Development Paper

iPort - A new proposal to transform port operations in Europe

IdealPort Summary

A review of recent publications (Lloyd's Register, Life Matters, June 2012) and IMO's own reports (Marine Environmental Protection Committee (MEPC), 64 session, Agenda item 4, 29th June 2012) and similar reports by learnt society and classification society and maritime organisations, for instance, German Lloyd Academy (GL, EDDI in practice, 2012) give a clear view of the road map for reducing the marine engine emissions in particular in the near future. The whole of Central and North America coastal areas are now almost an ECA (Emission Control Area) and it is expected that coasts of Mexico, coasts of Alaska and Great lakes, Singapore, Hong kong, Korea, Australia, Black Sea, Mediterranean Sea and Tokyo bay are currently considering to become ECAs. What is significant is the shipping routes which 90% of which goes through these areas so the implications are serious. The EEDI equation calculates the CO2 produced as a function of a ship's transport work performed. In other words, the equation provides a measure of the ship's 'benefit to society' by establishing how much CO2 is produced per transport work done. This equates to g CO2 / tonne.nm. The equations is highly complex and is made up of:

- Main engine(s)
- Auxiliary engine(s)
- Energy saving technologies (auxiliary power)
- Energy saving technologies (main power) Transport work

The top line of the EEDI equation is characterised by four key terms, whereby the energy saving technologies terms may include, for example, waste heat recovery systems, use of wind power or solar power. The CO2 produced is based on the product of the power, specific fuel consumption and carbon factor for a particular type of fuel used. The bottom line of the equation relates the total CO2 generated by each of the four terms, to ship capacity and speed. In addition, there are a series of correction factors that moderate the equation. These account for:

- Ship design factors (e.g. Ice-Class and shuttle tankers)
- Weather factor for decrease in speed in representative conditions
- Voluntary structural enhancement
- Ships built to Common Structural Rules (CSR)
- Capacity correction for chemical tankers and LNG ships

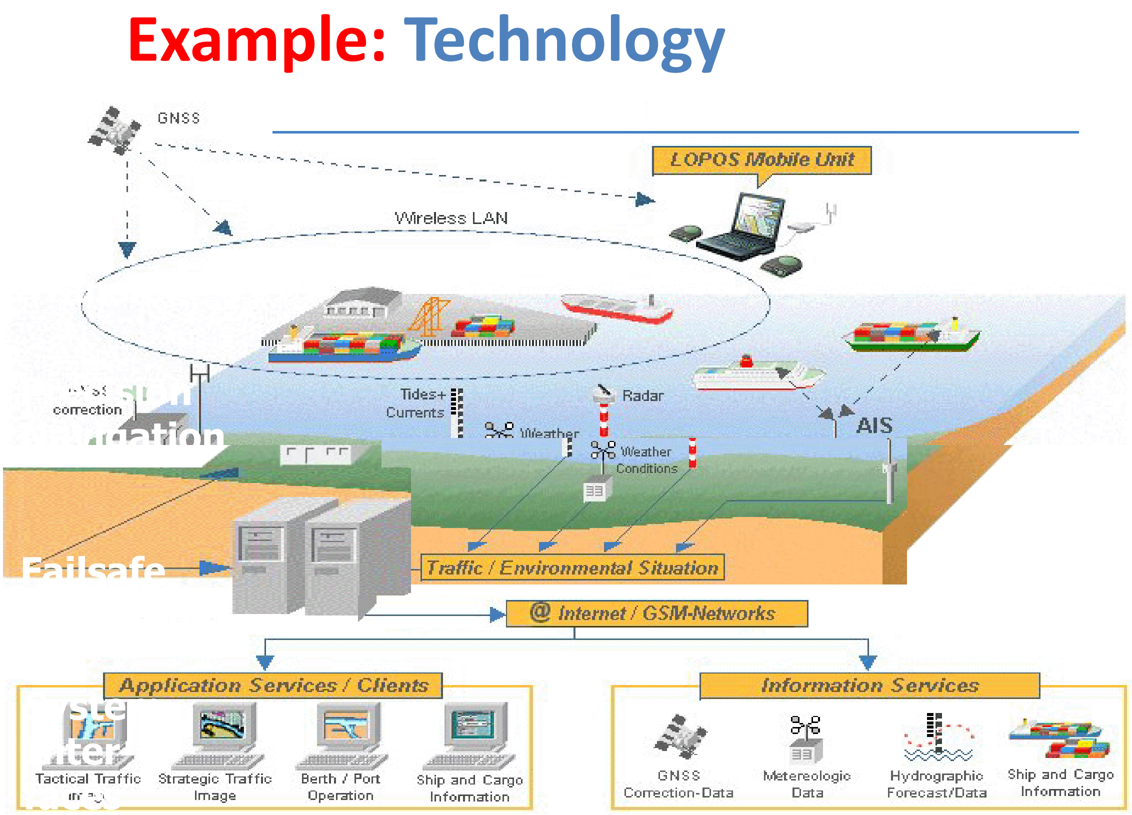
The calculation of the EEDI is detailed within the recently adopted 2012 Guidelines on the Method of Calculation of the Attained EEDI for New Ships (IMO Resolution MEPC.212(63). Verification of the EEDI is very comprehensive and will be in two stages:

