

An End to end Interoperability Framework For MaritimE Situational Awareness at StrategiC and TacTical OpeRations

EFFECTOR PROJECT OVERVIEW

Presentation to ANDROMEDA

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SECRÉTARIAT GÉNÉRAL DE LA

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The Agenda

Overview

EFFECTOR at a glance

Consortium

- Challenge
- Introduction to the project
- Objectives of EFFECTOR

More accurately

- Concept & Approach
- Architectural building blocks
- □ EFFECTOR Trials sites
- EFFECTOR linkage with ANDROMEDA
- Possible inter-connection with CISE
- Planning

2



Call:

H2020-SU-SEC-2018-2019-2020

□ Topic:

- SU-BES03-2018-2019-2020
- Demonstration of applied solutions to enhance border and external security

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3

□ Sub-topic 2:

New concepts for decision support and information systems

Project title:

 An <u>End</u> to end interoperability <u>Framework For maritime situational</u> awareness at strat<u>EgiC</u> and <u>Tactical OpeRations</u>

□ Starting date & Duration:

1st October 2020 (18 months)

EU contribution:

■ € 4.999.529,50

The Consortium



A selection of 16 partners Leading European organizations

Large enterprises (4): NAVAL, THALES, ENG, CLS

SATWAYS

RTOS (4): KEMEA, ICCS, INOV, IRIT

□ End-Users (7):

- ✓ SECRETERIAT GENERAL DE LA MER Coordinator
- ✓ HELLENIC MINISTRY OF MARITIME AFFAIRS & INSULAR POLICY
- ✓ HELLENIC POLICE
- ✓ PORTUGUESE NAVY
- ✓ BULGARIAN EXECUTIVE AGENCY FOR MARITIME ADMINISTRATION
- ✓ HELLENIC MINISTRY OF DEFENSE
- ✓ ADMINISTRATION FOR MARITIME SAFETY AND PORT MANAGEMENT OF MONTENEGRO



Practitioners



5

- An efficient combination, processing and information sharing of multiple sources and types of information is required in order to achieve an enhanced maritime surveillance picture for a better decision support and improved collaboration.
- Although the maritime surveillance sector has been enriched in the last decade, new and novel surveillance concepts are still underutilized both in terms of integrated surveillance systems and/or in terms of efficient processing and knowledge extraction.
- To achieve the integration and inter- and intra-operation of various surveillance data sources and decision support systems, different data formats, communication protocols and data exchange mechanisms need to be managed and controlled in a comprehensive manner; hence interoperability standards play a crucial role towards this direction.
- This becomes even more evident when it comes to strategic and tactical mission planning, command and control and intelligence reporting.



Introduction to the project







The EFFECTOR project offers a solution for maritime surveillance and border security which includes:



an interoperability framework;



associated data fusion and analytics services.

In brief..



EFFECTOR improves the **decision support** process by enabling faster detection of new maritime events.



At the same time EFFECTOR assists the operating authorities and on-site intervention forces in communicating and sharing information within common envi



The Objectives

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- Implement a multilayered data lake platform for end-to-end interoperability and data exploitation that will facilitate the seamless integration of maritime surveillance systems and the interoperation of information systems at tactical and strategic level.
- Enable the sharing of an enhanced situational awareness picture at local, regional and national level with CISE and EUROSUR.
- Implement a data harmonization layer, adopting interoperability standards and proposing standards where necessary, for exploiting data sources and systems currently underutilized in maritime surveillance environment.
- Demonstrate new concepts and tools for knowledge extraction, semantic representation, data fusion, analytics, and federated querying.
- Validate and demonstrate the applied solutions in three operational trials together with national maritime authorities, End Users and practitioners.
- Ensure full compliance with the existing regulatory framework on personal data protection and privacy.
 7



The Concept & Approach



AMBITION:

Develop an Interoperability Framework and associated Data Fusion and Analytics services for Maritime Surveillance and Border Security

ARCHITECTURAL BUILDING BLOCKS:

