TEST PROJECT ON COOPERATION IN EXECUTION OF VARIOUS MARITIME FUNCTIONALITIES AT SUB-REGIONAL OR SEA-BASIN LEVEL IN THE FIELD OF INTEGRATED MARITIME SURVEILLANCE (COOPP)

Coop.P

Maritime Surveillance

FINAL REPORT • March 2014

Final Report • March 2014

Preface

TEST PROJECT ON COOPERATION IN EXECUTION OF VARIOUS MARITIME FUNCTIONALITIES AT SUB-REGIONAL OR SEA-BASIN LEVEL IN THE FIELD OF INTEGRATED MARITIME SURVEILLANCE (COOPP)

Dear Reader,

You are about to introduce yourself with the Final Report of the Cooperation Project. From In this report, you may find the core results achieved by the project with its 28 partners from 12 European countries. Based on the results, you may also read the recommendations for next steps of development of Common Information Sharing Environment for Maritime Surveillance (CISE).

This report gives you an outline of the most significant results achieved by the Cooperation Project. The thematic Final Reports of Work Packages are **available on the Project's website www.coopp.eu** after the end of the Project in the end of March 2014.

In addition to the project results, you may read a story of M/S CISE. The scenario is meant to illustrate the benefits for an achieved Common Information Sharing Environment (CISE) within Europe. The M/S CISE journey is a fictitious story that takes place in 2021, when the CISE has been established. The M/S CISE vessel leaves Kotka, Finland in the Baltic Sea Basin and makes its route through several sea basins, to reach final destination Constanta, Romania in the Black sea basin. On her journey the ship will be an observer of various incidents taking place. Based on the improvements that CISE will contribute to through information exchange agreed between Member States, there will be considerable cost benefits for EU within the maritime environment. The total estimated cost benefits of CISE are up to 423 million euros. The cross sectorial benefits of cost effectiveness for maritime surveillance could rise up to 121 – 182 million euros.

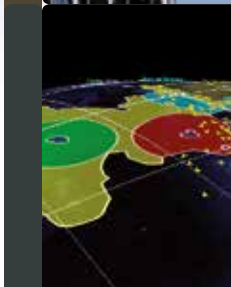
The thematic Final Reports of Work Packages are available on the Project's website **www.coopp.eu** after the end of the Project in the end of March 2014

Table of Contents







Index of Figures

Index of Tables

List of Acronyms & Abbreviations

AIS	Automatic Identification System
AdPOC	Administrative Point of Contact
BLUEMASSMED	Pilot Project for the Integration of Maritime Surveillance on the Mediterranean Area and its Atlantic Approaches
BMM	See BLUEMASSMED
BSMF	Baltic Sea Maritime Functionalities
CISE	Common Information Sharing Environment
CleanSeaNet	Near-real-time satellite-based oil spill and vessel monitoring service
CoopP	Cooperation Project Maritime Surveillance
CSDP	Common Security and Defence Policy
DG MARE	Directorate-General for Maritime Affairs and Fisheries
DIGIT	Directorate-General for Informatics
EEA	European Economic Area
EIF	European Interoperability Framework
EMODnet	European Marine Observation and Data Network
EMSA	European Maritime Safety Agency
ESA	European Space Agency
EU	European Union
EUROPOL	European Police Office
EUROSTAT	Statistical office of the European Union
EUROSUR	European Border Surveillance System
FP7	EU Seventh Framework Programme for research and technological development
FRONTEX	European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union
GDP	Gross Domestic Product
GMES	Global Monitoring for Environment and Security
HLS	High-Level Service
IA	Impact Assessment
IMDatE	Integrated Maritime Data Environment
IMO	International Maritime Organization
INSPIRE	Infrastructure for Spatial Information in the European Community
ISA	Interoperability Solutions for European Public Administrations

JRC	Joint Research Centre
LRIT	Long-Range Identification and Tracking of ships system
MARSUNO	Pilot Project: Maritime Surveillance North
MEP	Message Exchange Patterns
MSEG	Member States Expert Group
MSEsG	Member States Expert sub-Group
NCC	National Contact Centre
OCL	Object Constraint Language
OWL	Web Ontology Language
PMT	Project Management Team (CoopP)
POV	Pre-Operational Validations
RDF	Resource Description Framework
SafeSeaNet	Vessel traffic monitoring and information system
SAR	Search and Rescue
SC	Steering Committee
SEIS	Shared Environmental Information System
SOA	Service Oriented Architecture
SOP	Standard Operational Procedure
TAG	Technical Advisory Group
THETIS	Information system for the Port State Control inspection regime of ships
UML	Unified Modelling Language
UC	Use Case
User Communities	Border control, maritime safety and security, fisheries control, customs, marine environment, general law enforcement and defence
VMS	Vessel Monitoring System
VTM	Vessel Traffic Management
WSDL	Web Services Definition Language
WP	Work Package
WPL	Work Package Leader
XML/XSD	Extensible Markup Language/Schema Definitions

1 Executive Summary

Changing operational environment challenges the maritime sector authorities on a daily basis. Growing maritime traffic and society's increasing expectations are the most prominent factors in this process. Expectations are particularly focused on the ability to safeguard and secure maritime traffic and human lives and to protect the marine environment more economically and efficiently. The results of Cooperation Project demonstrate that following a medium scenario, CISE could bring benefits in cost effectiveness annually worth up to 423 million euros.

Securing European interests is of fundamental importance for our continued wellbeing. The most important way to cost-effectively enhance security and safety at sea is to cooperate at national and, especially, at international level. More efficient use of existing resources is the only way forward. When it comes to sharing relevant information regarding maritime surveillance there is a lot of room for improvement. Vital for the development of the European common maritime information sharing environment is to create European rules of the game, especially on technical standards. Cooperation Project made remarkable progress in this field by defining a data model for CISE services in addition to fifteen services and five messaging patterns based on the nine sectorial use cases for maritime surveillance that were defined in details.

Within maritime surveillance sectors — such as law enforcement, border control, transport, pollution control, fisheries control, customs and national defence — great efforts have already been made to increase the efficiency of surveillance activities with the existing means, including cross-border cooperation. The next logical step would be sharing information extensively between different sectors.
Cooperation project has created a stepping stone for that purpose, enabling further and more practical development to take place. The access right matrix defined in the Cooperation Project will help mapping the obstacles for information change between authorities.

Despite the challenging starting point of the project – with 28 partners, 45 authorities, a 2.7 million euro budget and one year to accomplish its ambitious targets – the project succeeded in delivering, and also exceeding, its expected output both in time and scope. In addition to delivering the expected results, the Project broadened its scope by defining and formalizing a set of fifteen services and five messaging patterns using the appropriate standards and by resourcefully drawing on existing related data models.

The agreement between the Finnish Border Guard and the Commission's DG MARE was signed on 10th of December 2012. Kick-Off Meeting took place on 8th of January 2013. Since then there's been 17 Work Package meetings in Bucharest, Rome, Naples, Helsinki, Malmö, Madrid, Lisbon, Warsaw, Paris and Tromsö. Project Steering Committee gathered six times in Brussels, back to back with other relevant groups composed of Member States' experts on maritime issues. Most of the project budget was spent to reimburse the partners for their labour. Most of this work was

done in Member States, within the institutions and agencies and between the meetings of the work packages.

Cooperation project was geographically decentralized, divided contentually in five work packages, short-term, highly technical and dynamic project, depending fully on the expertise and commitment of Member States, institutions and individual experts. The project was about exploring and exploiting the human capital in Member States and their institutions, EU Institutions and Services.

The participation of the project partners has been commendable. Work Package 2, in particular, attracted great numbers of experts to its meetings. Work Package 5, in contrast, encountered some initial challenges in engaging with experts with the relevant technical background. Fortunately, the WP5 leader managed to narrow this gap by involving external expertise provided by the Joint Research Centre. The preliminary work developed by the TAG and the ISA process and the methodology for developing CORE vocabularies have proven extremely beneficial in implementing WP5. Thanks to the commitment of Work Package leaders, experts of the participating authorities and project management personnel, the results of Cooperation Project are now delivered.

2

Scope and Objectives

The overall objective of the Cooperation Project was to support further cross-border and cross-sector operational cooperation between public authorities (including EU Agencies) in the execution of the defined maritime functionalities, with a focus on information sharing across sea-basins.

The information sharing cooperation was to be envisaged in the context of operational situations (use cases), and identify needs for improved information exchanges and the associated costs and benefits. In concrete terms the project was meant to define a number of information services and their data specifications (i.e. common data formats and common semantics) which may not be dependent upon existing systems.
Overall Objectives were to be accomplished by executing the Specific Objectives, namely defining and agreeing on a selection of use cases with related information services and attached access rights, defining common data formats and semantics, and contributing to the cost-benefit analysis of Integrated Maritime Surveillance.

In addition, CoopP was to contribute to any other cooperation between maritime functionalities deemed necessary across and within all sea-basins and to meet the objectives in terms of financial and administrative management.

M/S CISE Journey

PHASE 1: BALTIC SEA – DETECTION OF POLLUTION

Related Use Cases for the incident: 25b, 37, 44, 57

M/S CISE **clears Kotka Port, Finland one morning in May 2021 with a destination to Constanta, Romania.** ***M/S CISE*** **has got up-to-date information on the capacities of prevention of oil spills and chemical accidents of states surrounding Gulf of Finland in addition to surveillance assets in action and available. The vessel traffic control was working well already back in 2014, but the Common Information Sharing Environment has brought added value to the prevention of accidents and their impacts. CISE has improved remarkably the effectiveness of maritime surveillance and removed overlapping functions. M/S CISE receives automatically the services that VTS has produced in addition to other traffic information from the sea area to its navigation system. The Common Information Sharing Environment brings added value on top of the traffic separating zones and VTS-monitoring, control, and information. Within the CISE environment Common operation centres are more frequent, as well as shared use of experts.**

M/S CISE **notices a Border Guard aircraft detecting oil spills. The information is available for all related authorities following the work done on access rights and helps to a coordinated investigation and prevents further incidents. Frequent use of satellite images through CISE has improved the detection of oil spills and, combined with use of different systems as CleanSeaNet and other information, allowed easier tracking back to the polluters. The number of illegal oil spills is continuously decreasing due to frequent monitoring activities.**

3

Results

As defined in the Call for Proposals, results are direct and immediate effects resulting from the project and from the production of outputs. Compared to the outputs, results represent qualitative as opposed to quantitative values. The proposal of the Finnish Border Guard stated that the indicators for results identified in the Call were well defined and chose not to amend them. The Project has delivered the following results:

- A set of well-defined use cases;
- A complete functional description of information services supporting the selected use cases;
- A list of purposes for information exchange;
- A generic access rights matrix covering the use cases and information services identified;
- A complete description (semantics and format) of data elements used in the different information services identified (data elements independent of existing systems);
- An analysis of the added value of selected use cases (including long-term improvements);
- A contribution to the economic impact analysis of Integrated Maritime Surveillance.

