use of vehicles and the cranes. In other words, the inland carrier is mostly responsible for:<br>*a.* *Shuttle*: Transportation means that carry containers inside the container terminal.<br>*b.* *Yard crane*: Movement of container(s) between a shuttle and the container yard storage area<br>*c.* *Quay crane*: Procedures of loading/unloading ship cargoes. |
| Examples | When a vessel in going to be unloaded the inland carrier approaches the vessel in order to be loaded and transit through terminal(s) the cargo/freight. |
| Relations with other actors | extends the actor **base User** |

**Terminal Operator User**

| | |
|---|---|
| Short Description | The user from a terminal operator could be part of the port authority or part of a company that contracts with the port authority. The main actions are related to move cargo through a port. The work involves managing the movement of cargo containers between cargo ships, trucks and freight trains and optimizing the flow of goods through customs to minimize the amount of time a ship spends in port. |
| Role in the Port Authority System | Each terminal will have one or more qualified users involved to the following procedures: booking notification, terminal and gate reporting, container release, container status information, invoicing, discharge and loading for vessel, inland carriers and barge containers. Also the customs must be noticed whenever we export cargo at terminal. Major operations that included to the terminal operator user functions, are:<br>The container freight station user can be responsible or involved to the following procedures:<br>● Loading/Unloading of cargo/container<br>● Reefer container status<br>● Tracking in-transit cargo<br>● Recording of vessel, voyage and container details, dates, bills of lading |
| Examples | Whenever a vessel needs a terminal to load or unload containers the ship representative should reserve cranes and staff for such operations. The terminal operators must be informed from the ship representatives and vice versa. |
| Relations with other actors | extends the actor **base User** |

**Inland Container Depot User**

| | |
|---|---|
| Short Description | The inland container depot user is responsible for the stowage and storage of the freight in the container/freight station |
| Role in the Port Authority System | This user must be informed (or inform) other relative user or to participate about:<br>● Freight/cargo handling<br>a. Type of cargo that is loaded/unloaded<br>b. Weight<br>c. Sensitiveness/ Toxicity/ Fragility<br>d. Destination/origin<br>e. Country of origin<br>f. Inspection reports |

| | |
|---|---|
| | g. Storage of deposition of cargoes |
| Examples | When the cargo is unloaded in the freight station, the terminal operator user informs the inland container depot user that is sending a container for storage. Then the inland container depot user is responsible for the stowage and the storage of the container. |
| Relations with other actors | extends the actor **base User** |

**Freight Forwarder User**

| | |
|---|---|
| Short Description | A freight forwarder can be a person or company that organizes shipments for individuals or other companies and may also act as a carrier. A forwarder is often not active as a carrier and acts only as an agent booking or otherwise arranging space for these shipments. |
| Role in the Port Authority System | Freight forwarders arrange cargo movement to an international destination. Freight forwarders, have prepared and process the documentation and perform related activities pertaining to shipments. Some of the typical information reviewed by a freight forwarder is the commercial invoice, shipper's export declaration, bill of lading and other documents required by the carrier or country of export, import, or transshipment. Much of this information can be processed in a paperless environment. |
| Examples | When a cargo is going to be transported the forwarder communicate with the shipping agent and the consignee in order to arrange the time, the duration, the cost and other details about the goods transportation by the forwarding company (rail, truck, etc) |
| Relations with other actors | extends the actor **base User** |

**Customs Agent**

| | |
|---|---|
| Short Description | Customs agents is a person who is licensed to act as an agent for transaction of any business relating to the entry or departure of conveyances or the import or export of goods at any Customs station. |
| Role in the Port Authority System | The custom agents uses the port authority system to:<br>• customs declaration<br>• customs import manifest |

| | |
|---|---|
| | • arrival notice of export cargo at terminal<br>• export manifest / loading list<br>• notification of vessel departing<br>• pre-notification customs regarding safety<br>• notification of incoming vessel<br>• official exit confirmation of vessel to customs<br>• official notification of arrival of an vessel to customs<br>• transhipment notification<br>• transit upload customs documents by terminal operator |
| Examples | The customs agent is the highly involved in each custom's in port process. |
| Relations with other actors | extends the actor **base User** |

**Customs Officer**

| | |
|---|---|
| Short Description | A customs officer is a law enforcement agent who enforces customs laws, on behalf of a government. Whenever a good is imported or exported from a port an officer is in charge and a customs agent prepares the correlated paperwork in order to clear the goods. |
| Role in the Port Authority System | The customs officers doesn't interact directly with the port authority but they interact in real life with the customs agents and have key role to import and export goods. Customs officers are strongly related with crucial paperwork procedures so proper staffing and work schedule may decrease in-port time delays. |
| Examples | Each port that permits cross boundary freight processes has a customs office that performs state related actions to survey the traffic of goods. |
| Relations with other actors | **None** |

**Veterinary Office User**

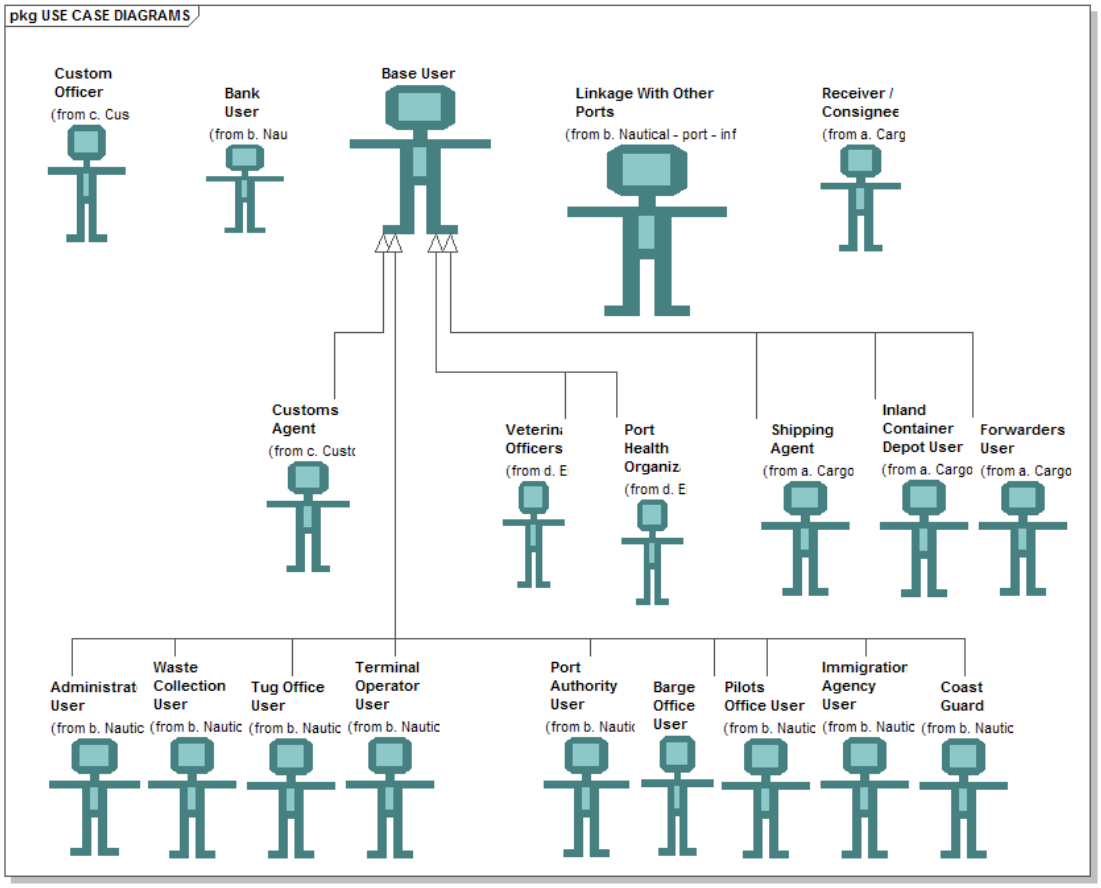
| | |
|---|---|
| Short Description | The Veterinary Office User may be noted for bespoke inspections due to goods that are passing through border point for Import, Export or Transit and has the right to block the export, import or transit of cargo when such goods are inconsistent with the standards required by the law. Goods that are subject to border crossing point's inspection could be:<br>All products and animal's origin by-products for human consumption. |

| | |
|---|---|
| | • Seafood and aquaculture<br>• Live animals<br>• Food for pets<br>Goods that are subject of control may be seedlings, seeds, wood materials, plants, and plant protection products. |
| Role in the Port Authority System | The veterinary office user will provide the appropriate certificates for import or export of sensitive - related goods. |
| Examples | When a passenger ship contains a truck with pets like dogs / cats / parrots and the truck is passing the national border, then the veterinary office should be notified in order to examine the live stock and control the appropriate paperwork and health of the pets. |
| Relations with other actors | extends the actor **base User** |

**Port Health Organization User**

| | |
|---|---|
| Short Description | The Port Health Organization user has a purpose of ensuring prevention of international spread of communicable diseases as par International Sanitary Regulations.<br>• General sanitation of port area and the Shipyard area, spaying of insecticides in the dock and its surrounds and advising.<br>• Port authorities to maintain and improve sanitary conditions of dock and its surroundings.<br>• Anti rodent measures may be ordered. Boarding the ships for sanitary inspection, medical inspection of personnel on board and inspection of provision etc<br>• Drawing of samples of imported food, edible oil and other edible articles. |
| Role in the Port Authority System | The port health organization may be asked through the port authority system to perform scheduled inspections or bespoke actions related to ship berthing or departure. |
| Examples | If a ship has an issue with rots, a ship representative may ask for special anti-rodent measures from the port health organization. |
| Relations with other actors | extends the actor **base User** |

### 3.1.2 User relations



## 3.2 System Processes Description

### 3.2.1 Cargo and Freight processes

#### 3.2.1.1 *Booking Notification of Containers at Terminal & Gate Reporting*

| | |
|---|---|
| Short Description | During this procedure, the shipping company or the relative shipping agent notify the Terminal operators that containers will be delivered or picked up at a certain time in the (near) future.<br>This procedure is necessary for import, export and logistic movements (is the order for the release of empty containers, announcement of the delivery of full or empty containers to the terminal, may concern both full and empty containers) and also can be used for non containerized cargo such as break bulk. |
| Usage | In this procedure, a terminal, depot, etc. confirms that the containers specified have been delivered or picked up by the inland carrier (road, rail or barge) and serve to facilitate the intermodal handling of containers by streamlining the information exchange.<br><br>This procedure can be used:<br>• To request operating means of transportation for a specific routing. Certain specific research criteria such as date/time of operation and type of transport desired may be precised to limit the volume of information requested.<br>• To answer to such a request furnishing a list of operating means of transport in accordance with the selection criteria. Such answer may comprise direct and/or combinations of means of transport.<br>• To request means of transport on which space is available for a specific routing. Certain specific research criteria like date/time of operation, type of transport and space desired may be precised to limit the volume of information requested.<br>• To answer to such request furnishing a list of available means of transport in accordance with the selection criteria. Such an answer may comprise direct and/or combinations of means of transport.<br>• to report the gate(s) activity (gate movements), associated with an item of equipment in and out of a container terminal, storage and repair, facility, or packing / unpacking facility. |
| Involved actors | • Inland Container Depot User<br>• Shipping Agent<br>• Customs Officer |

| | |
|---|---|
| | • Receiver / Consignee<br>• Freight forwarder User<br>• Inland Carrier User |
| Use of Formal XML Message | • Use of EDI CODECO<br>• Use of EDI COPARN<br>• Use of EDI IFTSAI |
| Triggers | • Freight Forwarder User<br>• Shipping Agent |

#### 3.2.1.2 *Booking of maritime transport*

| | |
|---|---|
| Short Description | This process is suitable for the arrangement of the transport of goods between all parties to the movement of the consignment (including the consignor/shipper and consignee as well as the forwarders, brokers, and carriers involved) as well as providing the information necessary to perform that transport and delivery of the goods. It can be used in the same way by each mode of transport when the requirements are common even if functionally similar information is known by different names. |
| Usage | This procedure is used from the party providing forwarding and/or transport services to the party booking those services giving the confirmation information to the booking of the consignment concerned. A confirmation might read that the booking of a consignment is accepted, pending, conditionally accepted or rejected. The conditions under which requested services take place may be given in this message<br>This process is can be also used between vessel operators, vessel sharing partners and cargo receiving and handling facilities such as marine terminals, inland receiving depots, rail ramps and truck terminals to confirm cargo particulars and equipment requirements of the transport provider to the service provider responsible for dispatching empty equipment and receiving the cargo.<br>Finally, it can be used whenever a confirmation of the booking of a consignment is deemed necessary as an answer to a booking provisional or booking firm message concerning a certain consignment and to confirm cargo particulars and equipment requirements. |
| Involved actors | • Shipping Agent<br>• Inland Carrier User<br>• Inland Container Depot User<br>• Freight Forwarder User |

| | |
|---|---|
| Use of Formal XML Message | • Use of EDI IFTMBC<br>• Use of EDI IFTMBF |
| Triggers | • Shipping Agent |

