

# STATUS AND PERSPECTIVES OF PORT COMMUNITY SYSTEMS DEVELOPMENT IN THE EUROPEAN UNION: THE CASE OF BULGARIAN BLACK SEA PORTS

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**Abstract:** The present paper analyses the status and current issues of port information exchange systems in the European Union and the Bulgarian Black Sea ports. Port Community Systems (PCS), being a complement to the Maritime Single Windows (MSW), are based on specific EU legislation thus achieving realization of documentary data exchange in maritime transportation through a single interface with various levels of access. The main objective of this paper is to outline the feasibility, the benefits of PCS development and integration within the European Union as well as the role of the developed MSW system of Bulgarian Black Sea ports for the PCS integration environment. The PCS integration process aims at decreasing of administrative burden, reduction of documentary errors, introduction of standardized electronic data interchange and reduction of service time for port users.

**Keywords:** PORT COMMUNITY SYSTEMS, MARITIME SINGLE WINDOW, MARITIME TRANSPORTATION, INFORMATION EXCHANGE SYSTEMS

## 1. Introduction

The globalization of maritime transport requires establishment of legal regulations at international (International Maritime Organization) and at regional (European Union) levels. European Union (EU) policy issues and regulations are seldom related to one member state only. The common framework approach to regulations related to electronic data exchange systems of EU ports and of the economic operators in maritime transport is a prerequisite for efficient coordination and implementation of strategic policies and measures. Main policy objectives for promoting transparent and efficient solutions based on innovative information technologies in maritime transportation within the EU include:

- improving the safety and security of maritime transport services and environmental protection (integrated surveillance, monitoring and control systems incorporating adequate intelligence means for proactive, remedial and cross-border operations);

- increasing the competitiveness of the EU maritime transport and logistics industry (improved utilization of advanced information and communication technologies leading to higher quality of shipping services and facilitating reduction of operational costs and increased competitiveness of the sector);

- reinforcing the human factor (there is a serious shortage of qualified people in seafaring and maritime professions within EU due to the lack of flexible continuing professional education at sea and ashore whereas ICT solutions can support competence development through long-distance learning).

The development of the MSW and of the port communication systems has led to the introduction of the concept of Port Community Systems (PCS) serving as integration points for all stakeholders of the community being interconnected via Maritime Single Windows (MSW). The ideal operation of a Port Community System involves no need for bi-directional communication lines between the various port-related actors as they all have access to the information they need through the central communication system [11].

## 2. Theoretical background and legal framework

The European Union White Paper for the future of transport sets the guidelines for a Single European Transport Area in which all barriers between modes and between borders are to be eliminated. In particular, it calls for a Blue Belt in the seas around Europe which would simplify the formalities for ships travelling between EU ports [5].

EU Maritime Single Windows have been associated primarily with two interrelated policies [3]:

- Directive 2002/59/EC for vessel traffic monitoring (the "VTMIS Directive") aimed to improve safety and environmental protection in European seas;

- Directive 2010/65/EU for ships arriving in and/or departing from ports of the Member States (Reporting Formalities Directive), describing the actions that Member States should implement to make efficient use of electronic data transmission and information exchange systems.

Further to above, the legal basis for the adoption of EU Directive 2002/6/EC is the International Maritime Organization (IMO) Convention on Facilitation of International Maritime Traffic (FAL Convention) that entered into force in 1967. The purpose of the convention is to enhance the efficiency of maritime transport by digitalization, formalities simplification, setting forth documentary requirements and procedures associated with vessels' movements in international voyages. However, every port communication system reflects the port specific requirements therefore vessels' reports and cargo documentation are often specific to the port [11]. Reporting requirements and hence the use of the single window will depend on where a ship or the cargo is on its voyage [6]. The timeline in the transportation process by sea is presented in Figure 1.