The expected project documents (use cases, set of purposes, information services, data models, access rights matrix, and analysis of added value) are included in the thematic final reports of the Work Packages.

3.1. Use Cases

A set of nine use cases was agreed on in Work Package 2. The use cases were selected from a list of 93 use cases defined by Technical Advisory Group (TAG) to encompass the broad range of user communities and sea basins covered by the project, while at the same time being as functional as possible. The use cases were also designed to be generic in order to cover all sea areas, as the work package identified no grounds for differentiating between sea areas.

The use cases describe the current situation, the outcome of possible failures, and why they occur. To improve the current situation regarding information sharing and to avoid possible failures, each use case suggests areas for CISE improvement. Use cases provide scenarios demonstrating how the information sharing environment is used and how to meet the user's requirements.

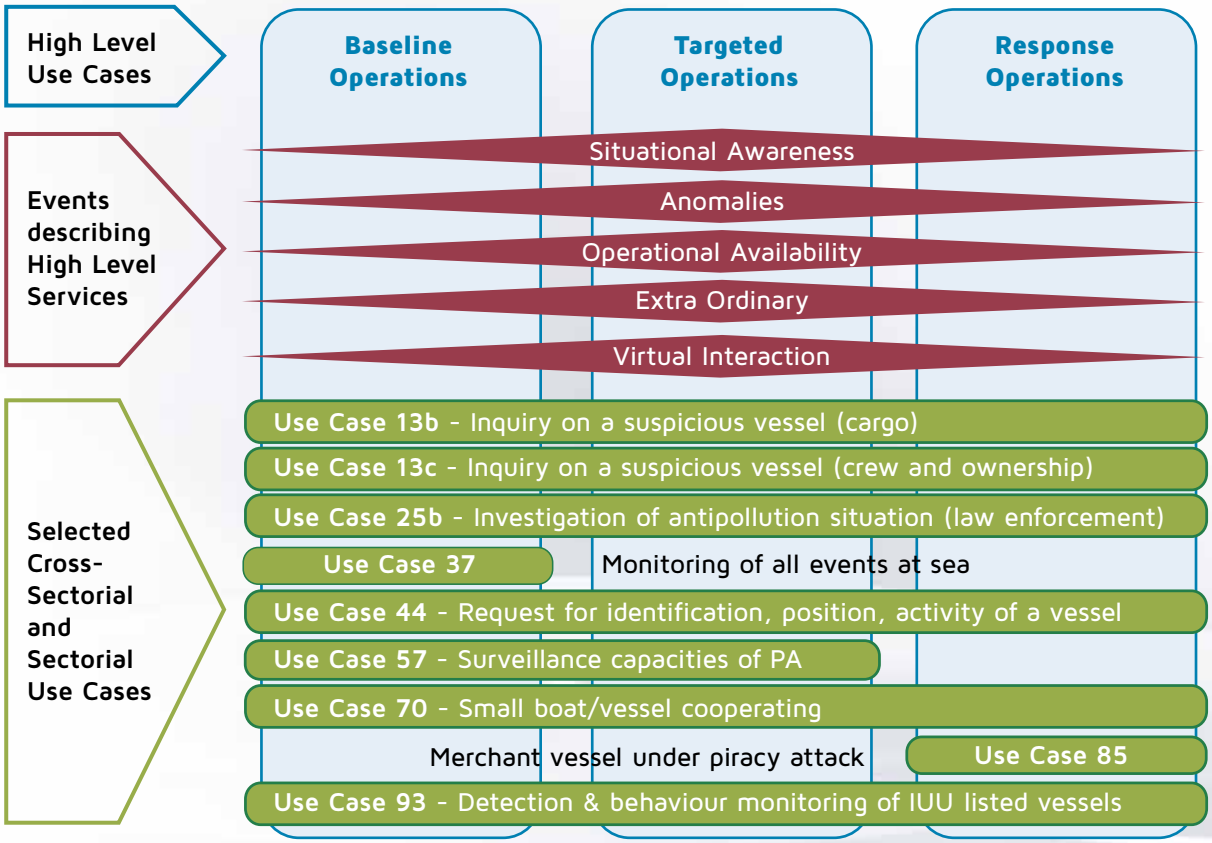
One finding was that it is important to connect information sharing with the operational aspect and make the use cases narrative in order to understand why the use case/scenario is relevant, and that information sharing is done for a reason.

Use cases were tailored for multiple uses as multiple stakeholders, particularly other Project WPs, were expected to implement them. This required coordination between the project management and WP leaders.

Work Package 2 defined three high-level use cases, namely 'Baseline Operations', 'Targeted Operations', and 'Response Operations', under which the nine sectorial use cases would fall. This enabled sectorial information and information sharing needs to be identified and described along with the kinds of overall services that are needed within these three levels of operations, and also facilitated the identification of potential high-level improvements in the information sharing environment. The high-level use cases also helped place sectorial or detailed use cases into perspective and provided a firm basis for the identification of services.

WP 2 selected nine use cases developed by the TAG as a starting point for further work. After comparing these nine use cases against the 'master list' of 93 use cases, the decision was taken that the selected use cases were sufficiently representative of all user communities.

Figure 1: Use Cases



The three high-level use cases and nine sectorial use cases are described in detail in the Work Package 2 final report.

3.2. Information Services Supporting the Use Cases

Work Package 2 also defined the information services supporting the use cases. Information services were elaborated only for eight use cases out of nine. Use case 37 (*Monitoring of all events at sea in order to create conditions for decision making on interventions*) was considered to be a service in itself and therefore no additional analysis was made for it.

The term High-Level Service (HLS) was introduced. A High-Level Service triggers and/or supports the High-Level Use Cases. HLSs describe the overarching services that could be used for each event. Five defined events are the link between a high-level use case and the sectorial use cases. These five events that describe the 'High-Level Services' are:

- Situational Awareness
- Anomalies
- Operational Availability
- Extra Ordinary, and
- Virtual Interaction

The list of services includes three levels of service ('Task Service', 'Entity Service' and 'Support Service') to describe how the use cases operate in an operational macro-model including roles, input, output and other characteristics. The list gives guidance on how to design data formats, data models and other technical design features that would improve the CISE. The same operational macro-model is used regardless of which use case is applied or which user community the actor is part of. In addition, the roles and products are the same and the operational procedure is the same regardless of borders or sectors. This may simplify CISE development in the long run and may also help in integrating existing platforms and systems, such as SSN, EUROSUR, Single Window and MARSUR, into the future CISE.

Each use case is defined in the operational model by a set of activities, and each of these activities is in turn realized by a set of services. These activities and services have been defined, with examples provided where necessary. Each activity of the described use cases is realized by a specific 'Task service' (services that implement a business function), 'Support Service' (services that execute business rules to support business decisions), and 'Entity Services' (services that manage access to business entities and provide information needed to implement the tasks).

An outline of the services development is provided in the tables below.

Table 1: List of Activities Related to Use Case

Activity	Role	Input	Output	Description/ example	New entities
Short name for the activity (should be related to an activity chart)	To choose between: ➥ Intelligence provider ➥ Analyst ➥ Operations decision maker ➥ Operations executor	Main entities necessary for the activity	Main entities resulting from the activity	Textual description of example if necessary	

Table 2: List of Services Related to Use Case

Service type	Name	Input	Output	Pattern	Description
Task Service	Simple Name	Main entities used as parameters for the operation	Main entities provided by the operation	Choice between: ➥ Pull ➥ Pull delayed ➥ Broadcast pull ➥ Broadcast push	Textual description of example if necessary
Support Service					
Entity Service					

The list of services is annexed to the final report of Work Package 2.

3.3. List of Purposes for Information Exchange

A list of purposes was defined, firstly, to outline which data needs to be available to each user community for each use case through the list of services and, secondly, to support the definition of information access rights. The List of Purposes aims to describe which user community needs to share what information why and when. The list, annexed to the WP 2 final report, is not exhaustive and does not describe all possible situations. It does, however, represent the use case scenarios, which are considered to cover a good portion of the maritime information sharing environment.

The List of Purposes is annexed to the WP 2 final report.

M/S CISE Journey

PHASE 2: ENGLISH CHANNEL – MARITIME ACCIDENT

Related Use Cases for the incident: 37, 44, 57

M/S CISE **continues the route through the English Channel. Through the VTS,** ***M/S CISE*** **receives information on collision of two vessels southwest of a Dutch port, North Sea. One of the vessels has started to sink.**

Search and Rescue teams (SAR) from states nearby are in close cooperation operating in the area. Some missing crew members over board are rescued by a rescue helicopter. The vessel that started to sink has been towed to a place of refuge. With CISE-support, available assets will be sent to the place of the accident. Information on the appropriate assets is shared through CISE and subordinated under command of OSC (On-Scene Coordinator). One of the two vessels leaks oil and since the weather conditions are difficult in the area, assets of pollution response are called in to minimize the damage. Drift calculation tools and data are in use, supported by aircrafts for observation.

English Channel, back in 2011, has been ranked as the top 1 area concerning incidents at sea (197 incidents). The area might be difficult to operate in due to poor weather conditions combined with higher risks for groundings and collisions, in addition to other factors[1]. The trend already in 2014 demonstrated that casualties are declining, but with CISE, casualties at sea could decrease by several persons a year.

Better tools for anomaly detection will reveal risks for collisions and alert the operators in time. Information services will be in place to deliver reliable information on the position, movement, and origin of the ship in addition to information on number of crew members and passengers, combined with common correlation services.

(1) ***www.lloydslist.com/casualty***

3.4. Generic Access Rights Matrix

Work Package 4 analysed the results of Work Package 2 on the definition of information services in order to assess the appropriate levels of access to information. For each of the eight use cases, WP 4 produced a generic access rights matrix, evaluated the level of classification of services, and identified deficiencies to be overcome in order to improve exchange of information between authorities.

The eight matrices annexed to the WP 4 final report clearly demonstrate the potential of a functional Common Information Sharing Environment (CISE) within the EU. In addition to existing communication channels, the matrices also identify potential exchange of information streams that are currently not exploited due to lack of organization or technical means. The access rights matrices are generic in the sense that they do not deal with all possible cases. Further analysis would be needed to go beyond the user community level. In addition, the work emphasized the utmost importance of the service definition. The services should be feasible, consistent, and add value to their customers.

Elaboration of the matrices was focused on desired evolution of information exchange even if the present situation does not always meet the expectations for it. Therefore, the matrices clearly identify the potential for a CISE from the access rights point of view. Some use cases indicate a bigger potential for a CISE, especially when the exchanged data is not classified and when there are lots of possible customers.