#### 3.2.1.3 *Container Release (procedure for container collection)*

| | |
|---|---|
| Short Description | This procedure is used serving orders to and giving permission for them to be picked up by or on behalf of a specified party. This process is serve to facilitate the intermodal handling of containers by streamlining the information exchange and is part of a total set of container-related processes. |
| Usage | During this procedure cargo/freight related information can be sent to the container terminal as soon as the shipping company or his ship's agent has certainty regarding the payment of the maritime transport. As long as he is not sure, he keeps the container as "security". The same information (in particular the "PIN code" as password) must also be sent to the customer (the consignee or his forwarder) in order to organize the inland transport.<br>The related with this procedure Edifacts are the COPARN, COPRAR and COREOR |
| Involved actors | Sending functions include:<br>• Shipping Agent<br>• Port Authority User<br>• Freight Forwarder User<br>• Inland Carrier User<br><br>Receiving functions include:<br>• Inland Container Depot User<br>• Freight ForwarderUser<br>• Inland Carrier User |
| Use of Formal XML Message | • Use of EDI COREOR |
| Triggers | • Freight Forwarder User |

#### 3.2.1.4 *Container Status Information (track & trace)*

| | |
|---|---|
| Short Description | This process defines the International multimodal status report between trading partners involved in administration, commerce and transport. More specifically, this procedure allows the exchange of information regarding the status of the physical movement of consignments, goods or equipment at any point (in |

| | |
|---|---|
| | time or place) within the full transport chain. |
| Usage | The usage of this process is a status notification:<br>• as the result of request/s for consignment/s or equipment/s status<br>• on a scheduled basis at predetermined times<br>• on the occurrence of a selected event/s<br>• on the occurrence of an exceptional event as agreed by the partners involved<br><br>Example:<br>Shipping company or his shipping agent sends IFTSTA to the shipper or his forwarder for feedback about the status or the flow of the containers. |
| Involved actors | • Shipping Agent<br>• Receiver / Consignee<br>• Freight Forwarder User<br>• Terminal Operator User<br>• Port Authority User<br>• Inland Container Depot User |
| Use of Formal XML Message | • Use of EDI IFTSTA |
| Triggers | • Shipping Agent |

#### 3.2.1.5 *Inland Transport Order*

| | |
|---|---|
| Short Description | This procedure is suitable for the arrangement of the transport of goods between all parties to the movement of the consignment (including the consignor/shipper and consignee as well as the forwarders, brokers, and carriers involved) as well as providing the information necessary to perform that transport and delivery of the goods. It can be used in the same way by each mode of transport when the requirements are common even if functionally similar information is known by different names. |
| Usage | It is usually used by a forwarder to notify the shipping company or the ship's agent in case of outbound cargo. The subsequent loading permit can also be done by the ship's agent to the Terminal operator.<br>Another use is passing on the transport instruction to an inland carrier. This can be done by the shipper or the forwarder ("merchant haulage") or the shipping company ("carrier haulage") both for "pre-carriage" and "on-carriage" (destination haulage).<br>The recipient of IFTMIN needs to confirm receipt with an APERAK |

| | |
|---|---|
| | message (Application Error and Acknowledgement). In this way the sender of the instruction can be assured that the order arrived in good order. |
| Involved actors | • Receiver / Consign<br>• Inland Carrier User<br>• Freight Forwarder User |
| Use of Formal XML Message | • Use of EDI IFTMIN<br>• Use of EDI IFTMBP<br>• IFTMBF<br>• IFTMBC<br>• IFTMCS<br>• IFTSTA<br>• IFTMAN |
| Triggers | • Freight Forwarder User |

#### 3.2.1.6 *Invoice audit*

| | |
|---|---|
| Short Description | This procedure will allow invoices to be compared with agreed rates and contracts in the computer system. Users can be able to generate a report that highlights the differences. |
| Usage | The shipping company sends the freight charges in the form of an electronic message after which this functionality will be able to calculate in real-time whether this corresponds with the actual cargo that was delivered |
| Involved actors | • Freight Forwarder User<br>• Receiver / Consignee<br>• Shipping Agent |
| Use of Formal XML Message | • Use of EDI IFTMCS |
| Triggers | • Shipping Agent |

#### 3.2.1.7 *Loading and discharge order break-bulk of pre - and on-carriage via inland carrier*

| | |
|---|---|
| Short Description | The ship's agent/forwarder gives the Terminal operator the order to load or discharge non-containerized goods in or out of a truck, wagon or inland barge. The load order applies for goods coming from a vessel; in case of a discharge order, the cargo has an |

| | |
|---|---|
| | overseas destination<br>During this procedure a single consignment based message, being aligned with other single consignment based messages such as the booking messages (IFTMBP, IFTMBF and IFTMBC), the Instruction Contract Status Message (IFTMCS) and the Arrival Notice Message (IFTMAN)<br>This procedure is suitable for the arrangement of the transport of goods between all parties to the movement of the consignment (including the consignor/shipper and consignee as well as the forwarders, brokers, and carriers involved) as well as providing the information necessary to perform that transport and delivery of the goods. |
| Usage | It is very important procedure for electronic booking. A message from the party issuing an instruction regarding forwarding/transport services for a consignment under conditions agreed, to the party arranging the forwarding and/or transport services. |
| Involved actors | • Freight Forwarder User<br>• Terminal Operator User |
| Use of Formal XML Message | • Use of EDI IFTMIN<br>• Use of EDI IFTSTA |
| Triggers | • Shipping Agent<br>• Freight Forwarder User |

#### 3.2.1.8 *Loading and Discharge Order Containers for Vessel*

| | |
|---|---|
| Short Description | During this procedure there is information (message) exchange from terminal to the interested users that the containers specified have been discharged from a seagoing vessel (discharged as ordered, over landed or short landed), or have been loaded into a seagoing vessel.<br>Via this procedure, also the ship's agent gives the Terminal operator the order to load or discharge containers in or from the vessel. The Terminal operator sends a confirmation of execution to the ship's agent afterwards<br>Finally is used to transmit information about equipment and goods on a means of transport, including their location on the means of transport. The message (BAPLE) can be exchanged between (liner's) agents, tonnage centers, stevedores and ships masters / operator. |
| Usage | During Loading Procedure:<br>The COARRI/Load message is sent subsequently to loading the |

| | |
|---|---|
| | containers on the vessel. For larger vessels, the shipping company or his ship's agent can't wait until all containers are on board and they expect intermediate COARRI/load messages of the container Terminal.<br>The loading of an inland barge is considered as a container move on the "land side" (such as truck or rail) and thus a CODECO message is used for the reporting, not a COARRI/Load message<br><br>During Unloading procedure:<br>The COARRI/Discharge message is sent subsequently to discharging the containers from the vessel. For larger vessels, the shipping company or his ship's agent can't wait until all containers have been discharged and they expect intermediate COARRI/discharge messages of the container Terminal. The message is merely used to report "water side"-discharging. The discharging of an inland barge is considered as a container move on the "land side" (such as truck or rail) and thus a CODECO message is used for the reporting, not a COARRI/Discharge message. |
| Involved actors | • Shipping Agent<br>• Terminal Operator User |
| Use of Formal XML Message | • Use of EDI BAPLIE<br>• Use of EDI COARRI<br>• Use of EDI COPRAR |
| Triggers | • Shipping Agent<br>• Terminal Operator User. |

#### 3.2.1.9 *Loading and discharge order inland barge containers*

| | |
|---|---|
| Short Description | This procedure is useful for transparency about the time of handling and the number of containers to be handled. The benefits are, less turnaround time on the terminal and accurate estimations of the required manpower and equipment at the Terminal.<br>Alternatively, in this process the inland carrier notify the Terminal he will come to pick up and/or deliver a container. Inland transport is mainly by truck, but this procedure is also suitable for a pre-notification of inland barges and rail operators |
| Usage | The relative message of this procedure COPINO and/or CODECO, is sent by the inland carrier to the Container Terminal as soon as they schedule the trip based on the order (IFTMIN) received from the instructing party of the inland transport. Upon receipt of this message, the Container Terminal will check whether the proposed container movement (delivery or pick up) at the proposed time is possible. He sends response (APERAK) to the COPINO message.<br>For example, if a container to be picked up is not yet available at or |

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| | if the booking data is still not known by the Container Terminal, a negative advice will be sent. This avoids the inland carrier having to make an unnecessary trip (particularly trucks) waiting at the Container Terminal |
| Involved actors | • Inland Container Depot User<br>• Terminal Operator User<br>• Freight Forwarder User<br>• Receiver / Consignee<br>• Shipping Agent |
| Use of Formal XML Message | • Use of EDI CODECO<br>• Use of EDI COPINO<br>• Use of EDI APERAK<br>• Use of EDI IFTMIN |
| Triggers | • Inland Container Depot User |

#### 3.2.1.10 *Notice of Arrival Goods Vessel Import*

| | |
|---|---|
| Short Description | This procedure is used to exchange messages from the party providing forwarding and/or transport services to the party such as has been indicated in the contract, giving notice and details of the arrival of the consignment. |
| Usage | This procedure is simply a notification report. By sending the notice of arrival the ship's agent informs the consignee the goods are available. In the notice of arrival the ship's agent reports the expected time of arrival of the vessel and all the appropriate provisions for collection of the goods being transported. Based on this information the consignee or his forwarder is able to make preparations for an efficient delivery of the cargo. |
| Involved actors | • Receiver / Consignee<br>• Freight Forwarder User<br>• Shipping Agent |
| Use of Formal XML Message | • Use of EDI IFTMAN |
| Triggers | • Shipping Agent |

#### 3.2.1.11 *Pre-notification delivery & collection of containers at Terminal*

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|---|---|
| Short Description | In this procedure, the carrier uses this message to notify the Terminal operator that a truck will be arriving to load or discharge. This pre-notification enables the Terminal operator to plan the loading and/or discharging of the trucks. |

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| Usage | During this process the carrier uses the relative messages to notify the Terminal operator that a truck will be arriving to load or discharge. This pre-notification enables the Terminal operator to plan the loading and/or discharging of the trucks<br>If the container is available on the quay, or the ship's agent released it, or the specified references are correct, then any available truck can be booked. |
| Involved actors | • Terminal Operator User<br>• Inland Carrier User |
| Use of Formal XML Message | • Use of EDI COPINO<br>• Use of EDI IFTSTA |
| Triggers | • Inland Carrier User |

#### 3.2.1.12 *Shipping instructions for bill of lading*

| | |
|---|---|
| Short Description | In this procedure the forwarder sends the shipping instructions to provide basic information to draw up the bill of lading. The forwarder collects this information based on the orders he received from the shipper. |
| Usage | This process is useful when the forwarder sends an IFTMIN message to the ship's agent. The ship's agent receives the basic details to draw up a bill of lading electronically. This bill of lading can be printed and signed in case of a transferable document and in case of a non-transferable document can be included as an e-mail attachment. |
| Involved actors | • Freight Forwarder User<br>• Shipping Agent<br>• Receiver / Consignee |
| Use of Formal XML Message | • Use of EDI IFTMIN |
| Triggers | • Shipping Agent |

#### 3.2.1.13 *Stowage Position / Baylist*

| | |
|---|---|
| Short Description | This procedure allows shipping companies and terminal operators to exchange stowage plans electronically, speeding up all relative operations. |
| Usage | This process is used by and between various parties to advise the exact stowage positions of the cargo on board of an vessel (stowage plans). It is currently chiefly used for container cargo. Besides the |

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| | container number and the exact position on board, general information regarding the containers is also specified such as weight and hazardous cargo class. All the above mentioned information can be recorded by electronically stowage plans (BAPLIE).<br>The Terminal operator bases himself on these stowage plans and loading and discharge orders (COPRAR message) of the shipping company/ship's agent to handle the vessel. |
| Involved actors | • Shipping Agent<br>• Terminal Operator User |
| Use of Formal XML Message | • Use of EDI BAPLIE<br>• Use of EDI COPRAR |
| Triggers | • Shipping Agent<br>• Terminal Operator User |

### 3.2.2 Nautical - In port - Infrastructure - Ship Traffic Processes

#### 3.2.2.1 *Barge Planning Request*

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| Short Description | Container barges often call at several Terminals in the port during the same call. To limit the administration regarding a port call as much as possible, a process is implemented which allows container barges to request a handling slot for all the Terminals in a uniform manner.<br>The exchanged messages will include:<br>• Forwarding and transport schedule and availability information message (Use of EDI IFTSAI)<br>• International multimodal status report message (Use of EDI IFTSTA) |
| Usage | The Barge process is a planning process for inland container barge. A barge operator who loads or discharges containers in the port is required to use the process to send planning requests to the Terminals he wants to call at. Using conflict monitoring the barge operator is notified if his planning requests at various Terminals are too close to each other. Based on the received planning requests, the Terminal operator will plan the barges at his Terminal and will provide feedback via the planning process to the barge operator. Operating systems can exchange XML messages via a machine-to-machine link. |
| Involved actors | • Barge Office User<br>• Inland Carrier User |
| Use of Formal XML Message | - |
| Triggers | • Barge Office User<br>• Inland Carrier User |

#### 3.2.2.2 *Consult Lock Planning*

| | |
|---|---|
| Short Description | The Port Authority offers Terminal and barge operators the opportunity to consult the planning of the locks in the port. |
| Usage | Per lock one can check when clearances take place or will take place toward the Scheldt and toward the docks. Per clearance the number of planned outland carriers and inland barges is shown. |
| Involved actors | • Terminal Operator User<br>• Barge Office User |
| Use of Formal XML Message | - |

