ORGANIZATION AND INTEGRATION OF BULGARIAN MARITIME NATIONAL OBSERVATION AND SURVEILLANCE SYSTEMS

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Abstract: This paper presents briefly the idea of integrated platform to be used for unified information exchange in the maritime domain between interested correspondents in the European Union (EU). The project is known as Common Information Sharing Environment, (CISE). The principles listed consider requirements and how-to-build the platform developed by the CISE work groups. A brief overview of the implemented systems in EU, as well as national ones is presented. Referring to the architectural vision of CISE, the authors propose a three-layer model of organization of different User Communities attended to the CISE National Node. The model is oriented towards functional use of the integrated system. Goals and objectives resolved in the various layers of the organizational model are defined.

Keywords: Surveillance systems, Integrating information, Platform, Organization, EU

1. Introduction

Increasing awareness, better maritime picture compilation, timely response to different situations as they occur are the key components of the goals of the Member States authorities and European Commission Directorate-General for Maritime Affairs and Fisheries (DG MARE). The process of integration of already implemented systems results in Common Information Sharing Environment (CISE) project (http://www.eucise2020.eu/home).

The European Union (EU) maritime domain could be described as the waters under the sovereignty and jurisdiction of EU Member States. The maritime domain also consists of activities

carried out in other international areas where the EU has a maritime interest (Fig.1) (http://www.eucise2020.eu/home).

2. **CISE-what is it and why? Basic Principles** (DIGIT/DG MARE/JRC, "CISE Architecture Visions Document", *Study supporting the Impact Assessment*, ver. 3, 06.11.2013 – pp. 18-20)

Maritime CISE is a process of collaboration to enhance relevant information sharing between maritime surveillance authorities and their information systems in the EU. This process includes development of common hardware and software implementations in order to connect previously installed and operating surveillance and communication systems.

Figure 1 European Maritime Domain and Areas of Interests.

Increasing efficiency, quality, responsiveness, and coordination of surveillance operations in the EU maritime domain using CISE will benefit prosperity and security of the EU and its citizens.

Maritime CISE will reduce collecting the same information concerning maritime picture or detail in it by one maritime authority from a given country instead of sharing it with already collected information by other authorities in other countries, thus freeing up services and resources for more detailed and deep maritime picture compilation.

Seven functions presented also as User Communities are covered : Defence; Customs; Border Control; Fisheries Control; Safety, security and pollution preventing from shipping; Environmental protection; General law enforcement.

Each member state in the EU has a different approach, organisation and execution of these functions by the relevant national authorities.

The nine basic principles implemented by CISE are listed bellow :

1) Any public authority in the EU and in the European Environment Agency (EEA) involved in maritime surveillance must be allowed to interlink in CISE;
2) Based on need-to-know and responsibility-to-share rules, CISE must increase maritime awareness;
3) Decentralised approach at EU-level must be preferred in CISE;
4) Interoperability among civilian and military information systems must be enabled in CISE;
5) Interoperability among information systems at the European, national, sectorial and regional level must be enabled in CISE;
6) Reuse of existing tools, technologies and operating systems must be preferred in CISE;
7) Seamless and secure exchange of any type of information, relevant to maritime surveillance must be enabled in CISE;
8) CISE must be system neutral;
9) Information providers must have the possibility to change their service offering.

3. Summary of EU-level initiatives (DIGIT/DG MARE/JRC, "CISE Architecture Visions Document", *Study supporting the Impact Assessment*, ver. 3, 06.11.2013– pp. 101-106)

3.1 Border Control

EUROSUR – European Border Surveillance System – this is a decentralized network of national nodes, referred as National Coordination Centers (NCC). Each NCC collects information from different national law enforcement bodies and border control sites in order to create coherent maritime picture. The operational information of interest is shared in the form of EUROSUR platform structured messages between connected NCCs and FRONTEX via secured internet connection (VPN). There is no raw data information processed via EUROSUR.

VIS – The Visa Information System consists of central system (CS-VIS), and the national interfaces (NS-VIS) of Schengen Member States. CS-VIS provides central capabilities and data storage room, NS-VIS provides access of Member State Authorities to CS-VIS via secure network sTESTA.