Experiences from previous maritime surveillance pilot projects, namely MARSUNO, BMM and BSMF, were studied with respect to data protection and access rights. Each of these projects, which used the same categories for data protection, categorized the vast majority of data as 'Basic Data' that can be shared easily, such as tracking information from sensors, observations, position and speed data, length of ship, etc. The other data categories recognized were 'Additional Data' and 'Restricted Data'. Only the latter category concerns sensitive information, while the 'additional' and 'basic' categories comprise non-sensitive open source information. Basic information could be freely exchanged inside the CISE community, whereas additional information could be shared on user demand. In addition, the information services were evaluated in reference to the EU classification levels (EU restricted, confidential, secret, top secret). When these two classification scales were compared, it was noticed that the 'EU Restricted' level does not correspond exactly to the 'Restricted Data' category. The 'Restricted Data' category has a broader scope, including several levels of EU classification, and also includes commercially sensitive information not deemed to be relevant to EU interests.

The protection of personal data is one of the biggest constraints in data management. Personal data cannot be processed for purposes other than those for which they were collected. Personal data must firstly be identified and, secondly, its purpose must be determined and legitimate before an actor can have access to it. The number of personal data that is processed in CISE should be minimized. However, CISE should also enable exchange of classified and personal data on demand if necessary.

The outputs of the eight use cases under analysis do not include personal data in any obvious manner. However, the output of one use case (UC 13c) does include information classed as personal data, in four other use cases (13b, 25, 44 & 93) the outputs could include personal data, while in the three remaining use cases, the outputs do not contain personal data under normal circumstances. However, in none of the use cases does the protection of personal data present an obstacle to sending the information to the legitimated customer.

The full access rights matrices are annexed to the Work Package 4 final report.

3.5. Overview of Data Model and Services

The Cooperation Project was expected to provide a comprehensive definition (semantics and format) of the data elements to be used in the different information services needed to support the development of an initial operational capability for the cross-border and cross-sectorial automatic exchange of maritime surveillance information in

the context of the Common Information Sharing Environment. This task was assigned to Work Package 5. However, WP5 did not only specify the common data formats and semantics as required. It also defined and formalized a set of fifteen services and five messaging patterns using the appropriate standards and by resourcefully drawing on existing related data models.

Data models and services are the building blocks of the technical interoperability framework that is necessary to support the information exchange activities required by the defined use cases and related services. The WP5 Final Report includes a thorough description of the methodology used in defining the information service data elements.

Both the data model and the services have been validated and verified, first by experts within WP5 and subsequently by two independent external experts, encompassing business and technical perspectives. The conclusions of the external experts and their recommendations are annexed to the Final Report of WP5. The data entities are fully used by the use cases defined by WP2, and the services fully enable the use cases defined by WP2 and further enhanced by WP5.

3.5.1. Data Model

The data model consists of 18 data entities, 7 main and 11 complimentary, with 271 data attributes. The data entities are defined in natural language and also specified in Unified Modelling Language (UML), Web Ontology Language (OWL), and Extensible Mark-up Language Schema Definitions (XSD). The data model developed is simple, sufficient and flexible. It comprises several special features to accommodate crosscutting concerns such as auditing, security and data reliability and validity. The model represents over 50% of the information needs identified by the Technical Advisory Group (TAG) for the development of the CISE, and over 64% of its definitions are based on existing definitions from 34 related standards, systems and initiatives.

The developed data model address following general requirements. The model is:

- Useful – the model structure and data definitions enable the use cases also defined in the scope of the Cooperation Project;
- Understandable – easily understood by those involved in future system integration activities;
- Usable – the effort it imposes to the systems' integration is acceptable;
- Extensible – future evolution of the use cases and services can be easily followed.

The data model has been defined using classes, attributes, associations and enumerations, with broad definitions and examples. The model comprises the following seven data entities essential to maritime surveillance information sharing:

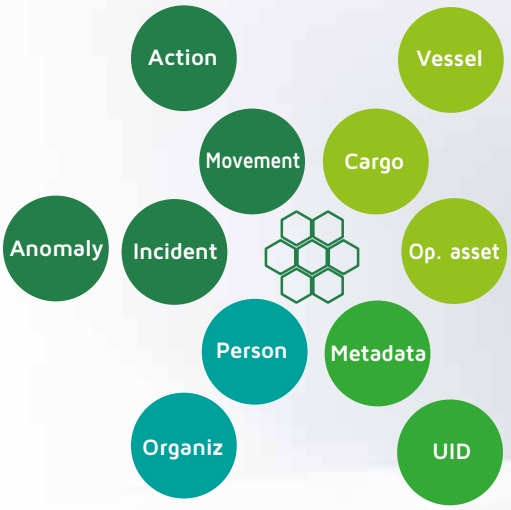
- Agent
- Object
- Risk
- Period
- Location
- Event
- Document

Figure 2: Data model essential data entities

To complement these, eleven other data entities were defined to increase the overall expressiveness of the data model and to support special features to accommodate crosscutting concerns such as auditing, security, data reliability, and validity:

- Action
- Movement
- Anomaly
- Incident
- Vessel
- Cargo
- Operational Asset
- Person
- Organization
- Metadata
- Unique identifier

Figure 3: Data model complimentary data entities



The data entities of the model are presented as a series of core vocabulary specification documents, as shown in Annex IV of the Work Package 5 Final Report. Each of these documents describes a part of the data model, using examples and with a focus on one of the data entities defined. Additionally, each core vocabulary specification has its corresponding formalization in XSD, in RDF (Turtle) and in OWL.

3.5.2. Services

WP5 defined fifteen services in natural language in addition to five messaging patterns, which, combined with each other, form a framework to enable the use cases defined in WP2 and later enhanced in WP5. The development of service catalogues focused on the entity services, which by themselves would bring considerable added value to the results of the project and would enable an initial operational information sharing capability to be developed. The services catalogue is a list of services that should be developed in order to support the information exchange activities required by the use cases and services developed by WP2 and further enhanced by WP5. In addition, a service model was developed to define how the services and the patterns would be used altogether. This framework is defined in UML and formalized in XSD. Finally, the messaging patterns and some of the services were formalized in WSDL.

The five messaging patterns developed in the Cooperation Project and explained below describe the different ways in which the different services can interact to enable the exchange of desired information between the computer systems involved. Their usage depends on being technically implemented by the specific service, and also on the given operational context. The messaging patterns, described in detail in the WP5 Final Report, are:

- Pull
- Pull delayed
- Broadcast pull
- Push
- Broadcast push

The services catalogue defines a list of business services that are necessary to support the activities defined in the use cases. To ensure the consistency, reusability and extensibility of the CISE technologies, it was beneficial to define a model for these services that is independent of activity- and use case-specific content and function. This allows parties to easily develop new business services that are automatically compatible and interoperable with existing ones and can be easily integrated into the CISE network.

The service model is independent of the specific activities of the use cases and is only loosely coupled to the data model developed in WP5. The service model is based on the notions of communication patterns and data templates, promoting reuse and extensibility.

The five messaging patterns can be viewed on three different levels or "layers":

- Business – the conceptual transaction between businesses
- Messaging – the layer in which the transaction is realised through a sequence of specific messages
- Transport[2] – the layer which defines how individual messages are transmitted on a technical level

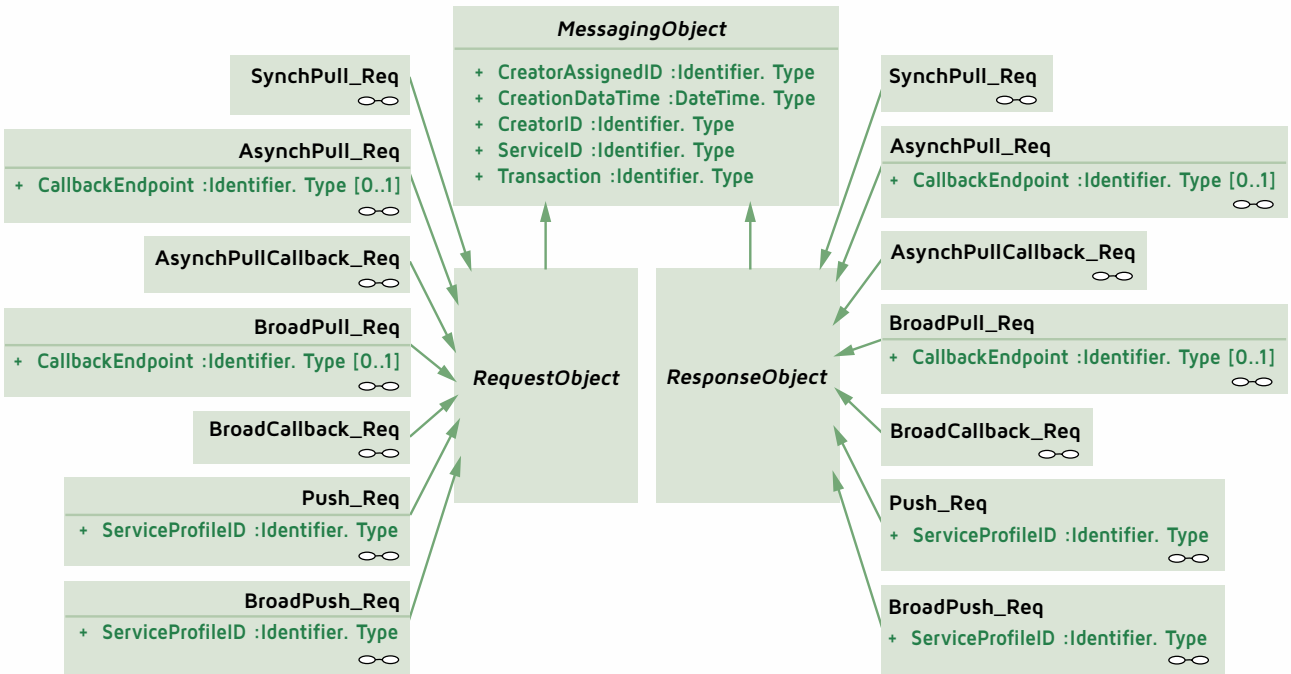
The transport layer defines five "fundamental" low-level operations for transferring messages between systems:

- *RequestObjectFromService*
- *RequestNotificationFromService*
- *CallbackNotification*
- *PushCISEMessage*
- *BroadcastCISEMessage*

Each operation takes an input and returns an output. The inputs and outputs of an operation are called messaging objects. Different messaging objects are passed back and forth in order to conduct the desired information transaction. The same transaction with different messaging objects will have a different outcome. Across all the patterns, there are seven pairs of messaging objects in total, each pair consisting of:

- A RequestObject (sent as part of the service operation invocation)
- A ResponseObject (received synchronously in response to a service operation invocation)

Figure 4: Messaging Objects



(2) *The transport layer defines how the messages are transmitted, while the messaging layer defines which service takes place*

The Services Catalogue defines a number of business services for maritime surveillance information exchange. Each service comprises an Input and an Output, which contain information in the form of Core Entities as specified by the CISE core vocabulary data models.