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| Triggers | • Terminal Operator User<br>• Barge Office User |

#### 3.2.2.3 *Declaration of berthing dues*

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| Short Description | Every vessel calling at the Port owes berthing dues to the Port Authority. To calculate these dues, the shipping agent must to specify the type and amount of cargo that was discharged or loaded when the vessel was in port to the Port Authority. |
| Usage | The shipping agent must declare the amount of discharged or loaded goods. |
| Involved actors | • Port Authority User<br>• Shipping Agent |
| Use of Formal XML Message | - |
| Triggers | • Shipping Agent |

#### 3.2.2.4 *Declaration of Waste Collection*

| | |
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| Short Description | Vessels owe to handle their waste in seaports with recognized collection facilities in order to protect the environment. The Port Authority can charge vessels a waste contribution irrespective of the actual delivery. All waste dropped off needs to be declared to the Port Authority by the waste collection companies. These data also allows the waste flows to be meticulously monitored. |
| Usage | This procedure is appropriate for the environmental policy of the port. During this procedure, all waste collection facilities in the port need to register their collections providing details about the vessel and the port call as well as waste notifications of the shipping agent. |
| Involved actors | • Waste Collection Office User<br>• Port Authority User<br>• Shipping Agent<br>• Port Health Organization User |
| Use of Formal XML Message | - |
| Triggers | • Shipping Agent |

#### 3.2.2.5 *Passenger Ship Berth*

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| Short Description | The process of berthing of a Passenger ship demands data exchange between shipping agent, Port Authority and related offices (immigration office, Customs, Coast Guard). This procedure will provide the Passenger list of a ship with an XML message defined in EDI PAXLST format. It has two main applications:<br>• International passenger movement ( passenger and crew lists)<br>• Inter country movement (crew lists) |
| Usage | This Passenger List Message permits the transfer of passenger/crew data from a Customs, Immigration or other designated authority in the port of departure to the appropriate authorities in the port of arrival of the means of transport.<br>Where national privacy legislation permits, and with the agreement of all parties involved, this message may also be exchanged between carriers and Customs, Immigration, Police or Port Authority.<br>This transfer of data may occur upon departure from the sending agency and prior to arrival of the vessel at the receiving agency. This is to permit the designated authority at the place of destination to screen this data and take timely decisions related to the clearance of passengers and crew.<br>The transfer of data may also occur prior to departure; carriers may transmit passenger listings to customs and immigration for pre-arrival clearance.<br>Endorsement of this message by the Customs Cooperation Council does not necessarily mean endorsement by national Immigration or Police authorities, nor does it place any obligations on parties to apply the message. |
| Example of use | A Passenger Vessel when approaching a port should provide the passenger and crew list. The exchanged information may include sensible personal data such as:<br>• name<br>• address<br>• passport or identification number<br>• place location of identification<br>• Nationality<br>• Transport information<br>• etc<br>None related sensible data like religion, political beliefs, personal beliefs and similar will not be included. |
| Involved Actors | • Port Authority User<br>• Immigration Agency User<br>• Shipping Agent |

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| | • Port Health Organization User |
| Use of Formal XML Message | - |
| Triggers | • Shipping Agent |

#### 3.2.2.6 *Passenger Ship Departure*

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|---|---|
| Short Description | This procedure permits the transfer of passenger/crew data from a Customs, Immigration or other designated authority in the country of departure to the appropriate authorities in the country of arrival of the means of transport. Where national privacy legislation permits, and with the agreement of all parties involved, this message may also be exchanged between carriers and Customs, Immigration, Police or any designated authorities. |
| Usage | This transfer of data may occur upon departure from the sending agency and prior to arrival of the vessel/ flight at the receiving agency. This is to permit the designated authority at the place of destination to screen this data and take timely decisions related to the clearance of passengers and crew. The transfer of data may also occur prior to departure; carriers may transmit passenger listings to customs and immigration for pre-arrival clearance. |
| Involved actors | • Shipping Agent<br>• Customs Officer<br>• Immigration Agency User<br>• Coast Guard Office User<br>• Port Health Organization User |
| Use of Formal XML Message | • PAXLST |
| Triggers | • Shipping Agent |

#### 3.2.2.7 *vessel berth reservation*

| | |
|---|---|
| Short Description | The ship's agent/shipping company makes berth reservation to the Port Authority. |
| Usage | The shipping agent/shipping company is able to requests a berth reservation (first needed or preferred berth) exchanging information (via BERMAN and APERAK edifact messages) such as the port of arrival, name of the vessel, shipping company, previous and next port. The Port Authority checks if this is possible and sends a confirmation. |

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| Involved actors | • Port Authority User<br>• Shipping Agent<br>• Terminal Operator User |
| Use of Formal XML Message | • Use of EDI APERAK<br>• Use of EDI BERMAN |
| Triggers | • Shipping Agent |

#### 3.2.2.8 *Ordering Pilot, Tug and other Services*

| | |
|---|---|
| Short Description | A process which will permit the vessels to ask for services like pilots, tug etc. This request is made via the BERMAN message. |
| Usage | The Berth management message is a message from a carrier, its agent or means of transport to the port authority, requesting a berth, giving details of the call, vessel, berth requirements and expected operations.<br><br>This message is meant to comply with requirements of authorities concerning the request for berthing services. The following guidelines, rules and functionality apply to this Berth management message:<br>• A message will contain information in only one means of transport/conveyance. The only exception will be the case of covering pre-announcement function.<br>• A ship call may require several berths.<br>• One berth may be the scenario of several operations.<br>• The message has to cater for the provision of sending updates (cancellation, replace, provisional, definitive) or new services request such as shifts and request for second berth. The message will cover the function of pre-announcement of vessels. |
| Involved actors | • Port Authority user<br>• Shipping Agent<br>• Terminal Operator user |
| Use of Formal XML Message | • Use of EDI APERAK<br>• Use of EDI BERMAN |
| Triggers | • Shipping Agent |

#### 3.2.2.9 *Pre-Notification of Arrival / Departure of an Vessel*

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|---|---|
| Short Description | The national/international legislation obligates the shipping agent/shipping company to provide information to the Port Authority about the vessel calling at or leaving the port. This is done |

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| | by the pre-notification of arrival- message. |
| Usage | This Procedure can be used as follows:<br>• The shipping agent/shipping company can sent to Port Authority information about port of arrival, name of the vessel, shipping company, previous and next port and details about crew, passengers, berth or transit.<br>• After receiving the pre-notification of arrival, Port Authority provides a port call number. This number is used for all further notifications during the vessel's call at the port. A departure request needs to contain all the data regarding the departure of the vessel from the (last) berth in the port area. |
| Involved actors | • Port Authority User<br>• Shipping Agent |
| Use of Formal XML Message | • Use of EDI APERAK<br>• Use of EDI BERMAN |
| Triggers | • Shipping Agent |

#### 3.2.2.10 *Request barge position*

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|---|---|
| Short Description | The Port Authority can offer to Terminal and barge operators the opportunity to request the positional data of inland barges. Terminal operators are able to request the position of every known inland barge. Barge operators are only able to request the positions of their own inland barges |
| Usage | The Port Authority can receive positional data through automated applications of inland barges for a certain number of transit points. These data can be used directly to request the position of every known inland barge. |
| Involved actors | • Barge Office User<br>• Terminal Operator User<br>• Port Authority User |
| Use of Formal XML Message | - |
| Triggers | • Port Authority<br>• Terminal Operator |

#### 3.2.2.11 *Terminal planning inland barge*

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|---|---|
| Short | Container barges often call at several Terminals in the port over the |

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|---|---|
| Description | course of the same visit. A Terminal handling inland container barges is required to approve, change or refuse planning requests of barge operators. Based on the received requests the Terminal operator can optimize his Terminal planning. |
| Usage | Terminals if the estimated time of arrival at a Terminal is not feasible, taking into account the average sailing time between Terminals and the estimated handling time. The Terminals can be able to harmonize their planning's using electronic information exchange with the use of the relative EDIFACTS (IFTSTA, IFTSAI). |
| Involved actors | • Terminal Operator User<br>• Port Authority User |
| Use of Formal XML Message | • Use of EDI IFTSAI<br>• Use of EDI IFTSTA |
| Triggers | • Terminal Operators User |

#### 3.2.2.12 *Waste / Pollution Notification about Vessels*

| | |
|---|---|
| Short Description | The shipping agent/shipping company is required under the national and international legislation to declare the ship's waste on board (for example oil residue, plastic, empty bottles, empty paint pots, chemicals, kitchen waste e.t.c) to the Port Authority before any arrival at the port. All ships owe to pay the port an amount for the collection of their waste, irrespective of the fact whether it is picked up or not. |
| Usage | This procedure is appropriate for any arrival at the port. The information exchange during this procedure concerns the number of passengers and crew, duration of the last voyage, storage capacity, nature and amount of waste on board that will be picked up, name of the collector, estimated amount of waste that will be produced until the next port of call, notification to the next port where the waste will be delivered. The notifications about the wastes on board can be made using the relative edifact messages. |
| Involved actors | • Port Authority User<br>• Shipping Agent<br>• Coast Guard Office User<br>• Port Health Organization User |
| Use of Formal XML Message | • Use of EDI APERAK<br>• Use of EDI WASDIS<br>• Use of DGRECA |
| Triggers | • shipping Agent |

#### 3.2.2.13 *Administration Processes*

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|---|---|
| Short Description | The port authority will have system users granted with special authority in order to perform administration tasks and maintenance of system. They will be able to perform processes related to:<br>• enroll system users<br>• backup the fully functional database<br>• trim - update the front end dynamic content<br>• perform - gather<br>  o system statistics<br>  o load monitoring<br>  o real time actions<br>• end user support |
| Usage | The system administrators can perform routine tasks using the front end of the system. Special privilege for these particular users must be granted. |
| Involved actors | • Administrator User |
| Use of Formal XML Message | - |
| Triggers | • Administrator User |

#### 3.2.2.14 *Port Authority Processes*

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|---|---|
| Short Description | The port authority users in order to maintain the system and keep the system up to date may perform one man tasks. Only the port authority users are involved in this process. The actions may be related to:<br>• information of assessment charges<br>• Tariff prices of port<br>• daily update of vessel position<br>• profile update of stakeholders<br>• helpdesk<br>• inspection reports |
| Usage | In some cases the port authority users must update sensitive data to keep the database up to date. For example when a representative of a ship doesn't complete a birthing of a ship, a port authority may complete the task in order to keep the database updated. Also when the port authority wishes to change the price charges then a port authority user may update the available fields. |
| Involved actors | • Port Authority User |

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| Use of Formal XML Message | |
| Triggers | • Port Authority User |

### 3.2.3 Customs Processes

#### 3.2.3.1 *Customs Declaration*

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|---|---|
| Short Description | Each good for import, export or transit is related to a Customs Declaration Message (CUSDEC) permitting the transfer of data from a declarant to a customs administration for the purpose of meeting legislative and/or operational requirements in respect of the declaration of goods for import, export or transit. For each customs declaration message a proper Customs response message Interchange (CUSRES) will allow a customs administration to respond to any customs message, including the possibility to respond to multi-consignment and batched messages. |
| Usage | The Customs declaration message based on universal practice related to administration, commerce and transport, and is not dependent on the type of business or industry.<br><br>The customs administration will make use of Customs Response Message (CUSRES) permitting the transfer of data from a customs administration:<br>• to acknowledge the receipt of the message<br>• To indicate whether the information received is correct or if there are errors (i.e. accepted without errors, accepted with errors, rejected, etc.)<br>• To inform the sender of the status of the customs declaration (i.e. goods released, goods for examination, documents required, etc.)<br>• To transmit additional information as agreed between parties (i.e. tax information, quantity information, etc.)<br>• to respond to batched messages |
| Involved actors | • Customs Agent<br>• Receiver / Consignee<br>• Freight Forwarder User |
| Use of Formal XML Message | • Use of EDI CUSDEC<br>• Use of EDI CUSRES |
| Triggers | • Freight Forwarder User |

#### 3.2.3.2 *Customs Import Manifest*

| | |
|---|---|
| Short Description | This procedure from a customs agent office message permits the transfer of data from a carrier to a Customs administration for the purpose of meeting Customs cargo reporting requirements.<br><br>For each customs declaration message a proper Customs response message Interchange (CUSRES) will allow a customs |

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| | administration to respond to any customs message, including the possibility to respond to multi-consignment and batched messages. |
| Usage | It is envisaged that the Customs Cargo Inventory Report Message may be initiated by the carrier to report single or multiple consignments to a Customs administration. The message is transmitted upon arrival of the goods, or where national legislation permits, prior to arrival. The data provides Customs with a means of "writing off" or acquitting the cargo report against Goods declarations. It also allows Customs to undertake selectivity processing in order to select high risk shipments requiring examination.<br>The message may be used for reporting:<br>• onward transit/transhipment;<br>• short and part shipped goods;<br>• empty containers;<br>• import/export cargo;<br>• house and masterbill relationship<br><br>The customs administration will make use of Customs Response Message (CUSRES) permitting the transfer of data from a customs administration:<br>• to acknowledge the receipt of the message<br>• To indicate whether the information received is correct or if there are errors (i.e. accepted without errors, accepted with errors, rejected, etc.)<br>• To inform the sender of the status of the customs declaration (i.e. goods released, goods for examination, documents required, etc.)<br>• To transmit additional information as agreed between parties (i.e. tax information, quantity information, etc.)<br>• to respond to batched messages |
| Involved actors | • Customs Agent<br>• Shipping Agent |
| Use of Formal XML Message | • Use of EDI CUSCAR<br>• Use of EDI CUSRES |
| Triggers | • Shipping Agent |