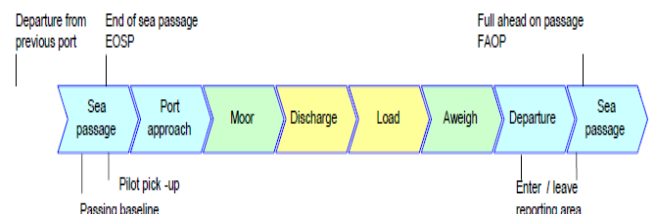


Figure 1. Timeline in a transport process [6]

EU Directive 2002/59/EC (SafeSeaNet) sets forth the guidelines that the ship operator, agent or master have to notify the competent authority, at certain time prior to entry into a port of a member state and provide strictly specific data related to the cargo or the vessel. Member states are obliged to monitor the status of all ships operating in their mandatory reporting systems and vessel traffic services as pursuant to the requirements of the IMO FAL Convention [11]. SafeSeaNet (SSN) is a specialized network facilitating the data exchange in an electronic format between the maritime administrations of the member states [11]. The system has been designed basis the EU legislation, regulations related to port reception facilities (waste disposal) and Port State Control (Paris Memorandum of Understanding) having significant level of reliability and security. All EU member states have developed systems to accept electronic reports via a Maritime Single Window as of June 1, 2015 for reporting formalities applicable to maritime

transport for arriving and departing ships within EU ports. Thus integration of information flows is achieved providing the business stakeholders, local customs and government administrations with relevant import and export data. Furthermore, the EU Directive 2002/59/EC requires that each country organizes coordinated methods for request of reporting procedures.

SafeSeaNet was established as a centralized European platform for maritime data exchange, linking together maritime authorities from across Europe. Evolution of SafeSeaNet during the last decade includes a number of developments that had an impact on Maritime Single Window solutions. Some of them are: integrated distribution of LRIT/AIS information via SSN, integration of SSN and CleanSeaNet functionality to facilitate pollution incidents analysis and identification of potential polluters, visualization of ship inspection information on the SSN GIS interface, SSN access mechanism improvement, etc. [3].

[12] defines the Single Window concept as "a facility that allows parties involved in trade and transport to lodge standardized information and documents via a single entry point to fulfill all import, export and transit-related regulatory requirements. If information is electronic, then individual data elements should only be submitted once."

The European Port Community System Association (EPCSA) represents the interests of the Port Community Systems Operators in Europe and promotes the role of PCSs in the MSW. EPCSA'S policy is aimed at encouraging the development of Port Community Systems as an efficient way of simplifying port procedures and means by which the requirements of Directive 2010/65/EC can be implemented. Some of the vital issues in the role of PCSs in MSW systems include: transition paths to unifying messages submitted by carriers and cargo agents to PCSs; potential of harmonization between PCS messages with the requirements of the ship formalities directive as agreed by all Member States.

PCS in general is a local initiative that is realized in an IT environment being specific to a port while the MSW is a country-level national system [9]. The MSWs are controlled by the government as pursuant to Directive 2010/65/EU. As the latter is not directly providing guidelines for the PCS therefore they are to be developed in addition to the MSWs initiatives in the ports. The PCSs can be either privately or publicly controlled and developed. Port community systems can integrate functionalities that are required by the parties benefiting from the PCS. In practice, PCS serve as electronic gateways for the MSW. The main differences between PCS and NSW are [9]:

- MSWs are country-specific, while PCSs are port-specific;
- Data submitted to MSW cannot be reused whereas PCS data can be used further or for other purposes;
- MSWs are government-controlled while PCS can be either government or public driven

The specific ports Single Window systems has a Business-to-Government (B2G) character as it provides local level information about the vessel to the authorities on a port level, while a Port Community System has a Business-to-Business (B2B) character acting as a tool to exchange commercial and logistics information among the members of a port's community [10].

### 3. Functionalities, benefits and integration of PCSs in the European Union

According to EPCSA's White Paper [4] the PCS supports electronic transmission of: vessel notification towards Harbor Master/Port Authority and Customs; cargo declaration, manifest filling/summary declaration towards Customs; ship's stores declaration; crew's effects declaration; dangerous goods declaration towards the Harbor Master/Port Authority, waste disposal and port

dues declarations. The economic operators can further use the information already stored in the PCSs for business-to-business processes (outturn reports, vessel information, etc.). The definition of 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 [4]. The PCS optimizes, manages and automates port and logistics processes through a single submission of data and connecting transport and logistics chains. According to [7] a PCS Operator is an organization that is either public, private or public/private that operates and maintains a Port Community System and where the Port Community System represents the core of that organization's business.