Each service can follow one or more messaging patterns. Each pattern is defined by a specific sequence of Operations and corresponding Request and Response Objects. Both types of Messaging Object – Request and Response – may contain information in the form of Core Entities, thus conducting the process of information exchange.

In conclusion, the Cooperation Project has developed the fundamental preliminary building blocks for technical and semantic interoperability within the CISE, the common data model and the services. The next steps towards the CISE should encompass the specification of technical reference architecture, aligned with the architectural visions and principles of the CISE, as well as the definition of an appropriate governance structure. Both of these steps should be built following an iterative and incremental approach, so that risk is minimized and the necessary experimentation is conducted before bringing this capability into production.

The data model and services are described extensively in the Final Report of Work Package 5 and its annexes.

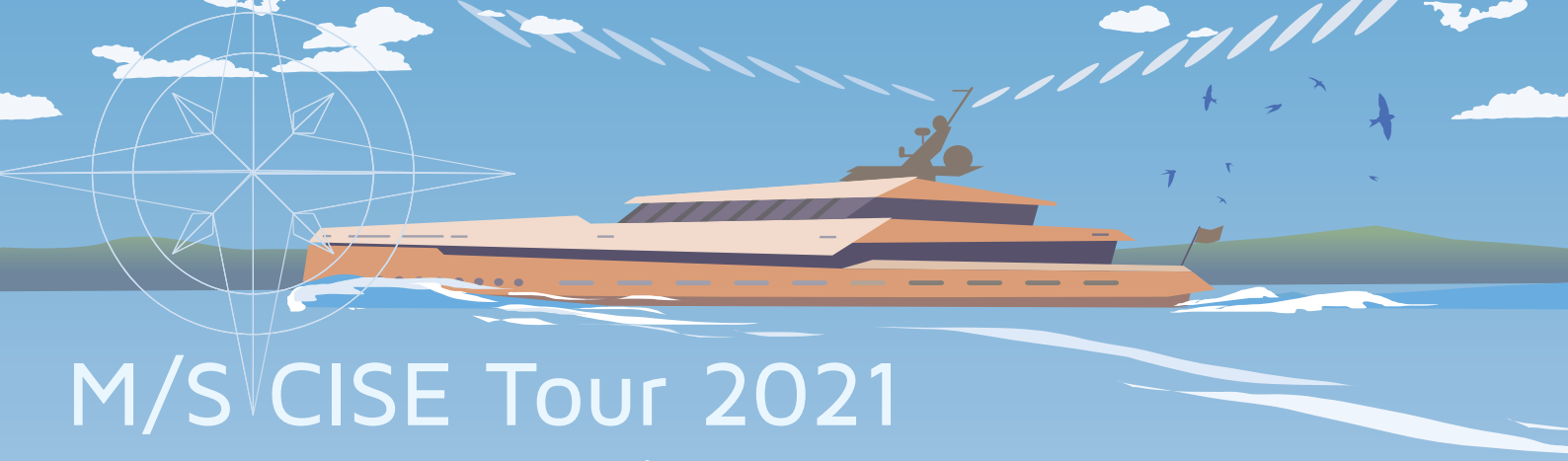
M/S CISE Journey

PHASE 3: ATLANTIC OCEAN – SMUGGLING OF DRUGS

Related Use Cases for the incident: 13b, 37, 44, 57, 70

A couple of days later, at night *M/S CISE* notice a customs vessel inspecting a dry bulk carrier. The vessel has been targeted by maritime surveillance systems upon request of an operation centre that has received intelligence information regarding the vessel. A surveillance aircraft has confirmed the information on indications and alarm for an anomaly in the vessel movements outside the coast of West-Africa. The bulk carrier has turned off the AIS transmitter (Automatic Identification System), with which the vessel is obliged to transmit its location. This has led to a decision from customs, which through CISE has been notified of possible illegal activities, to perform a ship inspection at high seas. Additional suspicions have grown due to a shared intelligence report which indicated an upcoming rendezvous with an unknown vessel and bulk carrier. The intervention of customs authority turned out successfully and resulted in a major seizure of drugs.

CISE would provide opportunities by improved information sharing, anomaly detection and knowledge of available assets for interception. CISE could lead to increased interceptions of illegal goods. In addition, social benefits should also be considered with seizure of drugs. Social economic benefits will result in lower health and crime costs.



M/S CISE Tour 2021

This fictitious story of the journey of M/S CISE taking place in spring 2021 illustrates the estimated cost benefits that the Common Information Sharing Environment brings to maritime surveillance. The story recapitulates the use cases and related information exchanged through various services. Based on the improvements that CISE will contribute to maritime surveillance through information exchange between Member States, the total estimated cost benefits of CISE are up to 423 million euros. The cross-sectorial benefits of cost effectiveness for maritime surveillance could rise up to 121 – 182 million euros.

Phase 3: Atlantic Ocean

Incident: Smuggling of drugs

Information exchanged:

- vessels, operational assets and inherent capabilities availability and actions
- anomalies (i.e. unexpected/suspect vessel movements)
- risks (i.e. illegal activities)

Expected annual cost benefits with CISE:

40–61 million euros

Phase 2: English Channel

Incident: Maritime accident

Information exchanged:

- incidents (i.e collisions, pollution) and risks
- vessels and crew members
- operational assets and inherent capabilities availability and actions
- locations of interest (i.e. places of refuge)
- inherent METOC

Expected annual cost benefits with CISE:

28–42 million euros

Phase 4: Mediterranean Sea

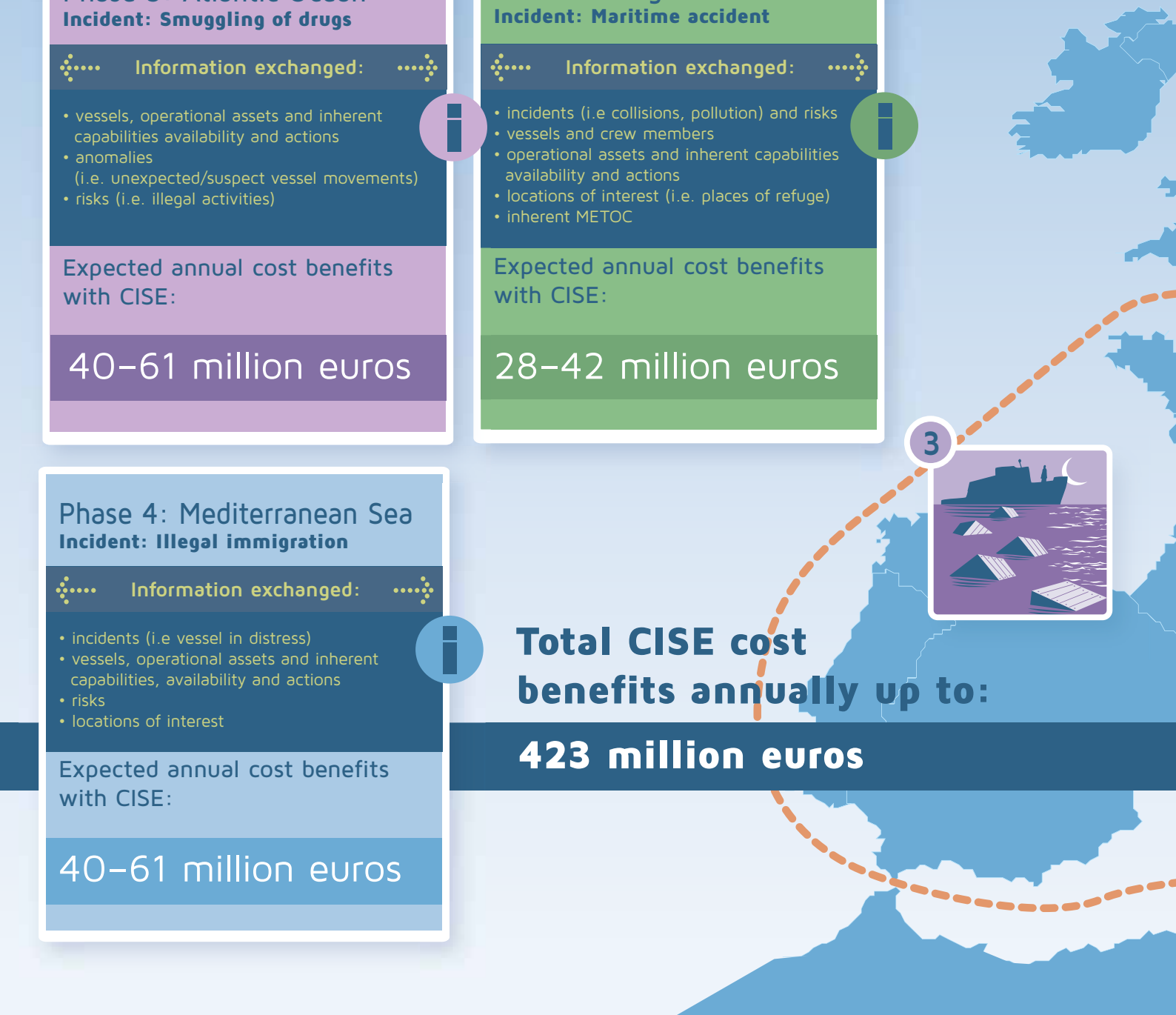
Incident: Illegal immigration

Information exchanged:

- incidents (i.e vessel in distress)
- vessels, operational assets and inherent capabilities, availability and actions
- risks
- locations of interest

Expected annual cost benefits with CISE:

40–61 million euros



Total CISE cost benefits annually up to:

423 million euros

Phase 1: Baltic Sea

Incident: Detection of Pollution

Information exchanged:

- operational assets and inherent capabilities availability and actions
- risks and incidents (i.e. pollution)
- locations of interest and inherent METOC (Meteorology and Oceonography)

Expected annual cost benefits with CISE:

41–63 million euros

M/S CISE clears Kotka Port, Finland, in spring 2021 with a destination to Constanta, Romania

1

2

Phase 5: Black Sea

Incident: Illegal fishing

Information exchanged:

- vessels and inherent documents
- cargo and persons
- risks

Expected annual cost benefits with CISE:

55–82 million euros

5

4

3.6. Analysis of Added Value of Selected Use Cases

An analysis of the added value of the use cases was conducted in Work Package 3. As the analysis is closely related to another objective of the project, namely contributing to the economic impact analysis of maritime surveillance, WP3 worked in contact with consultancy company COWI, which carried out the IA. The Cooperation Project did not develop an econometric analysis of its own, but instead integrated estimates from analyses drawn up by various reliable sources. The estimates were verified by the results of field surveys covering more than 30 indicators related to the phenomena of interest for maritime surveillance and carried out through the network of experts participating in the project.

As a starting point, WP3 estimated the total annual operating cost of maritime surveillance in Europe to exceed EUR 3.5 billion and the cost of investment to be around EUR 1.5 billion per year.