#### 3.2.3.3 *Arrival Notice of Export Cargo at Terminal*

| | |
|---|---|
| Short Description | This process provides a notification related to the Container gate-in/gate-out report message (CODECO) to be used in Electronic Data Interchange (EDI) between trading partners.<br><br>A message by which a customs agent informs a terminal operator |

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| | user confirming that the containers specified have been delivered or picked up by the inland carrier. This message can also be used to report internal terminal container movements and to report the change in status of container(s) without those containers having physically been moved.<br><br>This message is part of a total set of container-related messages. These messages serve to facilitate the intermodal handling of containers by streamlining the information exchange. |
| Usage | Business area:<br>Pre- and on-carriage transport of containers/equipment.<br>Sending functions include:<br>Container depot, Inland terminal, Container freight station<br>Receiving functions include:<br>Shipping agent, Logistic center, Shipper (copy), Freight forwarder (copy) and Inland carrier (copy)<br><br>Guidelines apply to this container gate-in/gate-out report message. The message contents can be uniquely identified by a combination of the following data elements:<br>• ordering customer, coded (NAD)<br>• ordering customer agent, coded (NAD)<br>• container announcement reference (being the release order reference number or the acceptance order reference number) (RFF)<br><br>The ordering customer agent, coded is needed to supplement the unique identification only in the next situation: the agent acts on behalf of several ordering customers issuing the same range of reference numbers for each customer. E.g. the ship's agent acts on behalf of several shipping lines issuing for each shipping line the same range of numbers.<br><br>A copy of this message may be sent e.g. to the shipper, freight forwarder, the inland waterways and rail carriers, according to the communication addresses as mentioned in the Container announcement.<br><br>One message may contain several containers. A supplementary container reference (container sequence number) is used to refer to the information of the container(s) in the Container announcement, if the container prefix and number was not completed in that message.<br><br>An indicator for the transport status (i.e. export, import, transshipment or continental) is to be completed on container level |

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| | (EQD-segment).<br><br>One shipping line can be specified on message level. The seagoing vessel and sea voyage number can be specified on message level. Inland transport details can be specified for each individual container.<br><br>For each container its place of discharge or its position of loading (stowage cell) in/on the means of inland transport can be specified.<br><br>In case of export the port of discharge and any port of transshipment can be specified for each individual container. The date/time of pick-up and final address of positioning or the date/time of delivery must be given for each container. For each container seals can be specified affixed by the shipper, container freight station, terminal, sea carrier and customs.<br><br>A status message may be sent:<br>• As the result of request/s for consignment/s or equipment status/es<br>• On a scheduled basis at predetermined times<br>• On the occurrence of a selected event/s<br>• On the occurrence of an exceptional event as agreed by the partners involved.<br><br>This message can relate to a status (or statuses) that had or have been reached in a transport chain.<br><br>Data requirements for tracking equipment where equipment is not associated with a consignment (such as repair container) are NOT addressed in this message. |
| Involved actors | • Customs Agent<br>• Terminal Operator User |
| Use of Formal XML Message | • Use of EDI CODECO<br>• Use of EDI IFTSTA |
| Triggers | • Customs Agent |

#### 3.2.3.4 *Exchange of Container Movement Reference Number with Terminal operator*

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|---|---|
| Short Description | This process will allow users to notify and to trace their cargo movements at the terminal. This is developed within the context of the automation of the export declaration as well as for transit declarations, particularly the requirement for the terminal operator to make an electronic notification of container goods arrivals to be sent to Customs. |

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| Usage | In the first phase this processes can be used for preannouncement of customs data for containerized cargo only.<br>Both export declarations as transit declarations for export can be pre-announced using this process. In case of a transit declaration European legislation still demands a physical handover of a hardcopy document to the Customs office at exit. Registration of the transit declaration in this process has the advantage that you can use the track and trace function for all export movements. |
| Involved actors | • Terminal Operator User<br>• Inland Container Depot User<br>• Freight Forwarder User<br>• Receiver / Consignee |
| Use of Formal XML Message | - |
| Triggers | • Freight Forwarder User |

#### 3.2.3.5 *Export Manifest / Loading List*

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|---|---|
| Short Description | This procedure from a customs agent office message permits the transfer of data from a carrier to a Customs administration for the purpose of meeting Customs cargo reporting requirements.<br><br>For each customs declaration message a proper Customs response message interchange (CUSRES) will allow a customs administration to respond to any customs message, including the possibility to respond to multi-consignment and batched messages. |
| Usage | It is envisaged that the Customs Cargo Inventory Report Message may be initiated by the carrier to report single or multiple consignments to a Customs administration. The message is transmitted upon arrival of the goods, or where national legislation permits, prior to arrival. The data provides Customs with a means of "writing off" or acquitting the cargo report against Goods declarations. It also allows Customs to undertake selectivity processing in order to select high risk shipments requiring examination.<br>The message may be used for reporting:<br>• onward transit/transhipment;<br>• short and part shipped goods;<br>• empty containers;<br>• import/export cargo;<br>• house and masterbill relationship<br><br>The customs administration will make use of Customs Response Message (CUSRES) permitting the transfer of data from a customs administration: |

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| | • To acknowledge the receipt of the message<br>• To indicate whether the information received is correct or if there are errors (i.e. accepted without errors, accepted with errors, rejected, etc.)<br>• To inform the sender of the status of the customs declaration (i.e. goods released, goods for examination, documents required, etc.)<br>• To transmit additional information as agreed between parties (i.e. tax information, quantity information, etc.)<br>• to respond to batched messages |
| Involved actors | • Terminal Operator User<br>• Shipping Agent |
| Use of Formal XML Message | • Use of EDI CUSCAR<br>• Use of EDI CUSRES |
| Triggers | • Terminal Operator User<br>• Shipping Agent |

#### 3.2.3.6 *Notification of Departing Vessel*

| | |
|---|---|
| Short Description | This Customs Conveyance Report Message (CUSREP) permits the transfer of data from a carrier to a Customs administration for the purpose of meeting Customs reporting requirements in respect of the means of transport on which cargo is carried.<br><br>For each customs declaration message a proper Customs response message interchange (CUSRES) will allow a customs administration to respond to any customs message, including the possibility to respond to multi-consignment and batched messages. |
| Usage | It is envisaged that the Customs Conveyance Report Message may be initiated by the carrier to report details of the means of transport on which cargo is conveyed to a Customs administration. The message is transmitted upon arrival of the vessel, flight, etc., or where national legislation permits, prior to arrival. The data provides a means of establishing the basis of a cargo inventory report for the conveyance in question. Details of individual consignments carried on the conveyance will be subsequently transmitted to Customs using a CUSCAR message or a series of such messages. It also allows Customs to undertake selectivity processing in order to select high risk conveyances and shipments requiring examination. The message embodies reporting requirements of all modes of transport. Each message covers the data requirements for one conveyance. The message may be used for reporting empty containers as well as numbers of passengers and crew. |

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| | The customs administration will make use of Customs Response Message (CUSRES) permitting the transfer of data from a customs administration:<br>• to acknowledge the receipt of the message<br>• To indicate whether the information received is correct or if there are errors (i.e. accepted without errors, accepted with errors, rejected, etc.)<br>• To inform the sender of the status of the customs declaration (i.e. goods released, goods for examination, documents required, etc.)<br>• To transmit additional information as agreed between parties (i.e. tax information, quantity information, etc.)<br>• to respond to batched messages |
| Involved actors | • Terminal Operator User<br>• Port Authority User<br>• Shipping Agent |
| Use of Formal XML Message | • Use of EDI CUSREP<br>• Use of EDI CUSRES |
| Triggers | • Shipping Agent |

#### 3.2.3.7 *Import Control Process: Pre-notification Customs regarding safety*

| | |
|---|---|
| Short Description | According to the European Import Control System (ICS), a summary declaration needs to be submitted for cargo that enters the first seaport of the EU Customs area, irrespective of its final destination. The aim of this regulation is to prevent the entry of unwanted cargo in the EU ports in respect of safety and security. |
| Usage | The summary declaration on arrival is done by sending an Entry Summary Declaration (ENS). The shipping company, his agent or a third party authorized by the shipping company needs to submit this to the Customs office of first entry into the EU, irrespective of actual discharging.<br><br>For container cargo, the ENS needs to be submitted 24 hours before loading at each loading port. In case of a serious safety risk, the shipping company or his agent receives a 'DO NOT LOAD' message for the container. For non-containerized cargo, for which an ENS needs to be sent a couple of hours before arrival, the Customs office of first entry into the EU, acts in case of a serious risk. Based on the CRMS (Common Risk Management System) the Customs office of its entry into the EU will exchange information with colleagues in the relevant member states, before the cargo enters the country. |

| | |
|---|---|
| Involved actors | • Terminal Operator User<br>• Customs Agent<br>• Shipping Agent |
| Use of Formal XML Message | - |
| Triggers | • Shipping Agent |

#### 3.2.3.8 *International Ship and Port Security Code declaration (safety)*

| | |
|---|---|
| Short Description | The International Ship and Port Facility Security Code or ISPS code stipulates that vessels wanting to call at an EU port, need to provide certain information in the form of an 'ISPS Declaration' to the authorities. |
| Usage | The shipping company/ship's agent fills out the required ISPS registration form and mails or faxes it to Customs within 24 hours at the latest prior to arrival of the vessel. This registration form must specify the identification details of the vessel and the last 10 port facilities called at (including the security level of each port facility). The current security level under which the vessel operates has to be specified too. |
| Involved actors | • Shipping Agent |
| Use of Formal XML Message | - |
| Triggers | • Shipping Agent |

#### 3.2.3.9 *Notification of Incoming Vessel*

| | |
|---|---|
| Short Description | This Customs Conveyance Report Message (CUSREP) permits the transfer of data from a carrier to a Customs administration for the purpose of meeting Customs reporting requirements in respect of the means of transport on which cargo is carried.<br><br>For each customs declaration message a proper Customs response message interchange (CUSRES) will allow a customs administration to respond to any customs message, including the possibility to respond to multi-consignment and batched messages. |
| Usage | It is envisaged that the Customs Conveyance Report Message may be initiated by the carrier to report details of the means of transport on which cargo is conveyed to a Customs administration. The message is transmitted upon arrival of the vessel, flight, etc., or where national legislation permits, prior to arrival. The data |

| | |
|---|---|
| | provides a means of establishing the basis of a cargo inventory report for the conveyance in question. Details of individual consignments carried on the conveyance will be subsequently transmitted to Customs using a CUSCAR message or a series of such messages. It also allows Customs to undertake selectivity processing in order to select high risk conveyances and shipments requiring examination. The message embodies reporting requirements of all modes of transport. Each message covers the data requirements for one conveyance. The message may be used for reporting empty containers as well as numbers of passengers and crew.<br><br>The customs administration will make use of Customs Response Message (CUSRES) permitting the transfer of data from a customs administration:<br>• To acknowledge the receipt of the message<br>• To indicate whether the information received is correct or if there are errors (i.e. accepted without errors, accepted with errors, rejected, etc.)<br>• To inform the sender of the status of the customs declaration (i.e. goods released, goods for examination, documents required, etc.)<br>• To transmit additional information as agreed between parties (i.e. tax information, quantity information, etc.)<br>• To respond to batched messages |
| Involved actors | • Terminal Operator User<br>• Shipping Agent |
| Use of Formal XML Message | • Use of EDI CUSREP<br>• Use of EDI CUSRES |
| Triggers | • Shipping Agent |

#### 3.2.3.10 *Official exit confirmation of vessel to Customs*

| | |
|---|---|
| Short Description | This Customs Conveyance Report Message (CUSREP) permits the transfer of data from a carrier to a Customs administration for the purpose of meeting Customs reporting requirements in respect of the means of transport on which cargo is carried.<br><br>For each customs declarations message a proper Customs response message. Interchange (CUSRES) will allow a customs administration to respond to any customs message, including the possibility to respond to multi-consignment and batched messages. |
| Usage | It is envisaged that the Customs Conveyance Report Message may be initiated by the carrier to report details of the means of transport on which cargo is conveyed to a Customs administration. |

| | |
|---|---|
| | The message is transmitted upon arrival of the vessel, flight, etc., or where national legislation permits, prior to arrival. The data provides a means of establishing the basis of a cargo inventory report for the conveyance in question. Details of individual consignments carried on the conveyance will be subsequently transmitted to Customs using a CUSCAR message or a series of such messages. It also allows Customs to undertake selectivity processing in order to select high risk conveyances and shipments requiring examination. The message embodies reporting requirements of all modes of transport. Each message covers the data requirements for one conveyance. The message may be used for reporting empty containers as well as numbers of passengers and crew.<br><br>The customs administration will make use of Customs Response Message (CUSRES) permitting the transfer of data from a customs administration:<br>• To acknowledge the receipt of the message<br>• To indicate whether the information received is correct or if there are errors (i.e. accepted without errors, accepted with errors, rejected, etc.)<br>• To inform the sender of the status of the customs declaration (i.e. goods released, goods for examination, documents required, etc.)<br>• To transmit additional information as agreed between parties (i.e. tax information, quantity information, etc.)<br>• to respond to batched messages |
| Involved actors | • Terminal Operator User<br>• Port Authority User |
| Use of Formal XML Message | • Use of EDI CUSREP<br>• Use of EDI CUSRES |
| Triggers | • Terminal Operator User |