- A. Multi-layer Data Lake and common data sharing environment for Local, Regional and National coordination centres
- B. Data Fusion and Analytics Layer for knowledge extraction and provision of situational awareness services
- C. Data harmonization layer for seamless integration of surveillance systems, sensors, platforms and data sources of interest
- D. Mission and reporting layer
- E. Maritime Semantic Layer
- F. CISE and EUROSUR Integration Layer for transnational information exchange
- G. Identity and Security Layer



Architectural building blocks (1)

A. Multi-layer Data Lake and common data sharing environment for Local, Regional and National coordination centres

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9

- □ Will be deployed in three National Coordination Centers (France, Portugal and Greece) following common guidelines.
- □ Will support national and local information (as surveillance systems and data sources).
- Will be composed by several interconnected Big Data Open Source technologies that will provide Extract, Transform and Load (ETL) capabilities and its aim is to:
 - Support most common standards for strategic and tactical information exchanges such as incident management, target tracking, mission planning, intelligence reporting, collection exploitation reporting etc.
 - Support Big Data using the latest advances in big data platforms, data aggregation, processing, storage and distribution.
 - Support data exploitation for enhanced contextual knowledge extraction, multi-level data fusion, semantics, analytics for improved decision support.
 - Ingest, cleanse and aggregate heterogeneous data, to store and collect raw data and metadata in a comprehensive and holistic manner.

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Architectural building blocks (2)

- A. Multi-layer Data Lake and common data sharing environment for Local, Regional and National coordination centres
- □ French National Control Center (1): SeaMIS, an operational system for search and rescue at sea used by the French MRCCs (Maritime Rescue Coordination Centers) coming under the control of the Directorate of Maritime Affairs.
- □ Greek National Control Centers (3): ENGAGE MSC Edition, an operational system for surveillance and coordination suited to support operations of National, Regional and Local Maritime Coordination Centres.
- Portuguese National Control Center (1): MUSCA, a Command & Control system that is able to handle moving objects, static objects, trajectories and areas of interest.

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Architectural building blocks (3)

B. Data Fusion and Analytics Layer for knowledge extraction and provision of situational awareness services

Will incorporate 3 different JDL levels of Data Fusion and will be complemented with advanced (Big) analytics services which will build a set of dedicated situational awareness services for improved decision support linked to the EFFECTOR use cases.

- Levell Object Detection: Insyto for trajectories fusion, Weak signal detection
- Level2 Situation Assessment: TRITON for abnormal behavior, Alert & anomaly detection module, Early collision notification
- Level3 Impact Assessment: Data fusion for RMP at different levels





Architectural building blocks (4)



C. Data harmonization layer (Indicative list of surveillance systems & sensors)

Platforms, sensors, systems and tactical assets	Type of data	Standards
Marine traffic reporting systems (AIS, SAIS, VTS, VMS, LRIT)	Vessel tracks, vessel Information, routes, trajectories etc.	IVEF, NMEA etc.
Radars (HF-radars, etc.)	Vessel tracks	ASTERIX, NMEA, binary etc.
Satellite Data Platforms	Satellite based meteorological and environmental data, earth observations, satellite-based target detection, satellite maps etc.	netCDF, GRIB, HDF5, GeoJSON, GeoTiff etc.
Environmental sensors and platforms	On line, in-situ environmental data	OGC suite of standards
UAV, unmanned vehicles	Video stream, mission data, target detection, object classification etc.	STANAG 4586 (for mission planning), MAVLink
Participatory sensing platform	Images, videos and data from citizens (mobile phones app), social media data	OGC Web Map Service Interface Standard (WMS), OGC O&M, OGC Web Feature Service (WFS), OGC SensorThingApi, GeoTIFF etc.
Vessel on-board sensors and platforms (E/O, radars, environmental etc.)	Different type depending on the systems	Various Standards and proprietary
Coastal and offshore surveillance infrastructure	CCTV, other surveillance/monitoring sensors (coastal infrastructures and offshore)	Proprietary, ONVIF, CAP, etc.
CleanSeaNet, SafeSeaNet, IMDate, VTMIS	Different types of data and maritime services	Different standards
Data bases	Ship register	IMO
Radio and/or wireless, telecom and satellite communications	Voice and data	Different Standards (LTE, 5G, 802.11xx, VHF, UHF, Maritime Satellite Broadband, etc.)