The estimates of the potential economic benefits resulting from the implementation of the CISE developed by the Cooperation Project are highly conservative and based on data drawn from international statistical sources and from sectorial studies promoted or cited by these sources.

The results show that, depending on the selected scenario, the benefit associated with the information services analysed by the Cooperation Project is estimated between EUR 176 million and 423 million per year. The Cooperation Project experts based their assessment of the potential benefits arising from the CISE on three alternative scenarios: a minimum scenario, a conservative scenario and a medium scenario. The benefits are evaluated in terms of cost-effectiveness with respect to compared to the annual operating costs of maritime surveillance in Europe. However, the expected benefits are kept to very conservative levels, ranging between 5% and 12% of costs.

Table 3: Cost-effectiveness Benefit Scenarios

		Costs/Effectiveness Benefits Scenarios		
		1	2	3
		minimum scenario	conservative scenario	medium scenario
CISE potential annual added value in % of present operational costs		5%	8%	12%
Value per year in million €		176	282	423

Several conservative assumptions were made in the evaluation of cost-effectiveness benefits, and the three scenarios regarding the potential benefits and their quantification are easily sustainable. The scenarios are also consistent with the figures derived from the use case analyses.

Furthermore, the total cost of the CISE is estimated at between EUR 77.9 and EUR 126.1 million, aggregated over a 10-year period. The above cost estimates are to be regarded as the Total Cost of Ownership (TCO). As such, they combine both one-off capital investment expenditure (CapEx) as well as annual operating expenditure (OpEx)

over a 10-year period[3]. The estimates include investment, operating, and non-IT costs, and represent a value of approximately EUR 13 million each year at the European and Member State level.

Compared to an estimated annual cost of approximately EUR 13 million, the estimated annual economic impact of the CISE investment can be measured at a value of between EUR 303 million and EUR 444 million.

These values are derived from the sum of the value of approximately EUR 21 million arising from the direct impact of the investment on the Added Value of the sector, and a variable value of between EUR 282 million (conservative scenario) and EUR 423 million (medium scenario) associated with the indirect economic, social and environmental benefits deriving from implementing the information services related to the examined use cases.

To attain the estimation of benefits on cost-effectiveness, the Cooperation Project partners estimated the percentage incidence rate that the activities related to each use case would represent on the overall maritime surveillance activities. The total economic value associated with implementation of the CISE was then allocated among the different use cases according to the dimension of their relative weight on the overall activities. The cost-effectiveness benefits associated with the implementation of each use case for the three considered benefit scenarios are shown below.

Table 4: Use Cases Related Cost/effectivess Scenarios

List and Weight of Use Cases for baseline maritime environnment		Global weight on yearly operations	Cost/ Effectiveness Benefits Scenarios		
Use Case ID 130	Inquiry on a specific suspicious vessel (cargo related)	12%	21	34	51
Use Case ID 130	Inquiry on a specific suspicious vessel (crew and ownership related)	12%	21	34	51
Use Case ID 250	Investigation of antipollution situation (law enforcement)	5%	9	14	21
Use Case ID 37	Monitoring of all events at sea in order to create conditions for decision making on interventions	20%	35	56	85
Use Case ID 44	Request for any information confirming the identification, position and activity of a vessel of interest	15%	26	42	63
Use Case ID 57	Knowledge of surveillance capacities of partner authorithies in a given sea area to plan basic tactival surveillance (Baseline ans Targeted operations	8%	14	23	34
Use Case ID 70	Suspect Fishing vessel/small boats is coopering with other type of vessels (m/v, Container vessel etc.)	18%	32	51	76
Use Case ID 85	Anti-piracy Maritime Surveillance and free navigation control: Merchant vessels at sea (outside Territorial waters) sends an alert that is it under Piracy attack	5%	9	14	21
Use Case ID 93	Detection and behaviour monitoring of IUU listed vessels	5%	9	14	21

(3) *Gartner (2013), Sustainability and efficiency of visions for CISE*

Quantification of the long-term improvement in maritime surveillance was done with reference to the major analysed sectorial threats associated with the CoopP use cases in order to estimate the possible benefits of the information services associated with the use cases. The analysed threats are: Illegal, Unreported and Unregulated (IUU) Fishing; Oil Spill and Illegal Discharges; Counterfeit Goods; Drug Trafficking; Maritime Accidents; Irregular Migration; and Piracy. The correspondence between the use cases and sectorial threats is demonstrated in the table below. In addition, the Project estimated the probability of the main risks associated with the analysed use cases for each of the European sea basins.

Table 5: Use Cases and related sectorial Threats

Name	Use Case	IUU Fishing	Illegal Oil Spill and Discharges	Counter feit Goods	Maritime accidents	Drug Trafficking	Irregular Migration	Piracy
13b	Inquiry on a specific suspicious vessel (cargo related)	✓	✓	✓	✓	✓	✓	
13c	Inquiry on a specific suspicious vessel (crew and ownership related)	✓	✓	✓	✓	✓	✓	✓
25b	Investigation of antipollution situation (law enforcement)		✓					
37	Monitoring of all events at sea in order to create conditions for decision making on interventions	✓	✓	✓	✓	✓	✓	✓
44	Request for any information confirming the identification, position and activity of a vessel of interest	✓	✓	✓	✓	✓	✓	✓
57	Knowledge of surveillance capacities of partner authorithies in a given sea area to plan basic tactival surveillance (Baseline ans Targeted operations	✓	✓	✓	✓	✓	✓	✓
70	Suspect Fishing vessel/small boats is coopering with other type of vessels (m/v, Container vessel etc.)	✓		✓		✓	✓	
83	Anti-piracy Maritime Surveillance and free navigation control: Merchant vessels at sea (outside Territorial waters) sends an alert that is it under Piracy attack							✓
93	Detection and behaviour monitoring of IUU listed vessels	✓						

After this, it was possible to estimate the economic benefits of the use cases with respect to the considered threats based on the conservative and medium scenarios.

Table 6: Estimated Economic benefit in cost/effectiveness per Sectorial Threat

	IUU Fishing	Illegal Oil Spill and Dis-charges	Counter feit Goods	Maritime accidents	Drug Traf-ficking	Irregular Migration	Piracy	Total, million €
Medium Scenario: Cost/Effectiveness expected Benefits, million €	82	63	61	42	61	61	54	423
Conservative Scenario: Cost/Effectiveness expected Benefits, million €	55	41	40	28	40	40	36	282

The cost-effectiveness analysis results are presented in full in the WP3 Final Report and its annexes.

3.7. Delivered Contribution to the Economic Impact Analysis of Integrated maritime Surveillance

Analysis of Integrated Maritime Surveillance
To support the Economic Impact Analysis of Integrated Maritime Surveillance study conducted by COWI consultants, the Project provided a Macroeconomic Framework for Maritime Surveillance. In addition, COWI carried out an expert survey among all Cooperation Project participants to gather information to help assess the extent to which the events described in the use cases relate to specific maritime risks, and to identify how these events and risks are distributed across the different sea basins.

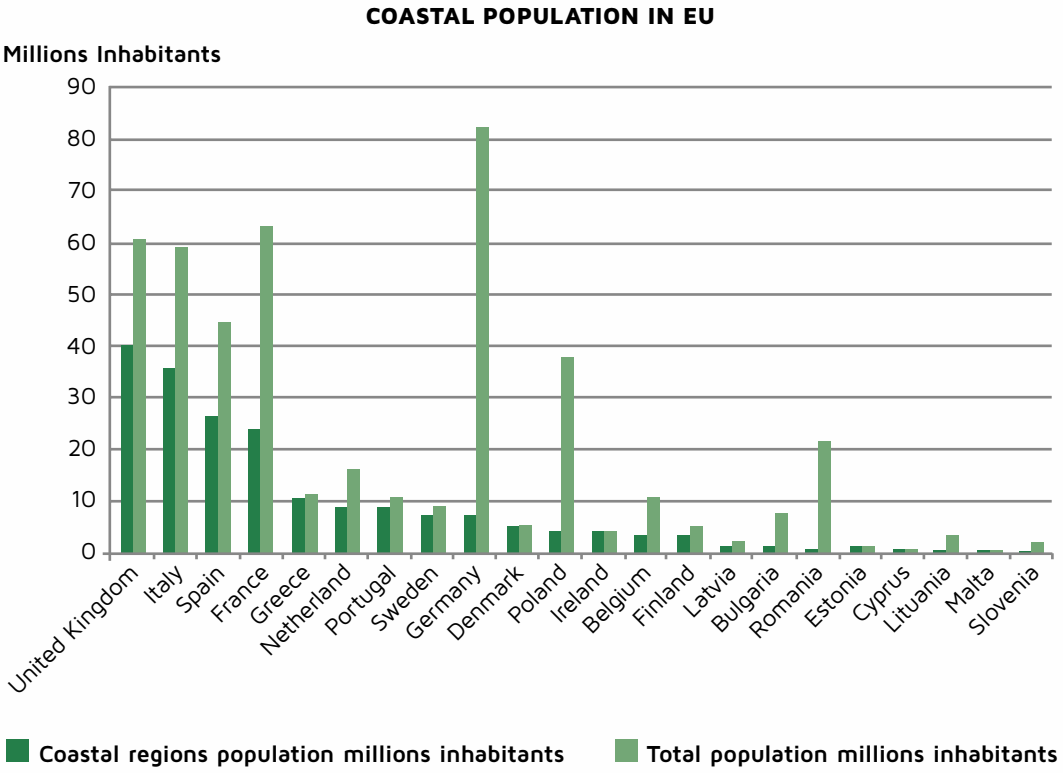
The CoopP participants assessed the frequency of the use cases per sea basin. The assessments revealed that the analyses of general Use Cases 37, 44 and 55 are central to the analysis of the potential added value of the CISE. Furthermore, the assessments confirmed that events in the Mediterranean Sea, the Arctic Ocean, the Baltic Sea and the North Sea should also be analysed in the search for benefits. The assessments provided by the Cooperation Project were based on specific sea basins in order to focus the analysis and increase the overall validity.

The developed Macroeconomic Framework for Maritime Surveillance demonstrates that the blue economy represents in Europe 5.4 million jobs and a gross value added (VA) of just under EUR 500 billion per year. In 2010, the blue economy accounted for approximately 4.55% of total VA in Europe and 9.50% of the VA of European coastal regions.

The European coastal regions generate above average VA for the European economy; in 2010, VA per capita for the EU-27 was EUR 22,601, while the VA per capita of European coastal regions was EUR 26,798. The VA of European coastal regions accounted for 46.54% of total VA in Europe in 2010.

Europe's coastal regions have a considerable economic impact. In 2010, the population of European coastal regions – about 196.4 million people – accounted for 39.25% of the total population of Europe.