- Pre-verification which commences at the design stage and
- Final verification upon completion of the sea trials and commissioning.

Details of the verification methodology are given in IMO resolution MEPC.214 (63) and the process

Full details of recent agreements regarding EDDI is given in the Marine Environmental Protection Committee, 64 session, Agenda item 4, 29th June 2012. It is worth noting the report to the Committee was submitted by IACS, BIMCO, INTERTANKO, INTERGARGO and OCIMF. This Agenda item primarily reviewed the arrangements for EDDI as outline in the above paragraphs and addressed one outstanding issue from 61 Session viz., a ship's manoeuvrability in adverse conditions. Some delegates had argued that, in order to reduce installed power, a ship designers may choose to lower a ship's design speed to achieve the required EDDI. To avoid negative impact, such as having under-powered ships, a provision was added to regulation 21 in the Chapter of MARPOL Annex VI, stating in effect that the propulsion power shall not be less than the propulsion power needed to maintain manoeuvrability of ship under adverse conditions as defined in the guidelines to be developed by the organisation. What is significant is that pre-assessment will ensure that a ship has sufficient installed power to achieve the minimum required advance speed in head waves and wind conditions, defined to facilitate course-keeping in all wave and wind conditions. All guidelines are very comprehensive and well documented. The only issue is how all these will be enforced. Although there clear verification processes and procedure, it is still unclear how ship builders and ship designers will respond.

The intention of this project is not only to support IMO EDDI application or any other related initiatives such as the 'Resolution MEPC 213(63) – 2012 Guidelines for the Development of a Ship Energy Efficiency Management Plan (SEEMP)'. But to review the existing arrangement for navigation on board vessels and consider a possibility of integrating the outputs of port operations and ship navigation and key engine controls and develop an intelligent management system which helps to improve the communication between the post and the ship primarily to make port-ship operations more effective and more efficient. The proposed integrated system would help to reduce accidents in close quarters such as port and inland water ways and help to reduce energy consumption and engine emission to minimum and above all increase safety of the ship and its crew. We also intend to develop means of monitoring the emissions at ports by novel means.



Ports as controlled Zones monitoring arrival of EDDI and Non-EDDI vessels

It is assume that ship designers/builders will have to abide with EDDI requirements and as part of this project EDDI will be used as one of the core equations for integration and navigation fusion of data from various navigation and engine controls.

Introduction

The European Union has introduced a number of regulations and recommendations aimed at considerably improving port operation and maritime security. These regulations are based on and complement the requirements of the International Maritime Organization (IMO). These are documented in International Management Standards (IMS), the International Treaty for the Safety of Lives at Sea (SOLAS), International Convention for the Prevention of Pollution from Ships (MARPOL) and the International Ship and Port Facility Security (ISPS) Code (Regulation XI-2/3, 2004 and EU Regulation (EC) 725/2004).

The information systems used in port operations have three major functionalities, as shown in Figure

Terminal Operating Systems (TOSs) are 'computer systems available for organizing the container terminal itself' [4]. These systems generally provide features related to the physical handling of cargo within the terminal area, such as planning, operation control, job instructions for equipments, etc. On the other hand, Port Management Information Systems (PMIS) generally provide the upper management with features to monitor and control the overall port activities and other managerial functions, such as billing, automatic reporting, etc.