D. Mission and Reporting Layer

Will support the:

- Execution of tasking of tactical assets.
- Mission planning and execution of missions including standard templates, mission parameters, mission exchange protocol, stages of mission execution.

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Reporting of incidents, collection of data, historical data management, mission debriefing, incident analysis reporting etc.





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14

E. Maritime Semantic Layer

- □ Will facilitate the use of common vocabularies and shared taxonomies for reaching semantic agreements on common concepts between National Coordination Centres, and the use of Linked Data technologies as a means of facilitating the exchange and integration of maritime surveillance data across Member States and maritime end users.
- An ontology related to the field of maritime surveillance will be implemented, while semantic queries will be developed enabling federated querying at local, regional and national data lake level.



Architectural building blocks (7)



15

F. CISE and EUROSUR Integration Layer for transnational information exchange

- □ All three Data Lakes deployed in the National Coordination Centres of France, Portugal and Greece will provide the means to exchange and share information with the CISE network.
- □ This will be achieved by implementing CISE adapters.
- □ This will enhance the situational picture and further facilitate the optimized response to security and safety maritime incidents. This is especially of high importance in cross-border operations.
- □ Implement EUROSUR compliant interfaces that will facilitate possible integration with EUROSUR services.





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16

G. Identity and Security Layer

□ Will follow the security by design concept ensuring user and data security.

- An administrator console will manage users/applications/services, authentication and authorization.
- Will allow the protection of both raw data and processed information exchanged between the various subcomponents.
- □ Will protect personal data.





EFFECTOR Trials sites





The EFFECTOR system is tested, validated and demonstrated in real operational scenarios together with

maritime authorities, End Users and practitioners in

France, Portugal and Greece.



EFFECTOR Trials sites

Greek Maritime Trial (Short Scale)

Partners involved: KEMEA / SATWAYS / ICCS / NAVAL / ENGINEERING / INOV

End Users involved: Ministry of Maritime Affairs and Insular Policy (MMAIP) / Hellenic Police (HPL) / Hellenic Ministry Of Defense (HMOD)

Scenarios:

- 1. Detection and apprehension of irregular migrants & SAR Operation
- 2. Detection of suspicious activity

Portuguese Maritime Trial (Short Scale)

Partners involved: INOV / NAVAL / STWS / ICCS / ENG

End Users involved: Portuguese Navy (PTN)

Scenarios:

- 1. Naval Control & Guidance
- 2. Illegal Activities

French Maritime Trial (Large Scale)

Partners / End Users involved: France / Greece / Portugal / Bulgaria / Montenegro

Scenarios:

- Contribute to the integrated maritime surveillance providing the participating authorities ways to exchange enhanced information.
- Implicate end users from different countries, and to work on the "Maritimes' limits" (maritime border).





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EFFECTOR will exploit the e-CISE Data Model of ANDROMEDA and adopt extensions that are related to enhanced cross-border situational awareness and operational collaboration between Member States coordination centres.



□ Technical feedback on CISE implementation:

CISE Nodes

CISE Adapters

- □ Implementation & Connection
- □ Sharing of sample and surveillance data during the implementation & integration phase of EFFECTOR.
- EFFECTOR will provide feedback on technical implementation by integrating legacy systems of Member States.
- □ Lessons learnt from ANDROMEDA and provision of feedback on sea trials and benefits of using the e-CISE data model.



Possible inter-connections with CISE





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Planning





Date (tentative)	Month	Purpose
Oct 2020	M01	Kick-off
Dec 2020	M03	End Users meeting / technical meeting / Advisory board
Mar 2021	M06	Plenary meeting / technical meeting
Jun 2021	M09	Technical meeting / Irst Workshop /
		Advisory board
Jul 2021	M10	Project interim review meeting
Sep 2021	M12	Technical meeting / Advisory board
Nov 2021	M14	Greek maritime trial setup
Nov 2021	M14	Portuguese maritime trial setup
Jan 2021	M16	French maritime trial setup
Feb 2022	M17	3-day demonstration period
Mar 2022	M18	Plenary meeting / 2 nd Workshop / Advisory Board / Final review





Thank you for your attention!

Any questions?

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