3.2 Customs

CCN/CSI (e-Customs) – this is an EU-prescribed private communications network between Member States and European Commission. It consists of a physical gateway and a set of protocols and APIs.

3.3 Fisheries Control

IFDM – DG MARE's Integrated Fisheries Data Management program, which is part of 2020 EU vision for establishment of integrated European information system for management of Member States fishery fleet activities. The main projects are Data Exchange Highway (DEH), Electronic Reporting System (ERS) and Data Warehouse (DWH). This projects form the basis for data exchange and reporting.

VMS and ERS - The **Vessel Monitoring System** and the **Electronic Reporting System –** these are separate systems for data exchange between fishing vessels and national Fishing Monitoring Centers (FMCs) over mobile satellite communications.

3.4 Defense

MARSUR – this is a decentralized network between voluntary agreed Member States, connected via national nodes (MEXS) through an API interface over a secured internet (VPN).

3.5 Law enforcement

EUROPOL SIENA – Secure Information Exchange Network Application – this is the platform for exchange the operational information concerning international crime between EUROPOL and its associates.

SISII and SIRENE – Schengen Information System II consists of Central Schengen Information System (C-SIS), located in Strasbourg (France) and National Schengen Information System (N-SIS) nodes for some Member States, or using available APIs for other Member States.

3.6 Marine environment

INSPIRE – The Directive on Infrastructure for Spatial Information in the European Community – it was created to support policies and activities connected with the environment issues. There are 34 spatial data themes under common Implementing Rules (IRs).

EMODNet – The European Marine Observation and Data Network (EMODNet) is created for open maritime observation data exchange. EMODNet data is split into 6 datasets, each of which having own web portal.

SEIS – **Shared Environmental Information System**. This system is built to improve exchange, collection and use of environmental data in EU. It consists of several interconnected systems and initiatives, supported and managed by the DG Environment, EEA, JRC, Eurostat and Member States. **ReportNet** is one of the main systems in SEIS; this is an electronic reporting system with central storage in EU. Two other important projects are **Wise Marine** (a set of agreements

between EU Commission and Member States of exchanging of marine environmental data) and **Eye on Earth** (public website to access environmental information services).

CleanSeaNet – satellite-based surveillance system used to observe about oil spills and vessel detection. Technology implemented use SAR (Synthetic Aperture Radars).

Copernicus (previously called GMES) is complicated Earth monitoring European system with satellite and ground based components. It collects environmental and security data from multiple space, air, ground and maritime sources.

3.7 Maritime Safety and Security

SafeSeaNet – this is the Internet-based system with distributed databases, aiming to prevent marine pollution and accidents at sea. AIS (Automatic Identification System) data is the main one exchanged over the SafeSeaNet. In addition four types of information services are performed: ship notifications, incident reports, port notifications and hazmat notifications.

LRIT – Long Range Identification and Tracking of all EU flag vessels is executed in the EU ELRIT Cooperative Data Center (EU ELRIT CDC) worldwide.

Thetis – this system supports the new Port State Control inspection regime by easing the planning, logging and publishing the vessel inspections. It is centralized web-based system, accessed via the LifeRay web portal.

IMDateE Integrated Maritime Data Environment project – is run by European Maritime Safety Agency (EMSA) under supervision of Directorate-General for Mobility and Transport (DG MOVE). The project aim is to integrate different EMSA managed systems (SafeSeaNet, Thetis, LRIT, CleanSeaNet) information to provide more complete services.

CECIS – web-based centralized system with centralized data which supports EU Monitoring and Information Center (MIC). Data collected concerns civil protection and marine pollution resources from participating States in case of an emergency.

3.8 Other Community Initiatives

Blue Hub – initiative, led by JRC to develop data prototype platform for systems integration, gathering, analysis and prediction of local, regional and global data in maritime domain from various sources (AIS, LRIT, VMSs, etc.).

Single Window in EU Member States – electronic format reporting system for ships arriving in/departing from EU Member States ports approved under EU Parliament Directive 2010/65/EU and entered into force since 01 JUN 2015.