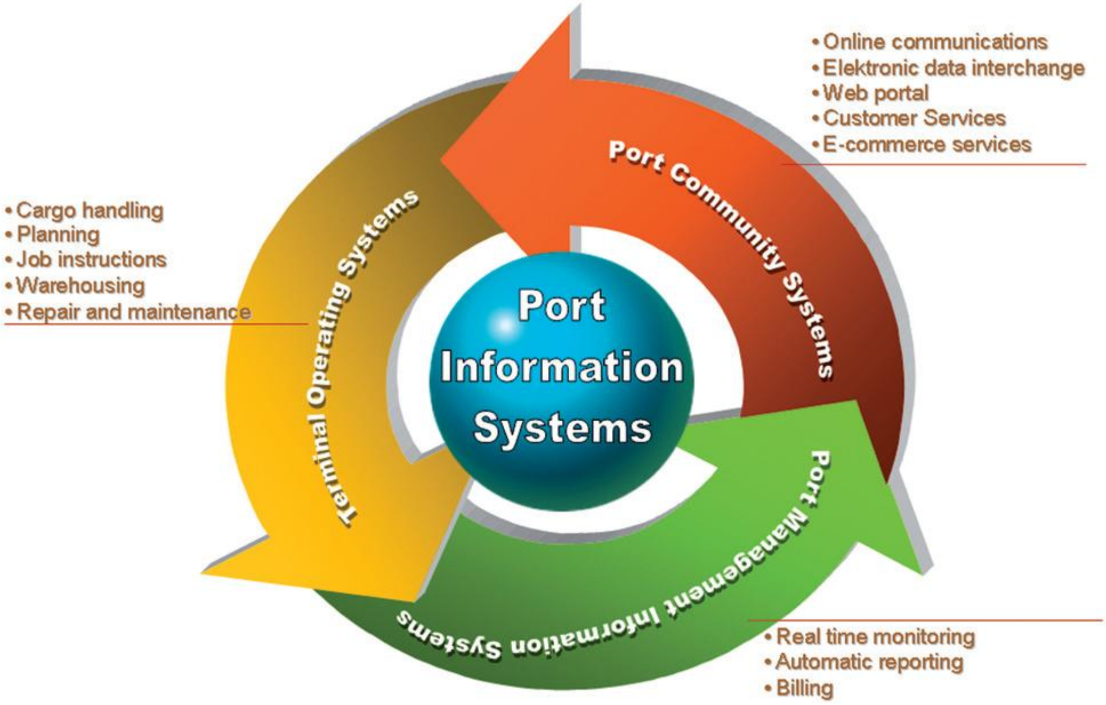


Figure 2 - Information systems used in port operations

Moreover, Port Community Systems (PCS) are 'computer networks which link up the port with all the companies that use it, including hauliers, rail companies, shipping lines, feeder ports, shippers and customs officers' [1]. Such systems can be distinct systems or different modules in one integrated system, depending on the organizational structure of the port.

The traditional way of handling port-related documents such as cargo-related documents and forms for port service requests is through paper-based methods, i.e. sending a fax or handing in the documents directly. As a result of diffusion of the internet, sending the documents via e-mail has also become a common practice. On the other hand, the information delivered in such ways must be re-typed into the port's information systems, which is time consuming and vulnerable to typing errors. In this proposal various PCSs in different part of the work have been reviewed and good aspects of each have been identified. For instance Portnet in Port of Singapore is the one that is most studied. Port of Singapore Authority's (PSA) Portnet is the representative PCS since it is totally connected to PSA's terminal operating system (CITOS) and custom declaration system (TradeXchange) of Singapore government [12, 13]. Portnet provides integrated services to shipping lines, haulers, freight forwarders, shippers and local government agencies operating in Singapore via internet environment. The system enables online ordering of services, document submission, tracking and tracing the location and the status of their cargo and orders, submission of legal or regulatory documents, easy-access data repository to share critical coordination data and financial functions. Besides Portnet, Data Communications System (Dakosy) and COAST (Container Authorization System) of Port of Hamburg, Customer Plus Programme and OnePort Ltd. and Tradelink of Port of Hong Kong, PortofRotterdam.com, Virtual Port and WebJonas of Port of Rotterdam, PORT-MIS and KTNET in Busan Port can be considered as some of the well-known PCSs around the world [14, 15].