Figure 5: Coastal vs. total population per Coastal EU Member State



Source: Eurostat database

As regards the operating cost of maritime surveillance, the resulting figure for European operational surveillance costs, at approximately 3.5 billion euros, seems adequate, though still underestimated (the most probable value is between EUR 4 and 5 billion).

Concerning the proposed figures for investments costs, it seems that the value is unbalanced with respect to operating costs. The proposed investment figure represents 38.5% of total maritime surveillance costs and two thirds of operating costs; this percentage is too high, even if the absolute value may be reasonable.

It should be noted, however, that the Project encountered difficulties in estimating the operating costs of maritime surveillance. It was estimated that the calculated average figure based on the collected data cannot be considered representative of the actual value, but is much lower, as the survey was conducted under time constraints, the respondents were a limited number of experts, and their interpretations of the survey questions requirements sometimes differed. Consequently, before using the collected figures to complete the cost-benefit analysis, verification of the data provided was crucial in order to obtain the minimum significant values required for the analysis.

It was, therefore, suggested to COWI to base the estimates not only on the figures collected through the WP3 surveys, but also on relative values based on real data, such as the GDP for coastal regions. As regards the incidence value used, 0.067% of the GDP of coastal regions for maritime surveillance activities was considered a good estimate. This corresponds to about EUR 4.2 billion in maritime surveillance operational costs.

4

Delivered Outputs and Committed Actions

The Call for Proposals for the Cooperation Project defines the output indicators for measuring the achievement of the Project objectives. Outputs are defined as tangible results, milestones and specific tasks achieved in order to complete the project. They result directly from, and provide information, on the main activities carried out during the project. The tasks and expected outputs of the Cooperation Project were defined in the Call for Proposals and the Finnish Border Guard's proposal for the Cooperation Project and distributed between the five Work Packages.

All of the tasks assigned to WP1 were delivered. The Project Management Team successfully executed the daily management of the project and the financial and budgetary issues under its responsibility. In addition, it met the continuous reporting requirements laid down in the Grant Agreement, managed the project communication and monitored the risks and project timetable. The Project encountered some challenges with the monthly budget follow-up due to delays in reporting among the project partners, but these were managed through close cooperation with the Administrative Points of Contact (AdPOCs) in question.

Outputs relating to project management and dissemination under the responsibility of WP1 were achieved as expected. The Steering Committee convened six times: February 28th, April 26th, July 5th, September 25th, November 22nd and February 13th 2014. The WP1 Project Management Team held nine meetings, the majority via video link.

Work Package 2 held four WP meetings with 27–42 participants. In addition, WP2 held one coordination meeting with six participants including WP leaders and representatives of the JRC. The coordination meeting was organized to ensure that the use cases and information service descriptions served the needs of the other work packages, and to ensure that these work packages had the possibility to exploit the results of WP2. The other WPs had the opportunity to start work reasonably early with the help of preliminary results from WP2.

WP2 reached completion by the end of June and delivered its final report at the beginning of August. All expected results, according to the objectives stated in the Call for Proposals, were achieved. Use cases were defined and agreed upon within WP2 and by the Steering Committee, information services were identified and described, and a list of purposes was elaborated. The Steering Committee took the further decision that minor changes to the use case descriptions defined in WP2 could be made if necessary in order to promote the work of the other WPs, in particular WPs 4 and 5. All amendments made to the use cases have been approved and coordinated by the Project Management in close cooperation with the WP2 leader and other WP leaders.

Work Package 3 held four meetings with 12 to 22 participants. From May to August 2013, WP3 produced the following outputs:

- 20 dossiers were processed for analysis of the different use cases by several representatives of CoopP partners from different User Communities in different basins; the UCs were classified according to the different phases of the maritime surveillance process and with reference to the principal risks;
- A methodology for collecting the macroeconomic data gathered by the DG MARE through the MSEsG channel was developed;
- A survey of CoopP partners was conducted to determine the frequency and priority of the phenomena of interest related to the UCs in the European sea basins;
- Current and future priorities regarding the major risks in the European sea basins were defined;
- More than 30 indicators relating to the activities and risks associated with maritime surveillance systems were identified; for each indicator the frequency, cost, forecasting trends and expected impact resulting from the implementation of the CISE were determined, and;
- An intensive analysis of the major statistical and economic data sources, both European and international (EUROSTAT, FRONTEX, EEA, FAO, IMO), was conducted to obtain the data required to complete the analysis of the expected benefits of the use cases and information services.

In the following period from September to December 2013, WP3 completed the analysis of seven sectorial scenarios and the estimation of the long-term benefits resulting from implementation of the information services related to the analysed use cases.

Work Package 4 on access rights held four meetings with around 20 to 30 participants. The work package involved the participation of some thirty experts (end use, legal, and information technology aspects) as well as 23 public authorities of 10 Member States and two European agencies. All sea basins were represented. All eight use cases and related information services were evaluated by means of an access rights matrix. The classification levels were assessed in comparison with EU classification levels and

some deficiencies were identified. Of all data sets described in the TAG data matrix, only a limited number of data is EU classified.

Work Package 5 held five meetings hosted by different public authorities and agencies in different Member States, with 21 to 34 participants. In addition, a presentation on the work package methodology and preliminary results was conducted at the SEMIC13 international conference.

WP5 defined one data model encompassing 18 core data entities which fulfil 100% of the data required by the use cases defined by WP2 and enhanced by WP5, and also 100% of the data required by the services defined by WP5. In addition, WP5 defined 15 different services in natural language, to provide initial technological support for the information exchange required by the use cases developed by WP2. Five different messaging patterns were defined based on the use cases developed in WP2, so that the information services developed could support the 'need to know' and the 'responsibility to share' paradigms and the information exchange requirements of the use cases developed in WP2.

To accomplish the results, several tools were used in WP5. They include among others: Confluence (wiki); Adobe Connect (web conferencing); and SVN (source versioning). The work of the WP5 was split in two sub-groups of 15-20 members. The wiki has been used to coordinate the work and to create in a collaborative way the data model and the standard agreements describing the structure of each object in the data model. All the reference documents (existing data models and standards) were also shared this way. More than 130 wiki pages were created. Adobe Connect has been used to coordinate the work within each sub-group (approximately 16 meetings of one to two hours, with two to eight participants). SVN was used to manage the versioning of the data model, the XSD, OWL and WSDL files.

M/S CISE Journey

PHASE 4: MEDITERRANEAN SEA – ILLEGAL IMMIGRATION

Related Use Cases for the incident: 37, 44, 57, 70

In the end of May M/S CISE carries on her journey towards Constanta, now passing through the Mediterranean, when she notices actions against illegal immigration taking place nearby. A small vessel not seaworthy with over 500 immigrants onboard, suspects of illegal immigration, is heading the European coast.

The vessel was originally spotted by a military satellite and identified by a surveillance aircraft on a patrol flight operating in a FRONTEX Joint Operation. All 500 immigrants are secured due to the early warning through CISE and quick interception by the coast guard.

Project Management

5.1. Working Methodology

The Cooperation Project was divided into five work packages under the overall management of the Lead Partner, represented by the Project Manager with the assistance of the Deputy Project Manager. The five work packages and their areas of responsibility were:

- Work Package 1: Project management
- Work Package 2: Use cases and information services identification
- Work Package 3 : Cost-benefit analysis
- Work Package 4: Definition of access rights
- Work Package 5: Specification of common data formats and semantics

The work packages were set up under the management of appointed WP leaders, including appropriate Project Partner experts and external experts, as well as EU agencies, which acted as Associated Partners. The work packages were expected to:

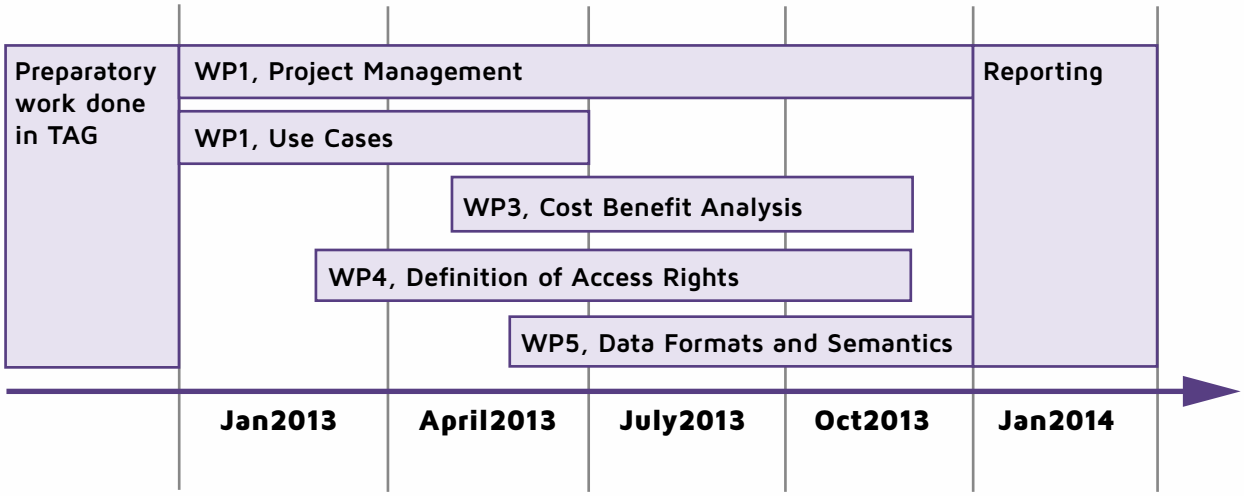
- Fulfil the tasks designated for the WP;
- Coordinate their work with the other work packages;
- Organize working meetings for WP;
- Ensure that issues relevant to different sea areas and user communities are taken into practical consideration, and;
- Report to the Lead Partner.

Day-to-day project management was conducted by the Finnish Project Manager assisted by a Deputy Project Manager and the Work Package 1 which acted as Project Management Team. The Steering Committee was responsible for overall guidance of the project. The Committee approved plans, monitored project progress, supervised reporting and took decisions. In addition to managing the administrative and financial issues of the Cooperation Project, the Project Management Team took the required actions to enable the Lead Partner to ensure sound management of the Project. WP1 (Project Management) was coordinated by The Finnish Border Guard.

5.2. Time Management

The Lead Partner proposed an initial timetable for the project at the kick-off meeting in January 2013. The timetable was planned to allow WP2 sufficient time to work on the use cases and information services before handing the results to the other WPs, which were scheduled to start at a later date. However, all of the WPs commenced work ahead of the initial schedule. This gave WPs 3-5 more operating time, but also placed additional pressure on WP2 to produce results for the other WPs. In response, the project management took action to allow WP2 more space to develop its outputs, enabling WP2 to provide the other WPs with partial results with which to start their work.