#### 3.2.3.11 *Official notification of arrival of an vessel to Customs*

| | |
|---|---|
| Short Description | This Customs Conveyance Report Message (CUSREP) permits the transfer of data from a carrier to a Customs administration for the purpose of meeting Customs reporting requirements in respect of the means of transport on which cargo is carried.<br><br>For each customs declaration message a proper Customs response message interchange (CUSRES) will allow a customs administration to respond to any customs message, including the possibility to respond to multi-consignment and batched messages. |
| Usage | It is envisaged that the Customs Conveyance Report Message may |

| | |
|---|---|
| | be initiated by the carrier to report details of the means of transport on which cargo is conveyed to a Customs administration. The message is transmitted upon arrival of the vessel, flight, etc., or where national legislation permits, prior to arrival. The data provides a means of establishing the basis of a cargo inventory report for the conveyance in question. Details of individual consignments carried on the conveyance will be subsequently transmitted to Customs using a CUSCAR message or a series of such messages. It also allows Customs to undertake selectivity processing in order to select high risk conveyances and shipments requiring examination. The message embodies reporting requirements of all modes of transport. Each message covers the data requirements for one conveyance. The message may be used for reporting empty containers as well as numbers of passengers and crew.<br><br>The customs administration will make use of Customs Response Message (CUSRES) permitting the transfer of data from a customs administration:<br>• To acknowledge the receipt of the message<br>• To indicate whether the information received is correct or if there are errors (i.e. accepted without errors, accepted with errors, rejected, etc.)<br>• To inform the sender of the status of the customs declaration (i.e. goods released, goods for examination, documents required, etc.)<br>• To transmit additional information as agreed between parties (i.e. tax information, quantity information, etc.)<br>• To respond to batched messages |
| Involved actors | • Terminal Operator User<br>• Port Authority User |
| Use of Formal XML Message | • Use of EDI CUSREP<br>• Use of EDI CUSRES |
| Triggers | • Port Authority User |

#### 3.2.3.12 *Transshipment Notification*

| | |
|---|---|
| Short Description | This procedure from a customs agent office message permits the transfer of data from a carrier to a Customs administration for the purpose of meeting Customs cargo reporting requirements<br><br>For each customs declaration message a proper Customs response message interchange (CUSRES) will allow a customs administration to respond to any customs message, including the possibility to respond to multi-consignment and batched messages. |

| | |
|---|---|
| Usage | It is envisaged that the Customs Cargo Inventory Report Message may be initiated by the carrier to report single or multiple consignments to a Customs administration. The message is transmitted upon arrival of the goods, or where national legislation permits, prior to arrival. The data provides Customs with a means of "writing off" or acquitting the cargo report against Goods declarations. It also allows Customs to undertake selectivity processing in order to select high risk shipments requiring examination<br>The message may be used for reporting:<br>• onward transit/transhipment;<br>• short and part shipped goods;<br>• empty containers;<br>• import/export cargo;<br>• house and masterbill relationship<br><br>The customs administration will make use of Customs Response Message (CUSRES) permitting the transfer of data from a customs administration:<br>• To acknowledge the receipt of the message<br>• To indicate whether the information received is correct or if there are errors (i.e. accepted without errors, accepted with errors, rejected, etc.)<br>• To inform the sender of the status of the customs declaration (i.e. goods released, goods for examination, documents required, etc.)<br>• To transmit additional information as agreed between parties (i.e. tax information, quantity information, etc.)<br>• To respond to batched messages |
| Involved actors | • Terminal Operator User<br>• Shipping Agent<br>• Port Health Organization User |
| Use of Formal XML Message | • Use of EDI CUSCAR<br>• Use of EDI CUSRES |
| Triggers | • Shipping Agent |

#### 3.2.3.13 *Transit: Upload Customs Documents by Terminal Operator*

| | |
|---|---|
| Short Description | Transit Upload (TUL) allows the Terminal operator to send customs and customs-related documents about incoming transit containers (NCTS) electronically to the cargo handler. Based on the container number, the document can be linked to the Terminal operator's system, so that it can be printed and given to the truck driver or barge operator who picks up the container. |

| | |
|---|---|
| Usage | From the customs- or other compatible application, an XML message is sent to the Terminal operator. This message contains the encoded document and the necessary meta data such as MRN (Movement Reference Number), container number, etc. The Terminal operator confirms the correct processing of the message or sends an error message (e.g. container unknown). |
| Involved actors | • Terminal Operator User<br>• Freight Forwarder User<br>• Inland Carrier User |
| Use of Formal XML Message | - |
| Triggers | • Terminal Operator User |

### 3.2.4 Environmental and Safety Processes

#### 3.2.4.1 *Declaration of Hazardous Goods for Vessels and pre- and on-carriage*

| | |
|---|---|
| Short Description | This process provides information exchange about dangerous goods (Edifact: IFTDGN) between trading partners involved in administration, commerce and transport. |
| Usage | This process is used for declaration of dangerous goods (e.g. carrier's agent, freight forwarder) to the agency acting on behalf of the port authority. It is used for performing the checks on conformance with the legal requirements on the control of dangerous goods, conveying the information relating to one conveyance/voyage of a means of transport such as a vessel, train, truck or barge, on the dangerous goods being loaded or unloaded, and/or in transit. |
| Involved actors | • Shipping Agent<br>• Freight Forwarder User<br>• Port Authority User<br>• Port Health Organization User |
| Use of Formal XML Message | • Use of EDI APERAK<br>• Use of EDI IFTDGN |
| Triggers | • Shipping Agent<br>• Freight Forwarder User |

#### 3.2.4.2 *SafeSeaNet Obligation*

| | |
|---|---|
| Short Description | SafeSeaNet can be defined as a platform for maritime data exchange among European Union countries, Norway and Iceland. More specifically, SafeSeaNet is linking all members maritime authorities providing contiguous information about ships, their movements (AIS: Automatic Identification System) and hazardous loads. |
| Usage | SafeSeaNet can be defined as a platform for maritime data exchange among European Union countries, Norway and Iceland. More specifically, SafeSeaNet is linking all members maritime authorities providing contiguous information about ships, their movements (AIS: Automatic Identification System) and hazardous loads.<br><br>SafeSeaNet system through vessel traffic monitoring and information exchange aims to enhance: |

| | |
|---|---|
| | 1. Port safety and marine environment protection via:<br>• Early identification of high-risk vessels<br>• Earlier precautionary actions and risk mitigation<br>• Improved emergency response to incidents or pollution.<br>2. High quality monitoring and efficiency of maritime traffic and maritime transport via:<br>• standardizing the accessibility to data<br>• helping stakeholders to respect their legal obligations<br>• Increase of the efficiency of port logistics (e.g. providing more accurate estimated times of arrival, details of waste handling, etc.)<br>• accurate, up-to-date information on the geographical location of vessels and their cargoes<br>• reliable statistics about the participating countries |
| Involved actors | • Port Authority User<br>• Shipping Agent<br>• Coast Guard Office User |
| Use of Formal XML Message | - |
| Triggers | • Shipping Agent |

#### 3.2.4.3 *Gate in / Gate out Procedures*

| | |
|---|---|
| Short Description | This section is twofold. It can be referred to the procedures during the notification of a vessel arrival/departure and during the inland gates of a port that are used for the forwarders, for the public during embarkation/disembarkation of a ship and for the port authority and relative agencies personnel. |
| Usage | Regarding to the procedures about goods and people transportation in the inland terminal gates, two individual procedures can be obviously recognized: The entrance and the exit.<br><br>Entrance:<br>The inland forwarders notify the shipping agent and the port authority about the expected time of goods arrival at the port. Then, port authority prepares or informs the forwarder and the shipping agent about the location of stowage or the location of transshipment (ship loading). Additionally, there can be information exchange between forwarder, inland carrier, terminal operator, shipping agent and Customs (goods transportation) and reporting simultaneously the gate personnel about these movements through the gates. |

| | |
|---|---|
| | Also, there can be information exchange between shipping agent/shipping line and port authority-shipper-coast guard about people and their vehicles that entering a specific gate.<br><br><u>Exit:</u><br>The shipping agent according to the arrangement with the final consignee informs inland forwarder(s) and port authority about the programmed export of goods and people exit. Then, the port authority can define (and report to the gate personnel) about the most suitable exit considering a series of parameters such availability, capacity of the weight, number of passengers, transshipment.<br>Additionally, there can be information exchange between shipping agent, inland carrier inland forwarder and Customs (goods transportation), reporting simultaneously the gate personnel about the programmed movements through the gates. Also, there can be information exchange between shipping agent/shipping line and port authority-shipper-coast guard about people and their vehicles that exiting a specific gate. |
| Involved actors | • Port Authority User<br>• Shipping Agent<br>• Inland Carrier User<br>• Coast Guard Office User<br>• Customs Officer<br>• Customs Agent<br>• Freight Forwarder User<br>• Terminal Operator User |
| Use of Formal XML Message | - |
| Triggers | <u>Entrance:</u><br>• Inland Carrier User<br>• Freight Forwarder User<br><u>Exit:</u><br>• Shipping Agent |

## 3.3 Processes and Users

| | Base User | Administrator User | Port Authority User | Waste Collection User | Tug Office User | Barge Office User | Pilots Office User | Linkage With Other Ports | Terminal Operator User | Immigration Agency User | Coast Guard Office User | Bank User | Receiver / Consignee | Inland Carrier User | Shipping Agent | Freight Forwarder User | Inland Container Depot User | Customs Agent | Customs Officer | Veterinary Office User | Port health organization User |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cargo and Freight Processes | | | | | | | | | | | | | | | | | | | | |
| Booking notification of containers at Terminal & gate reporting | | | | | | | | | | | | | X | X | X | X | X | | X | | |
| Booking of maritime transport | | | | | | | | | | | | | | X | X | X | X | | | | |
| Container release | | | X | | | | | | | | | | | X | X | X | | | | | |
| Container status information | | | X | | | | | | X | | | | X | | X | X | X | | | | |
| Inland transport order | | | | | | | | | | | | | X | X | | X | | | | | |
| Invoice audit | | | | | | | | | | | | | X | | X | X | | | | | |
| Loading and discharge order break-bulk of pre - and on-carriage via inland carrier | | | | | | | | | X | | | | | | | X | | | | | |
| Loading and discharge order containers for vessel | | | | | | | | | X | | | | | | X | | | | | | |
| Loading and discharge order inland barge containers | | | | | | | | | X | | | | X | | X | X | X | | | | |
| Notice of arrival goods vessel import | | | | | | | | | | | | | X | | X | X | | | | | |
| Pre-notification delivery and collection of containers at Terminal | | | | | | | | | X | | | | | X | | | | | | | |

| | Base User | Administrator User | Port Authority User | Waste Collection User | Tug Office User | Barge Office User | Pilots Office User | Linkage With Other Ports | Terminal Operator User | Immigration Agency User | Coast Guard Office User | Bank User | Receiver / Consignee | Inland Carrier User | Shipping Agent | Freight Forwarder User | Inland Container Depot User | Customs Agent | Customs Officer | Veterinary Office User | Port health organization User |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shipping instructions for bill of lading | | | | | | | | | | | | | X | | X | X | | | | | |
| Stowage position / bay list | | | | | | | | | X | | | | | | X | | | | | | |
| **Nautical - In port - Infrastructure - Ship Traffic Processes** | | | | | | | | | | | | | | | | | | | | | |
| Barge planning request | | | | | | X | | | | | | | | X | | | | | | | |
| Consult lock planning | | | | | | X | | | X | | | | | | | | | | | | |
| Declaration of berthing dues | | | X | | | | | | | | | | | | X | | | | | | |
| Declaration of waste collection | | | X | X | | | | | | | | | | | X | | | | | | X |
| Passenger Ship Berth | | | X | | | | | | | X | | | | | X | | | | | | X |
| Passenger Ship Departure | | | | | | | | | | X | X | | | | X | | | | X | | X |
| vessel berth reservation | | | X | | | | | | X | | | | | | X | | | | | | |
| Ordering pilot, tug and other services | | | X | | | | | | X | | | | | | X | | | | | | |
| pre-notification of arrival / departure of an vessel | | | X | | | | | | | | | | | | X | | | | | | |
| Request barge position | | | X | | | X | | | X | | | | | | | | | | | | |
| Terminal planning inland barge | | | X | | | | | | X | | | | | | | | | | | | |
| Waste/pollution notification about vessels | | | X | | | | | | | | X | | | | X | | | | | | X |
| Administration processes | | X | | | | | | | | | | | | | | | | | | | |
| port authority processes | | | X | | | | | | | | | | | | | | | | | | |
| **Customs Processes** | | | | | | | | | | | | | | | | | | | | | |
| Customs declaration | | | | | | | | | | | | | X | | | X | | X | | | |