4. Summary of Bulgarian National Maritime Surveillance Systems

4.1 Border Control

BLUE BORDER Project – since 2011, Ministry of (Inner Affairs) Interiors implemented system for sea coast and borders monitoring. It is run by the Border Police and gives operational information in favor of National Law Enforcement Authorities. It consists of Radar, CCTV, AIS and VHF Radio subsystems for monitoring of sea area of interests. There are 18 sites, 2 Local Coordination Centers, 1 Regional Coordination Center, a number of sea vessels and cars, equipped to communicate and share information (MINISTRY OF INTERIOR, DIRECTORATE "BORDER POLICE", Technical specification pdf format published 11 April 2017 [online] 2017 pp1-2).

4.2 Defense

EKRAN Project – since 2011**,** Ministry of Defense implemented this system for maritime picture observation and surveillance. EKRAN system consists of Radar, CCTV, AIS, and V/UHF, HF Radio subsystems. It includes 8 sites, one National Center in Varna, two Regional Centers in Galata and Bourgas (FSI: *"Ekran MSS architecture", 2011).*

4.3 Fisheries control

Fishery Vessel Monitoring System -since 2006, all fishery vessels over 15 meters long and since 2014 all fishery vessels over 12 meters long are supervised via FVMS. This system has a satellite based component and GPRS tracking component. FVMS uses a web based software. It consists of National Fishery Vessels Monitoring Centre, situated in Varna and mobile complexes, mounted onboard fishery vessels (SCORTEL LTD., *Fishery Vessels Monitoring System, 2017*). FVMS is under the jurisdiction of the Bulgarian Ministry of Agriculture and Foods (ИАРА, *Екранни снимки от ЦНРК – ИАРА Варна* [IARA Monitor shortcuts from the FVMS Center of Varna], 2017).

4.4 Vessel Traffic Information and Management system

VTMIS – Third generation system of Bulgarian VTMIS project run after 2015. The system consists of 22 sites, including two main centers – the port of Varna Control Center and the port of Bourgas Control Center. AIS, Radar, Relay, Meteo and VHF/ HF GMDSS subsystems, including MF NAVTEX component, built VTMIS-3 (TRANSAS LTD., VTMIS Technical Description, 2002).

5. Bulgarian National Maritime Node (BgNM Node)

Due to the EU membership and future integration processes of the Bulgarian maritime national observation and surveillance systems, choosing optimal architecture of integration is a key element of integration system development.

According to publication of DG MARE ("CISE Architecture Visions Document", *Study supporting the Impact Assessment*, 06.11.2013, pp 34-83) there are several architecture visions concerning the development of CISE – vision Core, A, B, C, vision C variant and Hybrid vision. Briefly, vision A means to have integration first at User Community Level, each Users Communities of Member States to be connected with each other (Defense of Member State A to Defense of Member State B, Border Authorities of Member State A to relevant Authorities of Member state B).

In vision B there is one National Authority which will act as "National CISE Node" and "Cervices Discovery Center" contemporary. The software referred to as "CISE service discovery coordinator" must be set, not only at the State, but also at the EU level. In addition, the software "CISE Node" is set to enable communication between different CISE participants. This vision is suitable for a Member State, but complicated due to additional software load per Member State. Also there are many technical details to be cleared about "CISE service discovery coordinator" software when implementation starts.

In vision C there is again a common "CISE Node" at Member State Level, but the "Service Discovery Coordinator" is EU level positioned and the "CISE Node" is only one for the Member State. This is the most appropriate variant for integrating of the implemented Bulgarian National Maritime observation and surveillance systems (Fig.2).

In accordance with the study and calculations between the three architecture visions mentioned above (DIGIT/DG MARE/JRC, "CISE Architecture Visions Document", *Study supporting the Impact Assessment*, 06.11.2013 pp.71-75), vision C achieves the highest scores according to the applied criteria. In addition, integration means creating a unified platform, the accomplishment of which is much more difficult when "Service Discovery Coordinator" is based locally.