IdealShip has learnt from the port operation of several advance and efficient port around the world and is proposing to bring the good attributes of these port into the IdealPort concept. For instance, Port of Hamburg's data communications system (Dakosy) links port operations to the operations of logistics companies within the port. It was established in 1982 and was selected as the world's top transport-related EDI system by International Federation of Port Cargo Distributors [1]. Today DAKOSY is the 'single window' of the Port of Hamburg, providing various service applications for import and export, freight forwarding, customs handling, carrier handling and dangerous goods. Dakosy not only enables a single window for the 'paperless port' of Hamburg, but also offers conversion and validation of information besides purely storing and forwarding. For example, inputted addresses can be automatically checked up in the boycott lists and relevant measures are automatically taken when there is a match [16]. The container information system, called COAST (Container Authorisation System) offers online information about status, location and condition of container via user-friendly internet [1].

The Rationale - The Intention

It is intended to enable better monitoring of ship-port interactions, freight flows, and combat irregularities including smuggling and to respond adequately to the threat of terrorist attacks. Today, many port facilities have to be compliant with all aspects of port operations and abide by IMO and EU rules and regulations. The overall process is inextricably linked to the establishment and maintenance of certain standards for the organization of their effective and efficient operation including security. Many operations of all aspects have been improved, such as electronic/architectural measures, but there has been not attempt to integrate all related port operations.

The Proposed Four Stages of Port Operation

There are four proposed port stages. Stage 1 consists of all activities related to ships, of various flags, approaching a port when all administration aspects should be proactively prepared, stage 2 commences when ships enter the port and while there, the process needs to be automated and integrated with stage 1 activities.

The third stage is when the ship is leaving the port; this is when all paperwork needs to be in place and all security issues have also been dealt with. Stage 4 is when the ship is at sea and there is record of its passage and cargo details are transmitted (to the ports on route and) to the destination port. The Port operation concept is extended to inland water such as each region of the waterway or rivers are seen as ports using a VTS concept. The accidents are avoided by better management of incoming and outgoing vessels from ports or segments of the waterway, using electronic guidance system, known here as AutoSet, a sea-ship autopilot system.

Additional Remit

This project will also take account of the maritime private port and security guards who are somehow put 'outside' of the scope of national private security legislation, which CoESS (Confederation of European Security Services) believes to be an alarming trend that could result in a dramatic lowering of the training standards of private security staff in ISPS-compliant (and EU Regulation (EC) 725/2004 compliant) areas.

Project Aims

The main aim of the IdealPort Project is to take account of existing good practices and knowledge for port management and operation, develop a details set of processes and procedures for ideal port operation and then develop a Port AutoPilot (an online and integrated software platform) integrating all aspects of four identified stages of ship-port operation in order to improve safety and to reduce wasted effort of applying discrete and separate operations as well as filling the security gaps created as the result of increased complex operational activities in ports, which are vital for the timely conduct of shipping that more than 90 % of the world trade depend on. The concept of ports is extended to waterway and same principle will be used to manage inland waters and rivers and ensure a greater safety and security in these waterways.

Current port operations are shown in the following Figure.