As per [8], research on the functions of PCSs have been carried out outlining the following functional areas: shipping lines, freight forwarders, terminal operators, port operators, customs, land carriers, container freight stations. The main functionalities for port operators are: ship arrival/departure confirmation, harbor dues, vessel inspection request, immigration clearance, reception of dangerous goods declaration, vessel arrival notification, notification waste disposal, statistics of supply chain performance, berth allocation management. Based on research of various authors [2] have summarized the benefits of the PCS (Table 1).

**Table 1:** Benefits of PCS and evaluation methods (adapted from[2])

Digital economies benefits		Quantification Method
Economic benefits	Reduce cost of information access	Value of time and labor saved
	Reduce cost of communication	Cost of previous forms of communication
	Extra revenue (government authority or administrator)	Value of revenue
	Correct taxation (port authority services)	Difference between the before and after tax revenue
	Prevention of illegal transactions	Per cent of illegal transactions reduction
Increased quality of information	Decrease of errors rate	Time and labor consumed to correct errors
	Elimination of data inconsistency	Time and labor consumed to sort and verify data
Increased performance	Fast access to information	Measurement of the increased labor productivity
	Efficient use of resources	Better use of equipment capacities
Community attendance benefits		Quantification Method
Increased competitiveness at stakeholder level	Increased access to information	Savings in costs of information
	Added value services	Revenue in added value services through PCS
Increased efficiency	Compliance with community standards and regulations	Less investment needed for business growth

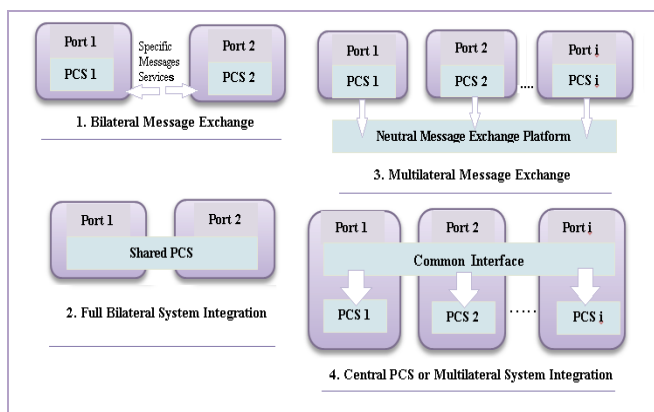
Current integration pilots in EU ports are concentrated on close integration efforts between several PCSs for achievement of a specific purpose via common user interface and single access for all participating PCSs. Another potentially feasible functionality of integrated PCSs within the EU is the multiple use of data provided by ships from previous port(s) which ensures for saving of time. Yet another developed area is the realization of the global data exchange where PCSs exchange data with extra-community PCSs. The latter is a prerequisite for integration with customs data exchange systems. Based on the present status of the PCSs integration level within the EU the following challenges can be outlined: heterogeneity of PCSs due to national/local regulations, technological diversity of existing PCSs, refraining from sharing confidential business information, need for benefits sharing between main beneficiaries of information and parties investing in PCSs integration.

Table 2 illustrates the features and building blocks that were incorporated into the MSW pilot projects of the EU countries of the Mediterranean and the Black Sea regions.

**Table 2:** Main features incorporated into MSW in the Mediterranean and Black Sea regions (adapted from [1])

Functionalities	Pilot Projects in EU Countries (December, 2015)					
	CY	GR	IT	RO	BG	SE
Digital Reporting	*	*	*	*	*	*
Internal public communication - multiple use of data	*	*	*	*	*	*
PCS	*		*			*
SafeSeaNet			*	*	*	*
Health	*	*	*	*	*	*
Passengers	*	*	*	*	*	*
Crew	*	*	*	*	*	*
Customs (reporting to MSW)	*		*		*	
IT security	*	*	*	*	*	*