Figure 6: Project Timeline



The early go-ahead given to the other WPs nevertheless proved, by the end of the project, to be beneficial. WP5 started working on the data models with the inputs available, namely from the TAG, while awaiting the results from WP2 and merging them along the way. If the original schedule had been followed, it would have been difficult, if not impossible, to deliver the required WP5 outputs within such a short time frame. Adjustment of the timetables allowed the development of synergies and cohesion among the work packages, especially between WP2 and WP5, which proved to be mutually fruitful.

In addition, the Impact Assessment Study (IA) carried out by independent consultant COWI put pressure on WP3 to press ahead with the cost-benefit analysis with only partial input from WP2. While one task of the Cooperation Project, and especially WP3, was to support the IA, differing timetables placed considerable strain on WP3, which was scheduled to deliver its results by the end of December 2013. However, COWI was in need of information already in summer 2013. Reciprocally, COWI provided its expertise to WP3 and helped to elaborate the working methodology for the work package.

5.3. Quality Management

Although the Call for Proposals did not include any indicators for quality management, it has nevertheless been an integral part of the project management approach and the Project Management has monitored the quality of the project activities and deliverables in a number of ways.

Reporting from the project to the stakeholders has been extensive and continuous. Progress Reports have been delivered to the TAG secretariat JRC every two weeks. Based on the feedback received at Steering Committee meetings, the reports to TAG have been extensive and worthwhile for the recipients. In addition, the project delivered a Progress Report and an Interim Report to the DG Mare at the end of May and September 2013, respectively, which were both approved. The fortnightly TAG reports have been continued up until the end of action period of the Project.

Regarding the actions taken in the Work Packages, and taking into account the chosen management model in which tasks were divided temporally and geographically throughout the year and Europe, the Project Management sought to achieve coherence and quality by encouraging interaction between the WP leaders. This was done by circulating project documents among the

WPs, reviewing project documents in the Steering Committee, organizing coordination meetings, and hiring an external expert to help ensure that the delivered results from WP2 are exploited in the other WPs. Experience gained from previous projects (MARSUNO, BMM, and BSMF) was also exploited, especially in WP4. The Project Management provided the WPs with online tools (IT platform) to circulate project documents among the WP participants and between the WPs.

As regards administrative issues, the quality of project and financial management was enhanced by exhaustive process descriptions and guidance, requesting partners to nominate an Administrative Point of Contact, organizing seminars for the AdPOCs, providing an IT platform for financial reporting, and organizing several Project Management Team meetings to monitor progress. The project costs were controlled on four levels; the first-level control was conducted by the AdPOC, the second by FEI, the third by the partner's own independent controller, and, lastly, by the Lead Partner's controller.

5.4. Financial Management

The Cooperation Project budget was prepared as part of the Finnish Border Guard's proposal to the Commission. The Budget aimed to take into account various potential expenses that might occur during the project. The Project Partners had sole responsibility for their own budgets, while the Finnish Border Guard with the help of France Expertise Internationale had the global perspective to the budget.

To ensure good management and monitoring of project expenses, the Project Management Team regularly communicated with partners. In addition, FEI organized three seminars covering same content as the Partners' Administrative Points of Contact on financial and administrative rules and common tools.

The costs of the actions within the Cooperation Project were divided between costs borne mainly from human resources (salaries), travelling, subsistence and accommodation, use of external expertise, financial costs, and communication and dissemination of project results. Budget expenditure was well in line with the initial project budget and reflected the chosen working methodology in which tasks were divided across five Work Packages operating across Europe.

M/S CISE Journey

PHASE 5: BLACK SEA – ILLEGAL FISHING

Related Use Cases for the incident: 37, 44, 57, 93

After passing the Sea of Marmara and Bosporus Strait with heavy traffic, *M/S CISE* reaches Black Sea.

M/S CISE **notices EU member state authority checking fishing vessels based on joint inspection teams with other Member State inspectors as part of the team. With CISE, information on inspections is shared across borders. This has led to improved state of environment and stronger fish populations thanks to improved fisheries inspections and better registers. Handling of restricted information concerning risk vessels in regards illegal, unregulated and unreported (IUU) fishing has been improved after establishment of CISE.**

Despite of efforts made back in 2010's, reports suggest that IUU fishing remained widespread in the Black Sea where 90% of the catches were done by third country vessels. Fleet overcapacity has been a key driver for overfishing. The lack of effective management and control systems and increased commercial pressure on fishery resources was the reason for vast IUU fishing industry.

Improved fisheries control and better registers and information exchange through CISE will lead to cost savings. Sharing of information from fisheries monitoring and inspections including information on risk objects IUU activities will decrease. CISE has supported EU member states to share data cross country and cross sector on EU fisheries and on third country vessel activities in EU-waters. Information is also available for cooperative third countries.

This time everything seems to be clear and the fishing vessel is allowed to continue its work. Inspections to fishing vessel have a remarkable preventive effect.

***

The journey of M/S CISE has demonstrated that the European Maritime Surveillance has gone through remarkable improvement after the implementation of Common Information Sharing Environment. After a safe trip, M/S CISE reaches the port of Constanta in the beginning of June 2021.

Recommendations for Next Steps

Based on the results and observations made during the Cooperation Project, the following general recommendations for next steps to be taken in future CISE development are made.

It's worth noticing that CISE is not only a technical issue. Instead, the improvement of information sharing is very much tied to operational procedures. Therefore, further CISE development should be done first and foremost on user demand and support operational user requirements.

1. **Support maintaining of a persistent CISE strategy.** To achieve the expected benefits with the implementation of CISE, long-term strategic vision and continuous and consistent course of action is needed. CISE is an ambitious and complex project, which will generate most of the benefits in the medium or long term. There is a risk that the project can be undermined by both discontinuity of the strategy and by erratic actions. It is possible that CISE may encounter obstacles caused by consolidated sectorial habits that are difficult to overcome, and then, without continuous and consistent action it could easily be argued that the expected benefits are not attainable. Otherwise the results of the Cooperation Project can be lost.

2. **Increase interoperability between actors.** To support interoperability business processes should be developed including services. A common language including the data entities could also be further developed. In addition, mutual confidence should be developed in the way personal data is handled. Current impediments to information exchange should not be under evaluated and organizational interoperability must be considered firstly before the legal and technical issues can be considered in development of CISE.

3. **Encourage exchange of information between authorities.** To get a reference point for increase of information exchange, a mapping of current data flow could be established.

   ➥ The number of data elements that could include personal data should be reduced, for example when referring to pictures of identifiable persons aboard. However, CISE should enable exchange of EU classified and personal data on demand if needed. Furthermore, a common understanding on the management of an IT service that could be used to share EU classified information should be reached.

- CISE solutions could be implemented in several steps. It is recommended to exchange best practices among relevant authorities. Furthermore, it is highly recommended to exchange automatically the basic data at least in neighbouring areas and even more widely. Finally, the opportunities brought by current networks and initiatives (Eurosur, SSN, CSN, and THETIS) should be used.
- Obstacles should be withdrawn to exchange of information. To support this public information sharing between authorities should be increased and not to be limited due to "purpose restriction" if not complying with EU classification levels.
- Establishment of an interaction network with common standards across sectors, borders and regions could facilitate planning, execution, and evaluation of every day work. In addition, it would enhance use of operational assets and support decision making. Common standards and interaction tools would be nationally implemented in NCCs, Operation Centres or equivalent. They could include, e.g., HQ video and audio, map-sharing and other interaction tools.

4. **Start discussion on the governance of CISE.** Since there are masses of information in the national maritime surveillance systems, their interoperability need to be enhanced at all levels; legal, organizational, technical and semantic. To make the benefits of CISE sustainable, and to manage the achieved results, Europe needs a collaborative CISE governance model. It shall be based on the principles of 'need to know' and the 'responsibility to share'. Since close to 80% of maritime surveillance data are owned by Member States, the governance model of the CISE needs an active and direct involvement of the affected Member States following the principles of European Treaties.

5. **Enable third country interoperability.** To acquire best situational picture possible and increase the coverage of maritime surveillance, interoperability with third countries in CISE should be enabled. Cooperation with third states should be developed at regional sea basin level but also at worldwide level, especially in piracy areas.

6. **Support the establishment of a CISE Handbook.** To support the development of the CISE, it is recommended to establish a CISE Handbook, the foundation for which has been laid down by the Cooperation Project. The Handbook should include the relevant use cases, access rights matrices, data entities and services. The purpose of the CISE Handbook would be to describe the process of developing services for the CISE and which data entities should be used. The structure for the services has been specified by the Cooperation Project.
   - The generic operational macro model used for service identification in the Cooperation Project could be used for further technical development. This would simplify routines, procedures and data formats as well as technical solutions, and could also simplify the development of common standard operational procedures.
   - The classification of services into entity services, task services and support services, as defined in the Cooperation Project, should be common for all sectors. AIS information as an entity service, for example, is used by many actors for different purposes and often as an important part of a support service. This would simplify standardization, access rights and correlation work.
   - Introduction of common, often used services should be considered. This could reduce misdirected queries and lead to improved quality and speed of response when obtaining information.
   - If there would be a choice to first implement only parts of CISE, the results of the Cooperation Project indicate that operational developments including work with access rights together with common data formats and semantics might generate better effect for the beginning than adapting to common technical solutions. Best effect could be achieved, however, with a combination of procedural, technical and operational aspects developed in parallel.
   - Start discussion on standardization work and explore possibilities to establish a standardization body for maritime surveillance related data entities.

7. **The outputs of Cooperation Project should be put into practice as soon as possible.** According to the independent external reviews given during the project, even if the outputs of Cooperation Project are technically sound, there is still room for improvement and concrete recommendations on how to proceed. Therefore, we recommend further improving the specifications delivered following those reviews. Additionally, any specification has to be implemented so that it can be further enhanced in order to be adequate.

8. **Continue work on the CISE architecture.** It is now necessary to fill the gap between the work already done on the architecture of CISE and the one being delivered by Cooperation Project, namely by defining a technical reference architecture for the CISE gateways and nodes, foreseen in the CISE architecture hybrid vision, which encompasses the services and data model herein specified.

9. **Adopt an evolutionary approach.** Since most of the important components of CISE are complex and innovative, an iterative and incremental approach is recommended, so that an evolutionary solution can be built, learning from experience and minimizing the risk of failure.

10. **CISE should maintain a user driven approach, supported by relevant technology.** The development done on use cases and information services clearly demonstrate that The improvement of information sharing is very much tied to operational procedures and cultural developments in cooperation and sharing of information between actors. Further CISE development on technical solutions should therefore include integrated operational user demand and operational user requirement support. Therefore, it is essential to keep the operational–technical link in further development.

11. **Information of best practices and tools should be shared across sectors and borders.** Development of common risk analysis and anomaly detection tools as well as sharing of best practices and standard operational procedures could facilitate early warning procedures in all sectors and reduce the number of unknown information.