| | Base User | Administrator User | Port Authority User | Waste Collection User | Tug Office User | Barge Office User | Pilots Office User | Linkage With Other Ports | Terminal Operator User | Immigration Agency User | Coast Guard Office User | Bank User | Receiver / Consignee | Inland Carrier User | Shipping Agent | Freight Forwarder User | Inland Container Depot User | Customs Agent | Customs Officer | Veterinary Office User | Port health organization User |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Customs import manifest | | | | | | | | | | | | | | | X | | | X | | | |
| Arrival notice of export cargo at Terminal | | | | | | | | | X | | | | | | | | | X | | | |
| Exchange of Container Movement Reference Number with Terminal operator | | | | | | | | | X | | | | X | | | X | X | | | | |
| Export manifest / loading list | | | | | | | | | X | | | | | | X | | | | | | |
| Notification of departing vessel | | | X | | | | | | X | | | | | | X | | | | | | |
| Import Control Process: Pre-notification Customs regarding safety | | | | | | | | | X | | | | | | X | | | X | | | |
| International Ship and Port Security Code declaration | | | | | | | | | | | | | | | X | | | | | | |
| Notification of incoming vessel | | | | | | | | | X | | | | | | X | | | | | | |
| Official exit confirmation of vessel to Customs | | | X | | | | | | X | | | | | | | | | | | | |
| Official notification of arrival of avessel to Customs | | | X | | | | | | X | | | | | | | | | | | | |
| Transshipment notification | | | | | | | | | X | | | | | | X | | | | | | X |

| | Base User | Administrator User | Port Authority User | Waste Collection User | Tug Office User | Barge Office User | Pilots Office User | Linkage With Other Ports | Terminal Operator User | Immigration Agency User | Coast Guard Office User | Bank User | Receiver / Consignee | Inland Carrier User | Shipping Agent | Freight Forwarder User | Inland Container Depot User | Customs Agent | Customs Officer | Veterinary Office User | Port health organization User |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Transit: upload customs documents by Terminal operator (TUL transit upload) | | | | | | | | | X | | | | | X | | X | | | | | |
| **Environmental and Safety Processes** | | | | | | | | | | | | | | | | | | | | | |
| Declaration of hazardous goods for vessels and pre- and on-carriage | | | X | | | | | | | | | | | | X | X | | | | | X |
| SafeSeaNet obligation | | | X | | | | | | | | X | | | | X | | | | | | |
| Gate in/Gate out procedures | | | X | | | | | | X | | X | | | X | X | X | | X | X | | |

# 4 System Design

## 4.1 System Architecture

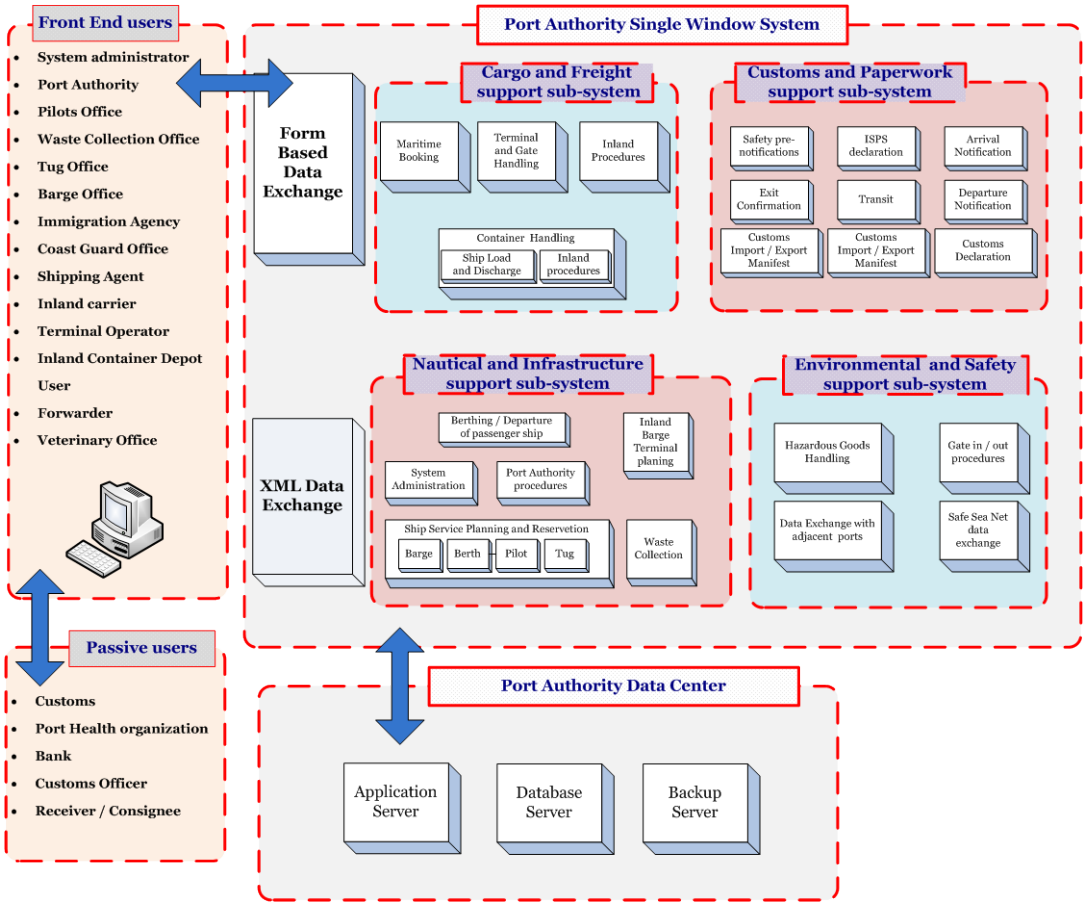
The port authority must implement a set of –radical -business models used by a variety of port stakeholders. Most of the traditional modeling would take advantage of up to date web based platforms capable to create reliable, fast and user friendly environments. New business models need maturing and many times the model initially designed may need adaptations and modifications for best results.

### 4.1.1 Architecture Challenges

- Update information and maintenance system that supports per year more than:
  - 100 million tones freight tracking and clearing
  - 10000 sea going ship calls
  - 10000 barge calls
  - 100000 inport jobs performed by dock workers
  - 100000 gate in / out....
- Real time port management
- Reduce redundancy and clustering of port related jobs
- Make data more accessible and reduce the efforts required for allocation of access right
- Centralize, standardize, and streamline port planning, port registry, infrastructure management, business development, and other critical activities to improve service quality and cut costs
- Track and share real-time port related information and mapping data seamlessly between port stakeholders
- Reduce paperwork and effort
- Increase productivity and quality
- Decentralized data management to individual stakeholders via standardized, tracked input forms
- Removed redundancies and increased data quality
- Semi-automated the acquisition of master data, as data flow quality
- Automated data quality updates
- Single window implementation – one point of access

### 4.1.2 System Overview

The proposed platform is a web based platform enabling intelligent and secure exchange of information between public and private stakeholders. It aims to improve management and to automate port and logistics processes through a “single” submission of data.
The following figure depicts the information flow, components and modules of the proposed Port Community System.




We can distinguish that the other subsystems also report to different authorities more or less the same information. In such a case we should integrate a PCS in the Single Window concept.

Accessibility and user friendliness are also key factors for the success of a PCS. Comprehensive operating instructions and guidelines should be created for users. Help Desk and user support services, including training, should be established, especially in the early implementation phase of the project. The Help Desk can be a useful means for collecting feedback information on areas of difficulty and bottlenecks in the system and this information can be a valuable tool in its further development. The need for and value of practical training courses for users cannot be over- emphasized, especially in the early implementation phase of the project. It is also important to address the multilingual requirements in some countries.

Establishing the necessary legal environment is a pre-requisite for implementation. Related laws and legal restrictions must be identified and carefully analyzed. For example, changes in legislation can sometimes be required in order to facilitate electronic data submission/exchange and/ or an electronic signature system.

The implementation generally entails the harmonization and alignment of the relevant trade documents and data sets. In order to ensure compatibility with other international systems and applications, these documents and data models must be

based on international standards and recommendations. This is true even if the Single Window is designed to operate without using electronic data communications.

Establishing a proper mechanism for keeping all stakeholders informed, it is extremely important to handle stakeholders' expectations properly, and it is worth remembering the business adage of promising less and delivering more. It is also important to remember that stakeholders often do not expect miracles: solving simple practical problems can generate significant goodwill to carry the project through difficult patches along the development path.

There are many well-established approaches to project management and several good software programmers available to assist in this process. The Project Management Plan should contain:

- A clear statement of the project's scope, goals and objectives
- A statement on key deliverables, responsibility for delivery, time frame and milestones for completion
- Definition of the roles and responsibilities of the various participants, including a clear agreement on who is in charge of the project and the level of authority
- Specification of the management and monitoring responsibilities
- A clear strategy for communicating with project stakeholders
- A clear and agreed project budget, including financial and human resources
- A clear statement of the project risks (such as a cutback in budget, delay in required legal reforms, etc.) and an agreed response plan
- Agreement on the criteria for measuring the project success
- An agreed project review and feedback mechanism

Key components

- Examine existing requirements, procedures, and processes for the submission of import, export and transit documents and information to government to:
    - Identify key governmental authorities and agencies that can potentially be involved in the system;
    - Determine the extent to which it is possible to harmonize and simplify these requirements, procedures, information flows and documents. In particular, explore possibilities for ensuring the single submission of documents and information;
- Consider the potential of the Single Window to address trade security issues;
- Identify the needs of potential users, especially regarding the design of the eventual service and associated interfaces (either electronic or physical);
- Consider "best practice" methods in existing Single Windows. This may involve visits to operational Single Windows;
- Consider the need for and approach to generating the required political support for the project.

Examine the overall organizational aspect of the proposed Single Window to determine:

- Which governmental authorities and agencies should be involved;

- Which governmental authority/agency, or private organization should lead the running of the Single Window project - government, private owner under government contract or completely privately-owned by business (service provider);
- Whether the Single Window should be centralized or decentralized;
- Should it be an active or passive program;
- Should a payment system be part of the Single Window system;
- Should participation be voluntary or mandatory;
- Should common risk profiles/compliance assessments be part of the system and should they be developed and/or shared;
- Who bears the risk if/when something goes wrong.

Review and document existing personnel resources within the relevant governmental authorities and agencies for the project development, implementation, and operation, and consider training, additional staffing and management requirements related to the implementation of the Single Window.

Technical aspects of a Single Window:

- Review existing technical systems for receiving, storing and exchanging the above information;
- Determine overall technical requirements, including specific requirements for additional systems development, interfaces, outlets and the possible development of interface systems to existing legacy systems for the proposed scenarios;
- Determine if existing systems will be able to handle (likely) increases in the volume and flow of data;
- Examine issues related to the verification and authentication of data;

Information and Documentation

- Review the existing set of trade documents in use and determine whether these need to be aligned, harmonized and/or simplified (preferably according to the UN Layout Key). Determine what data will be required; how it will be submitted; and in what format (electronic (EDI? XML? Other?) or paper);
- Determine who can submit the data or documents (Importers/Exporters, Customs Brokers, Agents);
- Determine how the data should be shared amongst participating governmental authorities and agencies and where it should be stored, etc.
- Consider how the data could be exchanged with administrations in other countries;
- Consider how the data could be used for risk analysis and other related purposes;
- Quantify the potential benefits of making better use of data held in commercial systems and records in meeting government requirements and helping to reduce business compliance costs in the transmission of information.

Standardization
In each port the electronic message standards are based on the Edifact standards of the United Nations. They are open standards that fit in with the standards used in the logistics world. It means the messages can be exchanged anywhere in the world with business partners, which increases productivity and efficiency of the port-related companies. In each port, most companies use the electronic message exchange, which simplifies doing business in the port.

Clearing center
Participants are able to exchange standardized messages easily with each other via the electronic clearing centre, the centralized platform for electronic communication. All participants (private companies, Customs, the Port Authority) are connected to the system via a unique identification. Via the network they send and receive electronic messages to their business partners and government-agencies. The clearing centre results in lower costs of connection and maintenance per user. The platform over which the messages are distributed acts as a, trusted third party. This guarantees the confidentiality of the data. This network supports EDI and XML versions of the electronic standard messages, as well as the sending of other formats and scanned or otherwise generated documents.

How does a connection to the clearing center work?
The Port Authority reached a strategic partnership with the Descartes Systems Group (formerly Porthus), which operates the clearing centre and integrates it with the Descartes GLN (Global Logistics Network). The user chooses a public internet) or a dedicated network connection (via a leased line) with the clearing centre. Identification numbers, passwords and encryption technology ensure the security.

Confidentiality first
All data entrusted by a user to the clearing centre remains the user's property. The system guarantees that only the sender and recipient of a message have access to the content, unless the user gave his explicit consent to send a copy of the data to other parties. The messages can be encrypted if necessary.

Characteristics and advantages of the clearing centre
The Descartes GLN (Global Logistics Network) clearing centre offers the following integrated services:

Transmission of standardized EDIFACT or XML messages Conversion of message formats Business rules and routings. Supporting network for all applications that exchange electronic messages Interconnections to an unlimited list of international networks worldwide Optional archiving of all messages for a period of at least 10 years Track & trace of sent and received messages, guaranteed delivery immediate access to the Descartes Global Logistics Network Authentication of sender and recipient.