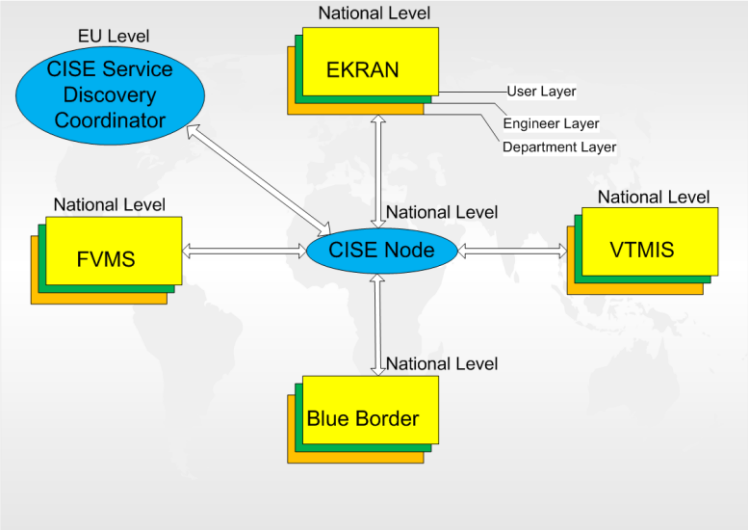


Figure 2 Architecture vision of Bulgarian National Node

Appropriate place to host the National Node is the Naval Academy; due to the present place of the Academy as a structure under the jurisdiction of the Ministry of Defense (MoD), Ministry of Transport (MTTITS) and Ministry of Education and Science (MON) simultaneously. Thus positioned, the Naval Academy staff has the rare possibility to experience and implement a proper management system, equipment and place in order to achieve interoperability among all the User Communities faster than any other organizational body.

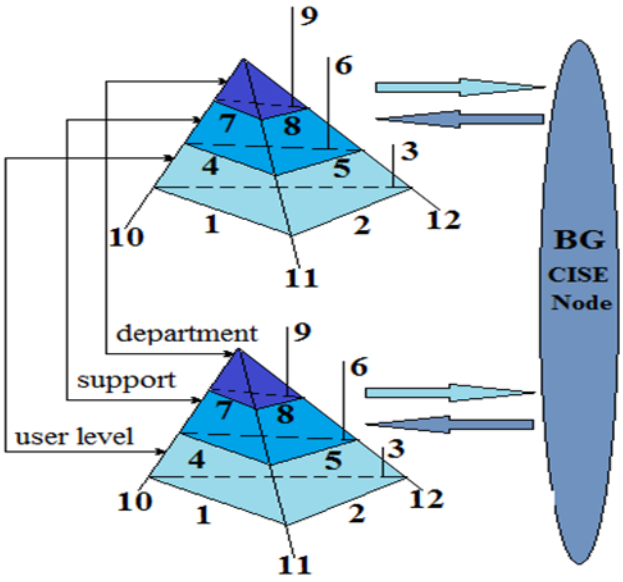
6. Development of the Integration Organization Structure.

All the process of planning, organization and implementation of such integration is better to be layered in three main layers (Three-Layer-Model):

1. Department Layer at Administrative Level.
2. Engineer (Support) Layer at Operational Level.
3. User Layer at Operational Level.

Figure 3 gives the idea of organization and interactions between the layers in governmental bodies aimed to integrate their systems in CISE National Node. There are two User Communities, relevant to two National Authorities (MoD and MTITS) for instance.

Primary users of the maritime observation systems for 24/7 in their service are in the pyramids' bases. The next layer - Operational Support Levels, includes Technical Support Section in MTITS and Logistic and Technical Support Sections in MoD Naval Headquarters. On the top of the pyramids are the department levels, leading to the relevant heads – Ministers in this example.



Agenda:
1-own data gathering;
2-node data gathering;
3-data analysis;
4-national logistic and support;
5-EU logistic and support;
6-logistic and support analysis;
7-national administrative lead;
8-EU initiatives lead;
9-leadership conclusions;
10-decision rights;
11-rules, agreements, normative acts;
12-responsibilities and good practices.

Figure 3 Organization Structure Example Scheme.

Conclusion.

Integrating the already implemented Maritime Surveillance and Observing systems in EU will enhance the maritime recognized picture and increase awareness and responsiveness of Member States and EU bodies. The three-Layer-Model on National level contributes to overcoming the internal organizational differences among the different User Communities in order to achieve better integration coherence. Timely response to different situations as they occur, better resource use without doubling and tripling of the same information gathering is part of the positives of CISE – a common Member States and EU Commission project. This EU initiative will benefit all EU citizens and will improve the quality of services delivered to business, science and other activities across the Union and Union collaborers.

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