Figure 2 [9] presents the four main PCS integration designs. The "Bilateral message exchange" design represents the most feasible integration option which realization requires only a limited amount of data from another PCS. The data exchange is performed via transfer of messages or specific data. In cases where there are more than two PCSs to be integrated, the "Multilateral message exchange" is applied and it provides for a central connectivity platform functioning at national or European levels. Front office cooperation in Bremerhaven and Hamburg is an example of the latter design. Barcelona and Marseille integration case is based on bilateral or consortium data sharing of specific messages between the PCSs and the development of shared services. The "Full bilateral system integration" design presents the case whereas two ports completely integrate their original PCSs into one IT system providing the same interface for both ports. There might be a practical limit on functionalities of one system that takes into account all diverse regional, local and municipal specifics and regulations. With the "Central PCS or multilateral system integration" design complete PCS integration between a larger number of systems is achieved by provision of a common interface for all participants but maintaining the port-specific PCS for locally-specific functionalities.

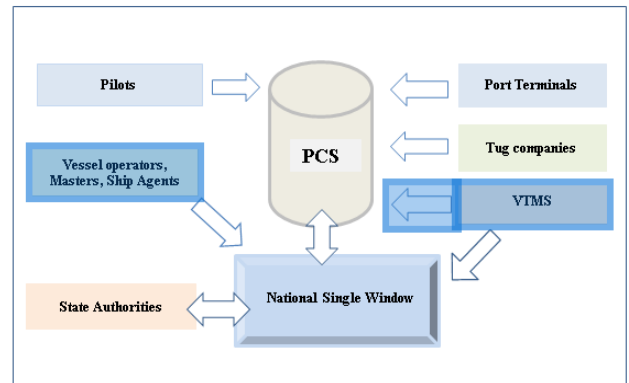


**Figure 2:** The four main PCS integrating designs [9]

#### 4. PCS in Bulgarian Black Sea ports

Based on the EU "Operational Program on Transport 2007-2013" and as pursuant to EU Directive 2010/65/EC, a new organizational and technological structure has been established in Bulgaria: National Centre for Electronic Exchange of Documents in Maritime Transport (NCEEDMT) that is functioning as a MSW. The operational functionalities of NCEEDMT allow for single electronic input of data whereas competent authorities receive the required information automatically which considerably reduces the time for documentary exchange. NCEEDMT has two structural entities: Bourgas Information Center and Varna Information Centre that coordinate the activities in the port terminals in Bourgas and Varna respectively.

As of December 2015, based on [1] the Bulgarian Port Infrastructure Company introduced a pilot project "Mover" as an extension of the already developed MSW. The objectives of the pilot project include: improvement of the technology of movement of vessels in the ports, improvement of the safety and quality, facilitation of the business. The pilot project (Figure 3) involves the following stakeholders: VTMS authorities, pilot stations, port terminals, tug companies, state authorities (customs, immigration, economic operators).



**Figure 3:** Pilot PCS project for Bulgarian Black Sea ports (adapted from [1])

Common interface is used for access to data and traffic planning is made by the VTMS control bodies whereas automatic messages are sent to the users for each re-planning. The model consists of a database, a business layer, validation module, service layer. Data elements cover several classes: initial data, secondary data and reference data. The expected results are related to achieving more efficient traffic planning, facilitation of the planning process, reduction of ships' stay in ports, financial benefits for the business. The pilot project is a useful technological tool for validating the flow of data between parties and improvement of the functional capabilities of the MSW in general being a technical add-on to the existing MSW.

#### 5. Conclusion

Despite recent trends for digitalization in maritime transport most of the services are still realized via paper-based solutions. The EU legal framework and the achievements of national authorities for development of the MSWs have traced the path for the introduction of PCS. Although the benefits of PCS are clear to all stakeholders the provision of standardized exchange of information is a technological challenge. The design, realization and usage of a PCS is a multi-stage process incorporating diverse layers and modules enabling transactions of business entities, port operators, customs, government agencies, etc. The development of the PCSs in Bulgarian Black Sea ports is inevitably on the right track on the basis of the already fully functioning MSW and the applicable national legal framework.

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