# 5 Future Prospects

There are several parameters and procedures relative to a port's daily life that can further improved or considered in order to be more competitive and cost efficient.

In a general approach, the automation of procedures and the contiguous monitoring of conditions that can directly affect the quality of services and overall the productivity of labor are major issues that must be addressed in an effort for future development.

More specifically, automated information systems can be implemented for improving security, organization etc, in order to speed up and lowering the cost of procedures and overall facilitate the information flow regarding to:

- Freight/Cargo handling
- Ship traffic
- Linkage among a network of ports
- Infrastructure
- Environmental policy
- Weather conditions monitoring
- Safety/Security - hazards
- Customs - paperwork - document exchange etc

### 5.1.1 Freight/cargo handling

It is of crucial importance for a modern port to fully monitor and record all the relative information about freight/cargoes. Additionally, the efficiency and capacity of terminals in a port has a significant impact on transport costs. Poor infrastructures imply higher transport costs, delays and negative economic consequences. More developed and automated transports systems tend to have lower transport costs since they are more reliable and can handle more movements.

In a port location, monitoring goods and ships, from arrival until departure, involves many operators: freight forwarders, shipping agents, consignees, handling agents, brokers, authorities, and customs that have to exchange information with line shipping companies. With the success of containerization and hence that of intermodal transport, nodal points must be able to integrate their operation with other trading partners operating in more complex and wider supply chain. Ports are increasingly seen as element in larger supply chain, contributing value to shippers and competing as one element of the in the supply chain management system. In this perspective the used technologies and the information management represent a primary condition to adapt the port strategy to the new logistics and customer requirements. The information system and architecture adopted in the port industry is generally called Cargo Community Systems (CCS). Modern technologies about ports cargo/freight are able to connect different ports and each single port operator allowing to trace cargo in each phase, check transit time of goods in real time.

Furthermore can facilitate the integration between different port community members through the use of PCS.

### 5.1.2 Ship traffic

Shipping is obviously the key element for ports existence. The number, the kinds, the capacity and many other parameters regarding ships can characterize the total number of the activities and the whole infrastructure of ports. Among a large number of factors that affect port daily life, the ship flows are of major importance and nowadays there are available completely different technologies and methodologies to record and monitor these flows. The systems that developed for this purpose are generally called Automatic Identification Systems (AIS). These systems are (or can be) used to track ship routes, to schedule routes and provide information exchange with ports.

In addition to the traditional ways monitor ship traffic where radio frequency and radar systems are used, the AIS can be satellite based. The use of suitable satellite data and products can improve the marine traffic especially in remote sea areas providing accurate information and contributing in a continuous (near real-time) recording of the ship information and location (Schreier et al., 2010).
As a future (innovative) step to this issue, it would be of great interest the modeling for the probability of vessel collisions and their consequences and can be included in a PCS as a Risk Management system or as a Decision Support System (Goerlandt et.al., 2011).

Regarding to the information exchange between ships and port authorities it has been concluded that there is a clear need for recording common parameters about ships (size, type, load, wastes, staff and/or passengers) in an electronic format for a useful exchange and storage of information.

All these procedures and be implemented through automated information systems designed for these purposes, improving significantly any existing methodology and helping for a more accurate and realistic future port planning, developing and decision making.

Consequently, the basic information about ship traffic and the relative freight that is transported can be integrated in modern automated information systems in a twofold aspect.

The first, can deal with the automated exchange, management and storage of information among port stakeholders and port authorities. This practice is commonly used nowadays for all the modern ports although there are still significant differences about the characteristics that are recorded and/or measured, the way that operate these systems and provide services to the port stakeholders, the availability and publication of the data to other users.

The second aspect can be considered as a general future plan of development strategies about port information systems and deal with the operation of automatic

modules that measure and monitor in real-time basis important parameters about ship traffic such as ship flows especially in the entrance of a port, seaways that are followed, possibility of collisions and delays in extreme cases, risk management and decision making applications about priorities in the arrival/departure procedures and the expansion and deepening of a port in order to be hosted more and larger ships (cruise ship, cargo and tankers).

### 5.1.3 Infrastructure

#### 5.1.3.1 *Fully automation of container terminals*

Container terminals play an important role in global manufacturing and international business by serving as multimodal interfaces between sea and land transportations. Quay cranes (QCs) are the most important equipment for vessel operation in container terminals (Wang and Kim, 2011).Major facilities at container terminals (Yin XF, 2010), are:

- *Container berth*: Procedures relative to ship anchoring.
- *Quay crane*: Procedures of loading/unloading ship cargoes.
- *Shuttle*: Transportation means that carry containers inside the container terminal.
- *Container yard*: Storage of deposition of cargoes.
- *Yard crane*: Move container between a shuttle and the container yard storage area.

- In each of these facilities relative documentation exchange among relative agencies can be automated, improving the speed, the security and finally the efficiency of a port in this sector. This documentation can include:
- Information about the condition of the machinery and shuttle (last service, number of services, date of construction, capacity and other specific information relative to the machinery category).
- Information about the freight/cargo unloaded and/or loaded (kind, weight, country of origin, destination, storage, property, transshipment, fragility, toxicity).

Additionally, it could be useful to automatically monitored and recorded any machinery breakdown, and the maintenance of infrastructure (lighting, ventilation etc) either in the container terminals or passenger terminals and other buildings within the periphery of the port is very significant.

#### 5.1.3.2 *Bathymetry*

Another important aspect regarding infrastructure, is the planning of a possible expanding and mainly deepening of a port due to the continuous increase of the world fleet (UNCTAD, 2010) and the construction of more and even larger mega container ships (Yin XF, 2010) from the shipping industry in an effort to lower the cost of goods transportation. The role of bathymetry and the widening of port sea borders can play an important role to the ship traffic and management, decreasing the possibility of vessel collisions and the ships congestion inside a port's territory. The widening and the deepening of a port is significant because these factors directly

affect the number and the types of ships that can be hosted in a port and especially tankers, cruise ships and mega cargo ships. This planning can be achieved by monitoring, recording and analyzing all the possible factors that result in such conclusion through an information system that can collect all the relative parameters and then experts will integrate and analyze the data for future port development in this sector.

#### 5.1.3.3 *Multimodal transportation*

Regarding to the multimodal processes approach a set of parameters that are related with the transportation chain outside the port can be considered. On this perspective it would be useful to continuously monitor and automatically record parameters, according to (Marlow and Paixão, 2003):

- The road/rail network conditions.
- Delays by road works and congestion.
- Points of congestion.
- Turnaround time of trucks in roads.
- Compliance with road construction rules and regulations.

#### 5.1.3.4 *Linkage with other ports*

An interesting and useful perspective in port's management and planning is the geography of transportation. The initial consideration behind this concept is the fact that every port is a node to a network of ports. The type of connections among ports within the network is "point-to-point" while the type of connection between port and the inland transport chain (road, railway) is "hub-and-spoke".

A network consists of the number of ports that cooperate by the means of arrivals/departures of ships. Within the network, modern ports owe to be agile (Marlow and Paixão 2001) in order to be more efficient in a highly competitive environment. A classic measure that can characterize the importance of a port as a node to its network is its "geographic accessibility" (Rodrigues et al., 2006).

The Geographical Information Systems (GIS) have become a useful tool for such kind of parameters. Additionally there are specific modules or versions of a GIS application that are called in general GIS-T (Geographical Information Systems for Transportation) and it can be implemented in a variety of issues (Rodrigues et al., 2006), such as in infrastructure planning, design and management, transportation safety analysis, travel demand analysis, traffic monitoring and control, public transit planning and operations, environmental impacts assessment, hazards mitigation and intelligent transportation systems (ITS). Also, GIS-T can be useful tools for a variety of logistics applications. Again, many of these logistics applications are based on GIS-T analysis and modeling procedures such as routing and facility location problems. Nevertheless it must be highlighted at this point that each of these applications tends to have their specific data and analysis requirements.

Considering the fact that ports interact with others in a multi-level approach and create networks it will be of great interest to use PCS modules where transportation information (e.g. mean speed, distance travelled, chosen route, stops,

delays, usual itinerary, type, weight and total value of the transferred freight) will be stored and analyzed in order to provide information about the connectivity level of nodes (individual ports) in the network that they are belong or intended to be. This issue can also be a significant factor of the strategic plans and management of ports in order to increase their competitiveness and the trade in the regions where they operate, contributing to their economic growth.

### 5.1.4 Environmental Policy

In modern ports there is a clear tendency nowadays to be as "environmental friendly" as possible not only because they have to operate according (inter)national relative legislation but it is in parallel a good way in order to be more competitive and cost efficient. The environmental issues nowadays, play a crucial role in the majority of the port activities, the logistics chain and the management plans and practices. The sustainability of port development and management affect port authorities and their connection with the port stakeholders and vice versa. Also, port authorities are increasingly aware of the costs in terms of financial penalties of neglecting their environmental duties and of failing to apply effective environmental strategies. Additionally, the increasing interest in the environmental policies of a port is starting to be directly related to the quality of services that are provided from the port to the stakeholders. The significance, the specifications and the priorities about the environmental policy of ports are defined through policies and strategies of international organizations and agencies like International Maritime Organization (IMO), Environmental Protection Agency (EPA) and European Sea Ports Organization (ESPO). The environmental policy usually comprises environmental management strategies, marine safety, coastal zone protection, conservation flora and fauna of the local ecosystems, air and marine pollution, wastes and infrastructure development projects.

An environmental policy that leads to a sustainable port development must consider priorities and restrictions about a variety of parameters such as (ESPO, 2009).

**Noise**

The noise from port activities include underwater noise from ships, noise from traffic congestion during the embarkation/disembarkation of vehicles, noise from traffic and other activities in the terminals and port gateways. The noise is a significant parameter because it has an impact on human health and welfare. Long-lasting exposure to high noise levels can cause psychological disturbances (perturbations, displeasure), functional disturbance (sleep disorders, loss of work productivity) or physiological disturbances (health issues such as fatigue, and hearing damage).

**Air quality**

The air quality in a port domain can be affected by the ship and vehicle exhausts emissions and is considered one of the most unknown issues in the anthropogenic air pollution (Pandolfi et al., 2011) with many uncertainties and constraints in the estimating procedures of the shipping air pollutants (Miola et al., 2011). More specifically, dense vehicle flows inside and nearby a port along with the

use of low quality fuels of marine transport sector containing high amounts of sulphur and heavy metals are the major factors that affect air quality (Pandolfi et al., 2011). Also, important factors that contribute to the atmospheric pollution can be every activity regarding the development and the repairing of infrastructure and the transportation of gaseous or liquid hazardous substances. Major atmospheric pollutants are:

- Dust
- NOx
- SOx
- CO2
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Particle Matter (usually PM2.5, PM10)

A synoptic review about the methodologies that are followed to estimate the air pollution at global and/or local scale is given by Miola et al., (2011). It is highlighted that many of these pollutants are Greenhouse Gases (GHGs) (Contini et al., 2011; Miola et al., 2011). Considering that emissions from the ships around ports account for 5% of the total emissions from navigation activities (Dalsoren et al., 2009) and approximately 70% of ship PM emissions annually occurring within 400 km of the coast (Moldanova et al., 2009), the significance of the atmospheric pollutants in the environmental policy of ports, is obvious. It must be noted also, that the air quality is very important in the environmental policy not only because it affects the flora and the climate but because it can also cause respiratory problems and cardiovascular illnesses to humans (Anderson 2000; Pope and Dockery 2006).

**Energy consumption**

The savings in consumption of light at terminals, offices (computers, and other devices that even in the “stand by” mode consume energy), heating/cooling devices, in materials that store solar energy for heating and help in cooling buildings and in parallel they are eco-friendly.

**Water pollution**

Major pollutants of sea are ship wastes and leakages in case of accidents or bad services of ships and infrastructure inside the periphery of the port. Also, routine activities such as ship discharge (ballast, sewage, and spillage) contribute significantly to water pollution. The water quality can be measured via a set of parameters: transparency, PH, temperature, salinity, turbidity, suspended solid (SS), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), sulfide (S2), nitrogen (N), mercury (Hg), lead (Pb), zinc (Zn), phosphorous (P), Cadmium (Cd), cyanide (CN), Hydrocarbons (H/C), density and types of phytoplankton and zooplankton are some of the more usual parameters that are measured to study the quality of the water (Saengsupavanich et.al., 2009).

**Pollution of port activities (ships, terminals and the whole infrastructure)**

Dredging, antifouling painting, sediment contamination management, garbage handling. All the above mentioned are parameters that affect the environment of port areas and can be measured, monitored and finally decreased

through the evaluation of a system of practices that are modulated from international organizations and agencies according to the international legislation. These systems are called Environmental Management Systems (EMS) and constitute substantially systems of procedures and reviews that seek to identify and minimize a variety of environmental impacts of port operations. The most well-known EMS certificates are:

**ISO 14001**

The "ISO 14001" is a general international standard scheme that enables organizations and companies to evaluate environmental friendly policies according to the international legislation and in parallel to record and estimate their effectiveness of their environmental issues. The adoption of "ISO14001" standard scheme leads to a general EMS that is modified according to the size, the type and the activities of an organization, industry or company. The "ISO 14001" does not require specific restrictions and rules but postulate to be accomplished policies about planning, checking and reviewing environmental problems that the organization, industry or company has initially defined itself to solve. Finally, it must be highlighted that the evaluation of "ISO 14001" standard is voluntary.