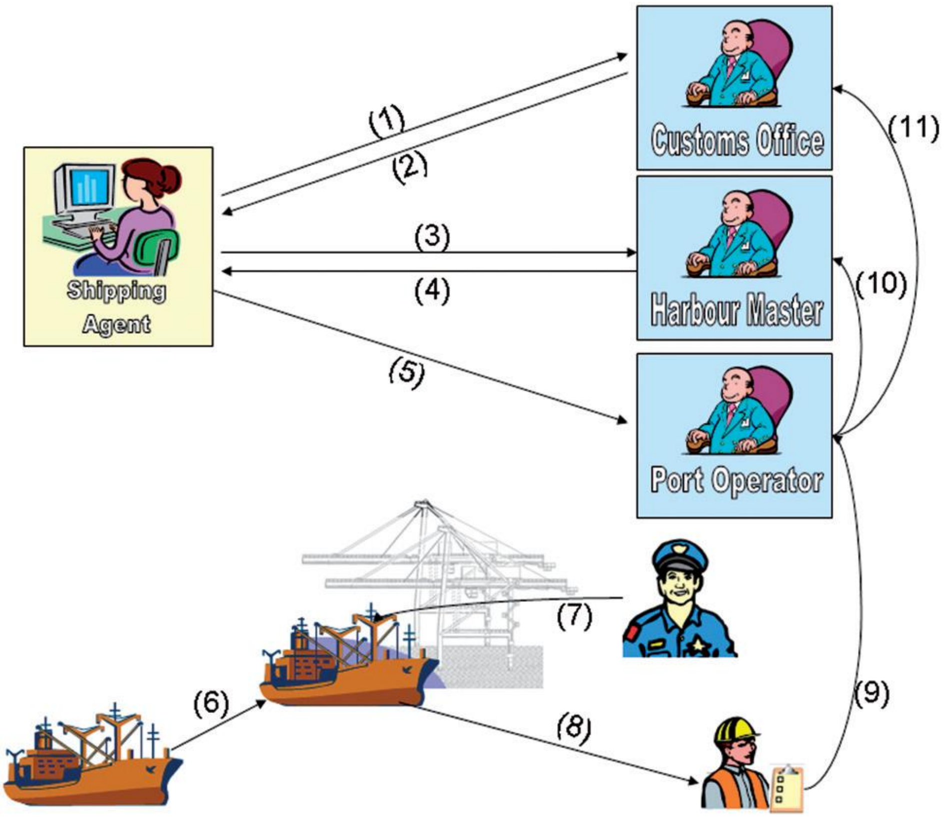


Figure 3 - Summary of current situation

The partnership has proposed a three-stage transformation strategy for EU maritime community, as shown in Figure 4. The proposed system is then integrated with ship operations, safety and security.

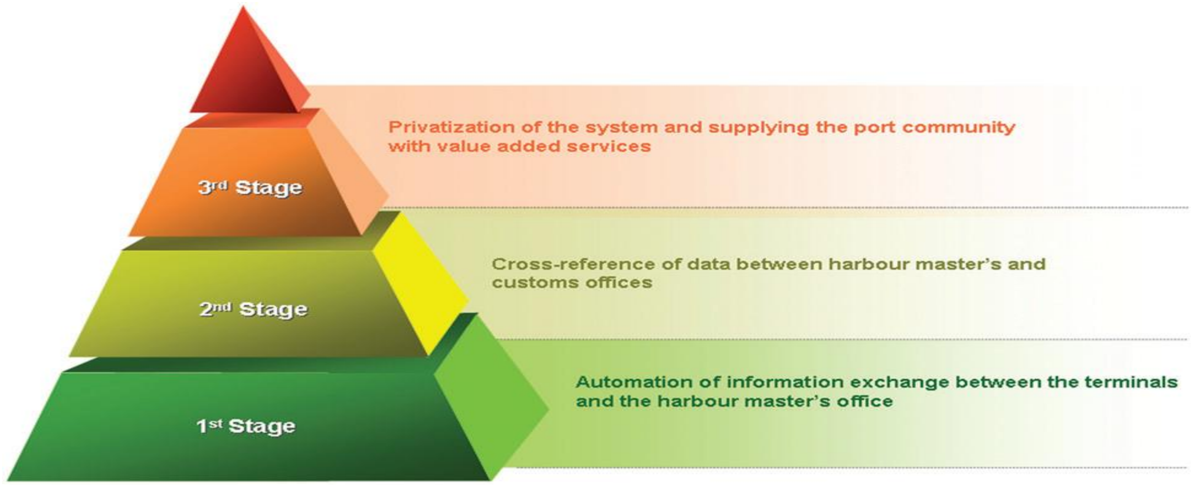


Figure 4 - Proposed PCS Development Strategy: First stage: automation of information transfer between the port operators and the harbour master's office