12. **Consider supporting the establishment of regional CISE related services.** Most of the purposes defined in the Cooperation Project support a regional approach to CISE and only few of them require a global surveillance picture. Most of the data would thus be shared regionally and only a limited amount shared throughout Europe.

13. **Design and implement a coherent statistical system for maritime phenomena.** To assess the CISE benefits, Europe must develop a coherent statistical system to measure the maritime economy and the phenomena associated with legal and illegal activities carried out in the European seas. Currently European and national official statistical authorities produce a large amount of structural and economic statistics relating to different sectors of the maritime economy (transport, fisheries, aquaculture, etc.), but lack of statistical indicators useful to build an integrated view of phenomena relevant for the maritime economy. Due to the absence of official data on performance, cost and impact of maritime activities, the impact analyses are particularly scarce and difficult to compare. Consequently, an effort is needed to analyze the needs and design a coherent system of indicators, enhancing existing sources.

14. **Design a process of Knowledge Management (KM).** To achieve and consolidate the CISE benefits, a formal process of Knowledge Management should be designed to conduct the benchmarking among the user communities, to identify the best practices, to recognize the experts, and to promote the transfer of knowledge. In the future projects in parallel with the technological platform of information sharing, the Knowledge Management (KM) system should be developed, to organize the network of users, to build the community of innovators, and to accumulate social capital (rules, standards, trust).

Lessons Learned

The following key lessons learned by the Project Management during the process should be taken into account in further similar projects:

1. Nomination of an Administrative Point of Contact (AdPOC) by partner organizations. In addition to a point of contact on technical issues, it proved valuable to ask the partner organizations to nominate an administrative point of contact, especially as the responsibility for the project budget remained with the co-beneficiaries and not with the lead partner or administrative partner. Nominating an AdPOC enabled smooth communication between the Project Management Team and partner organizations in financial and administrative matters.

2. Organizing AdPOC seminars for the Administrative Points of Contact proved valuable. The seminars enabled to communicate efficiently the tasks of the AdPOC. The reporting of monthly costs started properly after the seminars.

3. Executing the interim certification of expenses helped the partners and their AdPOCs and Controllers to execute the final certification since the process was already familiar.

4. Establish a functional working platform for information exchange. The collaborative working space provided by FEI enabled the exchange of project documents and, importantly, monthly budget monitoring of the partners. The collaborative working space should be customized and accommodate different project activities and requirements. Some authorities, however, cannot use external working platforms due to strict security policies.

5. When planning the project, attention should be given to the timetable and sequence of project activities. Due to the tight Cooperation Project schedule, Work Packages 3, 4 and 5 were eagerly awaiting results from Work Package 2 in order to be able to start their work and finish by the end of the project period. This challenge was managed by continuous coordination between the project management and WP leaders, and by sharing the WP2 results as early as possible. In future projects, the project period should take into account whether commencement of certain work packages depends on results obtained from other work packages.

6. Management of the geographically widely dispersed project required continuous oversight of project activities by the project management. This was achieved through bi-weekly reporting, continuous exchange of emails between key players, and the regular participation of the Deputy Project Manager in various WP meetings. The strong commitment of the WP leaders eased this challenge significantly.

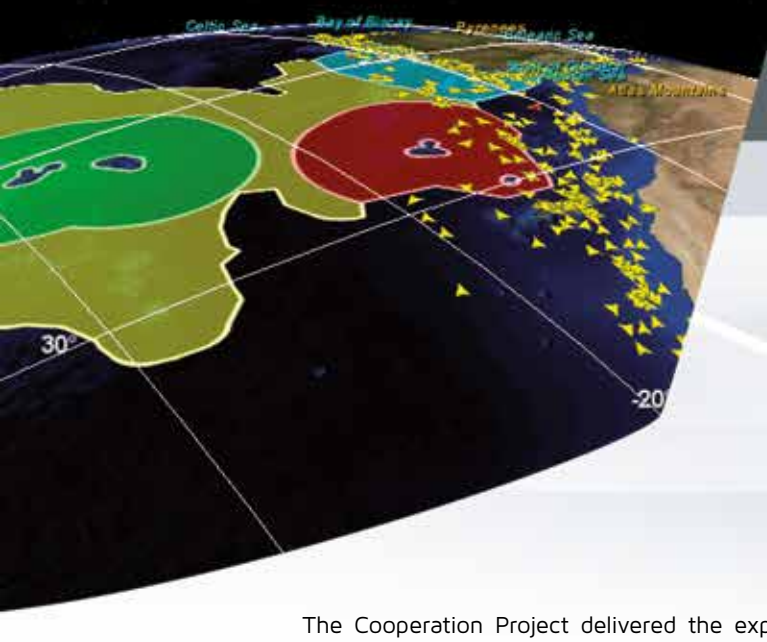
7. Continuous communication with project partners seems to facilitate project management when the number of partners is high. The Project Management regularly contacted the partners and updated them on the project situation as a whole.

8. Work Package 1 was constructed as a Project Management Team serving the needs of the Project Manager and the lead partner. The PMT members had different roles based on their expertise.

9. One key success factor proved to be the involvement of external experts, representing JRC, DIGIT and the TAG, in the work of WP5. Without the broad experience and knowledge that they brought to the project, it would not have been possible to achieve the expected results, especially given the fact that an overwhelming number of topics were involved and the WP5 tasks were technically complex. More external experts could also have been used to support the other WP leaders in their challenging tasks.

10. Engaging pilot projects (MARSUNO and BMM) in the Cooperation Project also proved to be advantageous. The MARSUNO coordinator was a member of the Project Management Team and brought the perspective of previous projects to the on-going project. This ensured continuity between the projects.

11. Organize a final seminar with an attractive programme. The final project seminar should not focus solely on presenting project results, but should also highlight strategic and political aspects. Thinking out of the box and bringing a public/private linkage to the programme could attract more attention and help communicate the project results.



Conclusions

The Cooperation Project delivered the expected results, advancing the implementation of the Common Information Sharing Environment and providing a solid basis for the following projects. The CoopP project can be considered an integral part of the continuity started with the MARSUNO and BlueMassMed pilot projects and leading to the CISE. The results laid down in this report provide the basic elements for the further development of a CISE Handbook. The Cooperation Project offered its participants and stakeholders valuable insights into the development of the CISE. We conclude this final report by recapping these key insights.

Firstly, the CISE is not only a technical issue. The use cases and information services work clearly demonstrates that the improvement of information sharing is very much tied to operational procedures and cultural developments in cooperation and information sharing between actors.

Secondly, it is fully acknowledged that the CISE will enable the maritime authorities to save costs regarding information gathering and the use of assets. This will lead to a reduction in data duplication resulting from cross-sectorial information sources as well as rationalisation in the deployment of assets such as ships and aircraft. The results of Cooperation Project demonstrate that the benefits on cost effectiveness can rise annually up to 423 million euros.

Thirdly, the work gave a clear insight into the complexity of the future CISE. This complexity derives in part from the lack of similarity between the communities and the public authorities of each Member State, in addition to which the areas of responsibility of public authorities vary from state to state. These complexity issues can, however, be overcome by the hybrid architecture of the CISE.

Fourthly, it can be acknowledged that the core data entities selected and specified by the project are relevant to maritime surveillance information exchange. This has been confirmed by their wide usage in the use cases and services defined, as well as in the related data models, albeit sometimes with different designations, and also by the TAG.

Fiftly, Unknown areas for CISE development should be discovered. To attain this, relevant public authorities should be provided more information on developing shared services using current assets and new assets should be developed to increase the coverage of surveillance.

The Project management would like to express its deepest gratitude to all Project Partners for their dedication to the project objectives. The real heroes of the project are the Work Package leaders, Mr. Markus Grönblad, Mr. Etienne Leray, Ms. Carolina Matarazzi and Mr. Fernando Dias Marques. It is to their credit that the results were achieved both in terms of time and content. Sincere thanks are also extended to the Project Management Team and its experts for their tireless work with the administrative and financial issues as well as preparation of this Final Report.

Last but not least, the Project Management wishes to thank the DG MARE, JRC and DG DIGIT for funding and for offering their valuable guidance and expertise to the Project.

Partners

1. Lead Partner: Finnish Border Guard
2. Finnish Transport Agency
3. Finnish Transport Safety Agency
4. Finnish Customs
5. Swedish Coast Guard
6. Swedish Navy
7. Swedish Agency for Marine and Water Management
8. Portugal Consortium: Portuguese Directorate General for Maritime Policy
   Portuguese Directorate General for Natural Resources
   Portuguese Safety and Maritime Services
   Portuguese Sea and Atmosphere Institute
   Portuguese Navy
   Portuguese Directorate General of Maritime Authority
   Portuguese Maritime Police
   Portuguese National Republican Guard
   Portuguese Air Force
9. France Expertise Internationale
10. General Secretariat of the Sea (France)
11. French Customs
12. The Armaments Procurement Agency (DGA) / French Ministry of Defence
13. Centre National D'Etudes Spatiales (France)
14. Federal Ministry of Transport, Building and Urban Development (Germany)
15. National Maritime College of Ireland
16. Irish Naval Service
17. Coastal Administration (Norway)
18. Spanish Navy
19. Spanish Customs
20. Guardia Civil (Spain)
21. European Union Satellite Centre
22. Estonian Police and Border Guard Board
23. Romanian Border Police
24. Bulgarian Border Police
25. Bulgarian Maritime Authority
26. Italy Consortium: Italian Space Agency
    Ministry of the Interior
    Ministry of Justice
    Ministry of Defence – Defence General Staff / Navy General Staff
    Ministry of Economy and Finance – General Command of the Finance Guard
    Ministry of Economic Development – DG Industrial Policy and Competitiveness
    Ministry of Infrastructure and Transport – DG Maritime and Inland Waterways Transport
    Ministry of Infrastructure and Transport – General Command of Port Authorities / Coast Guard
    Ministry of Agricultural, Food and Forestry Policies – DG Sea Fishing and Aquaculture
    Ministry of the Environment and Protection of Land and Sea
27. Finnish Navy
28. The Baltic Marine Environment Protection Commission (HELCOM)
    Associated Partners:
29. FRONTEX
30. European Space Agency
31. EFCA, European Fisheries Control Agency
32. EMSA, European Maritime Safety Agency
33. EUROPOL
34. Wise Pens International Ltd

Contact Information

Email: rajavartiolaitos@raja.fi

Address:

Ministry of the Interior
Border Guard Headquarters
International Affairs Unit/CoopP
PO Box 3 (Panimokatu 1)
FIN-00131 Helsinki
FINLAND

Phone +358 295 421 000
Fax +358 295 411 500

website: www.raja.fi/en
Project website: http://coopp.eu

Co-Financed under the European Integrated Maritime Policy

Layout: Elan Graphic, Paris

M/S CISE Info-graphics: Sopiva Design, Helsinki

Printing: Elan Graphic, Paris

ISBN: 978-952-491-901-2
978-952-491-902-9 (pdf)