**EMAS (Eco-Management and Audit Scheme)**

The "EMAS" (European Community Regulation 1836/93) standard scheme is the European Union standard and has adopted since 1993. Similarly to "ISO14001", "EMAS" is a general standard that allows every interested organization or company to be certified with this standard, to define its own priorities about the environmental policy that will follow. Nevertheless, EMAS is stricter than "ISO14001" because it requires a full environmental statement in non technical language, which should be available for the public, whereas only the environmental policy is required in "ISO14001" (Stavrakouli and Wooldridge, 2004). Additionally an initial review is mandatory in "EMAS".

**PERS**

The PERS (Port Environmental Review System) standard scheme was created according to ESPO and Ecoports regulations and policies. It is focused on the port areas and their activities and it is developed to help port authorities to apply the ESPO standards and restrictions for environmental sustainability. Additionally, "PERS" is considered as the first step in order to gain ISO 14001 certification. This EMS is based on the Self Diagnosis Method (SDM) which gives to the port authorities the opportunity to define and manage their own problems, priorities and policies about issues with environmental impacts.

Consequently, it is clear that all the above mentioned environmental issues play a significant role for the management and the quality of services that are provided by modern ports and the surrounding ecosystems. The measurement of many parameters and the thresholds exceedance following the international legislation can be monitored via automated modules of a PCS. Also, forecasts of a wide range of parameters can be provided via modules integrated in a modern PCS. Using suitable instrumentation that can automatically record and transmit the measured values to the PCS database, graphs, maps and forecast charts can be

provided through specified PCS modules, giving continuous information about the environmental sensitivity of the ports. Finally, these data can be collected and stored in a database for further analysis that will be useful for the environmental management, the future plans and the sustainability of the ports.

### 5.1.5 Weather conditions monitoring

Another important issue that many times it is not being taken into account is the extreme weather conditions. In general, the weather conditions (among others, temperature, humidity, wind direction and intensity) play a crucial role to the port activities because they can affect the labor productivity, the visibility at the terminals and in mooring procedures, the instantaneous air pollution in the port area (Contini et al., 2011), the possibility of accidents during the loading/unloading, transportation and storage of cargoes or sensible products. As a final result the weather conditions can cause financial losses of the port's incomings because of accidents, delays and productivity decreasing. This factor can play a more important role in the case of ports without bulwarks and is of crucial importance to be continually informed about the weather conditions (especially extreme ones) in order to protect staff, infrastructure and cargoes and overall the whole transportation chain from accidents and delays. Even nowadays many ports cover their needs about weather conditions in the port territories from weather stations in the greater local area and weather models that are accurate to their predictions in as spatial scale coarser than a port boundary. In will be very useful if the ports have their own weather stations and operating model providing forecasts in a representative spatial scale for the port area. All this information can be integrated and announced automatically though a PCS in order to be informed all the stakeholders and the port authority about extreme weather conditions are likely to occur, preparing timely all the responsible offices and deteriorating any possibilities for accidents.

### 5.1.6 Safety -Security - Hazards

The use of a modern and intelligent information system (such as PCS) must maintain the highest levels of security and privacy of the data exchange among stakeholders. The safety in this section can be achieved considering:

- Access to the data can be suitably protected through access control mechanisms providing user-based, group-based and role-based security.
- Sensitive data can be stored encrypted.
- Communication between data sources and PCS central database can take place through secure, encrypted communication channels.
- Audit trails can be maintained for any and all changes made to the data in the central database.
- Backup operation on encrypted data, so that no data can be stolen.

To achieve the above described features, access to the PCS and its database has to be strictly controlled and monitored. At a general level, the security can be consisted of the following characteristics:

- Definition of users / user departments / user levels.
- Password security at operating system level and application level.
- Policy based security management that provides single sign-on.

- Access control and rights and authorization levels.
- High levels of data encryption at storage procedures and communication.
- Provision to digitally sign the documents to ensure secure exchange of transactions/messages.
- Audit trail to store all access to all parts of the data and message transactions and for reporting security breach.
- Protection against virus threats, intruders, Trojans and other security threats.

Nevertheless, the safety/ security issues cannot be restricted in the software issues. These can be expanded to a wider space that can be managed through automatic modules of a PCS and include characteristics about safety and security in every daily activity in a port. It is easily understood that the safety policy of a port is a very important issue and it can include almost all port activities.

More specifically the major activities are:

- Safety of the labor.
- Safety of goods storage.
- Safety during loading/unloading freights.
- Security from passengers that may carry harmful objectives.

Additionally, port security includes consideration about terrorism, smuggling, stowaway, asylum seekers, illegal immigration, sabotage, theft and pilferage of cargo (Chlomoudis et al., 2011). Regarding the automatic security systems that should be implemented at the ports, such as the one of Siror et al., (2011), an intelligent system must generate alerts on violations and report them to the relevant agencies or officers. Also, they propose the continuous monitoring of the health status of sensitive or perishable cargo and the provision of alerts when the required thresholds in a given area, yard or context are exceeded.

In the security issues the modeling of the probability of vessel collisions and their consequences can be included (Goerlandtet.al., 2011; Wu et al., 2011). Also, many applications have been developed in order to estimate the hazard potential during high traffic density sea passages such as the one of Mueller et.al (2011).

In the last two decades many different standards and regulations about safety and security within marine transportation sector have been introduced at national and international level. Nowadays these issues tend to be synonymous with the quality of the port services to the stakeholders. Indeed, the relatively high number of bulk carrier accidents that is probably due to the insufficient loading/unloading procedures in the EU periphery has been mentioned by the EU as a quality problem (Chlomoudis et al., 2002). Additionally, the role of training and the connections among safety, security and quality has been recently addressed for integrating ISO 9001 with the International Safety Management Code for Safe Operation of Ships and Pollution Prevention (ISM code) of IMO creating an Integrated Quality and Safety Management System (IQSMS) (Celik M., 2009).

At this point it is noted that there are specific standards about safety and security (for example ISO/PAS 20858, ISO2800 and COM 2001/96/EC) but these issues are also included, in more general – with environmental perspective – standards such as ISO 9001 and ISO 14001.

Conclusively, it must be referred that the adoption of safety and security standards and implementation of relative systems has many benefits because it can be used as a marketing tool to improve the image of port, to improve port services and operations, to increase the competitiveness, to correspond to the requirements of the stakeholders, to help the decision making and master planning, to attract new investments and stakeholders (Chlomoudis et al., 2011).

# 6 Bibliography


Action Plan for the Deployment of Intelligent Transport Systems in Europe COM(2008) 886 final.

AnttiPosti, JaniHäkkinen, Ulla Tapaninen, *Promoting information exchange with a port community system – case Finland*

Celik M., 2009. Designing of integrated quality and safety management system (IQSMS) for shipping operations.*Safety Science*, 47 (5), 569-518.

Chlomoudis C, Pallis A, 2002. European port policy: towards a long term strategy. Edward Elgar, Cheltenham.

Chlomoudis C, Kostagiolas P, Lampridis D, 2011. Quality and safety systems for the port industry: empirical evidence for the main Greek ports. European transport research review, 3 (2), 85-93.

Communication from the CommissionCOM 2007 / The EU's freight transport agenda: Boosting the efficiency, integration and sustainability of freight transport in Europe COM(2007) 606 final

Contini D, Gambaro A, Belosi F, De Pieri S, Cairns W.R.L, Donateo A, Zanotto E, Citron M., 2011. The direct influence of ship traffic on atmospheric $PM_{2.5}$, $PM_{10}$ and PAH in Venice.*Journal of environmental management*, 92, 2119-2129.

Dalsoren S.B, Eide M.S, Endresen O, Mjelde A, Gravir G, Isaksen I.S.A, 2009. Update on emissions and environmental impacts from the international fleet of ships: the contribution of major ship types and ports. *Atmospheric chemistry and physics*, 9, 2171-2194.

ECONOMIC COMMISSION FOR EUROPE United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) - UNITED NATIONS New York and Geneva, 2005."Recommendation and Guidelines on establishing a Single Window to enhance the efficient exchange of information between trade and government Recommendation No. 33"

Economic Commission for Europe,United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT), *Case Studies on Implementing a Single Window*, Working Draft, 2005

e-Maritime: Concept and Objectives, Christos Pipitsoulis, Project Officer, European Commission, DG Energy and Transport, 26 March 2009 and Deployment of e-Maritime systems, DimitriosTheologitis, Maritime Transport & Ports Policy; Maritime Security, joint meeting at Short Sea Shipping and Motorways of the Sea Brussels, 8 July 2009

Cane T. (BMT) & T. Katsoulakos (INLECOM), *The e-Freight 'Next Generation Single Window' for Trade and Transport*, 2011

Goerlandt F, and Kujala P., 2011. Traffic simulation based ship collision probability modeling. *Reliability engineering and system safety*, 96, 91-107.

Keceli Y, Choi HR, Cha YS, Aydogdu V, 2008.Third Conference on Convergence and Hybrid Information Technology, DOI 10.1109/ICCIT.2008.396.

Maritime Navigation Information Services (MarNIS), *Container Security Conference*, Bremen, 2009

Marlow PB, Paixão AC, 2001. Agility, a key enabler in port competition, In: Cullinance K.P.B., Lee, T.W (Eds.), *Proceedings from the International Association of Maritime Economists Annual Conference* 2001, 18-20 July, Hong-Kong, pp. 102-114.
Marlow PB, Paixão AC, 2003. Measuring lean ports performance.*International Journal of Transport Management*, 1, 189-202.
Moldanova J, Fridell E, Popovicheva O, Demirdjian B, Tishkova V, Faccineto A, Focsa C, 2009. Characterisation of particulate matter and gaseous emissions from a large ship diesel engine.*Atmospheric environment*, 43, 2632-2641.
Miola A, Ciuffo B., 2011. Estimating air emissions from ships: Meta-analysis of modeling approaches and available data sources.Atmospheric environment, 45, 2242-2251.
Mueller R, Braverman P, Demuth M, 2011. Hazard identification by geo-referenced tracking of seagoing vehicles.Second international conference on computing for geospatial research and applications 23-25 of May, Washington DC.
Saengupavanich C., Coowanitwong N., Gallardo W.G., Lertsuchatavanich C., 2009. Environmental performance of an industrial port and estate: ISO 14001, port state control-derived indicators. *Journal of Cleaner Production*, 17, 154 - 161.
Siror JK, Huanye S, Dong W, 2011. RFID based model for an intelligent port. Computers in industry.Article in press.
Schreier M, Joxe L, Eyring V, Bovensmann H, Burrows JP., 2010. Ship track characteristics from geostationary satellite observations on the west coast of Southern Africa.*Atmospheric Research*, 95, 32-39.
Pope C., Dockwery W, 2006. Health effects of fine particular matter pollution: lines that connect. *Journal of air waste management association*, 56, 709-742.
Pandolfi M., Gonzalez-Castanedo Y., Alastuey A., De La Rosa J., Mantilla E., Sanchez De La Campa A., Querol X., Pey J., Amato F., Moreno T., 2011. Source apportionment of $PM_{10}$ and $PM_{2.5}$ at multiple sites in the strait of Gibraltar by PMF: impact of shipping emissions. *Environmental science and pollution research*, 18, 260-269.
Stavrakouli S., Wooldridge C. Current status of port environmental management. *Protection and restoration of the environment VII Conference*, Mykonos 2004.
S.P. Sahu, *World Customs Organization's work on Single Window Environment*, 2010
UNCTAD, 2010.Review of Maritime Transport, 2010.United Nations Conference on Trade and Development.
United Nations Economic Commission for Europe, "The Single Window Concept"
Wu W.F, Wu W.Q, Feng X, Wang Z.M, 2011. Study on the frequency prediction of marine accidents for ship on the sea. Fifth international conference on bioinformatics and biomedical engineering 10-12 May, Wuhan.
*White Paper, The Role of Port Community Systems in the development of the Single Window*, published by European Port Community Systems Association (EPCSA), 2011, www.epsca.eu
Wang Y., Kim K.H., 2011. A quay crane scheduling algorithm considering the workload of yard cranes in a container yard.*Journal of intelligent manufacturing*, 22, 459 – 470.

Yin XF, Khoo PL, Chen C-H. 2010. A distributed agent system for port planning and scheduling. *Advanced Engineering Informatics*. In Press (DOI: 10.1016/j.aei.2010.004)
Rodrigue JP, Comtois C, Slack B. Geography of transport systems. *Published by Routledge*, New York, 2006.

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|---|---|---|
| Base User<br>Bank User<br>Customs Agent<br>Customs Officer<br>Inland Carrier User<br>Waste Collection Office User<br>Linkage With Other Ports | Shipping Agent<br>Administrator User<br>Immigration Agency User<br>Coast Guard Office User<br>Terminal Operator User<br>Receiver / Consignee<br>Port Authority User | Pilots Office User<br>Tug Office User<br>Barge Office User<br>Veterinary Office User<br>Freight Forwarder User<br>Inland Container Depot User<br>Port Health Organization User |