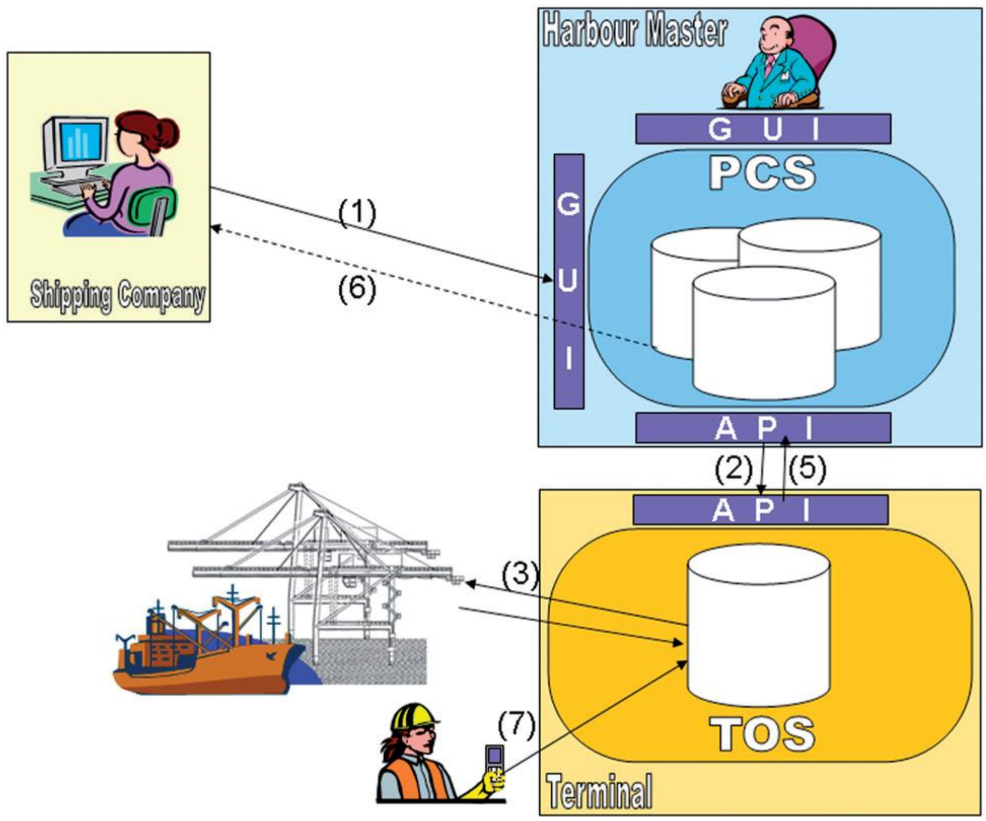


Figure 5 - Phase 1 – 2: Second stage: cross-reference of data between the harbour masters and customs office

This stage is relatively more difficult to implement since neither the harbour masters nor the customs office have jurisdiction on the other. In this stage, an API would be provided between the databases of the harbour master's office and the customs office in order to check any inconsistencies in the data submitted by the shipping companies, as shown in Figure 6. These inconsistencies may be intentional or accidental. In any case, when there is any inconsistency, the customs enforcement officers or port state surveyors may directly visit the ship for verification. Thus, limited number of personnel can be used more efficiently by focusing on the suspicious ships.

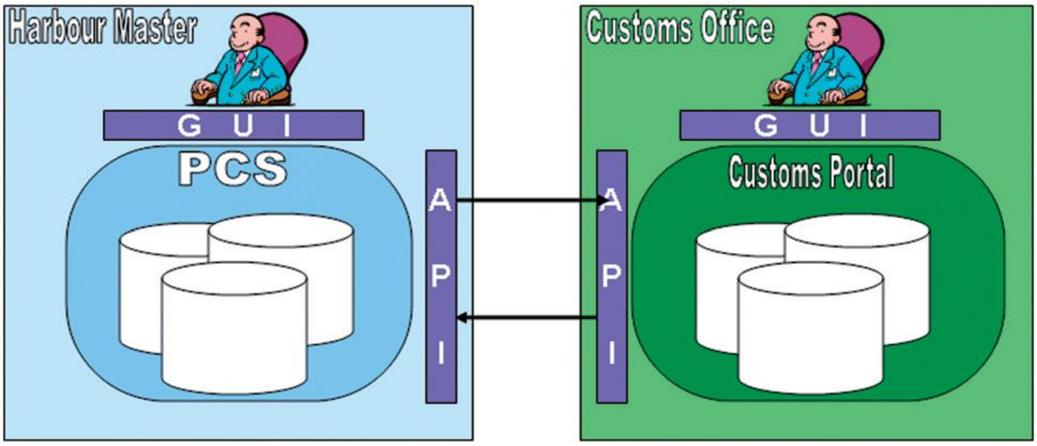


Figure 6. Phase 2 - 3. Third stage: privatization of the system and supplying the port community with value-added services

The involvement of the private companies (i.e. the port customers) in the system should be left to the final stage, as given in Figure 5. There are several reasons for this. There are several published cases indicating that private companies may resist changing the type of business they are used to do, and refuse to use such a system until they perceive the benefits of the new system. Thus, the involvement of the users before the maturity of the system may cause failure. It is suggested that user acceptance of PCSs directly depends on the support of the user company's top management and the technical reliability of the system. Thus, maturity of the system is not sufficient. The governmental agencies must provide good public relations with the industrial companies, such as providing training programmes, seminars and incentives to ensure that the benefits of the new system are well perceived by the users. Since it is not very practical for a governmental institute to provide commercial services, privatization of the system may contribute significantly to the efficiency of operations, quality of the services provided, and the acceptance of the system by the members of the port community. On the other hand, security and the control of the activities must be ensured by the government. It is the best practice to operate a PCS by an independent corporation for commercial flexibility. System being first implemented by government and government supervision after the privatization can assure the trust of the customers needed for private sector participation.

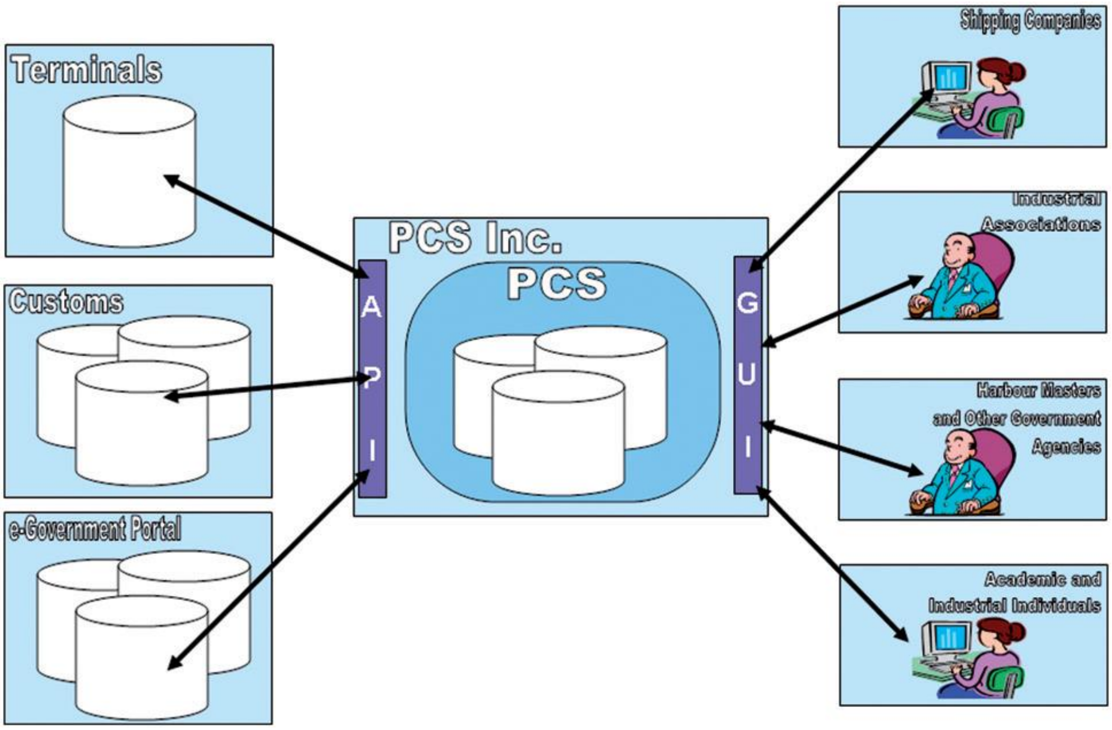


Figure 7 - Phase 3: Third stage: privatization of the system and supplying the port community with value-added services

The involvement of the private companies (i.e. the port customers) in the system should be left to the final stage, as given in Figure 7. There are several reasons for this. There are several published cases indicating that private companies may resist changing the type of business they are used to do, and refuse to use such a system until they perceive the benefits of the new system [2, 15]. Thus, the involvement of the users before the maturity of the system may cause failure.

Partnership

C4FF (Maritime Division), UK – UK Ports
VTEK – TR Ports
Bahçesehir University; TR
Satakunta University, FI – Finnish Ports – Case PortNet System
University of Szczicin, PL – Polish Ports
MMP/MMRTC/ CERTIPILOT; ML - Maltese Ports
Niva, GR
Makroshipping, TR

Plus several ports (already agreed, post in Istanbul, Genoa and UK)