

## **New EMCIP**

### **Technical Specifications**

**Appendix E of EMSA/OP/15/2016, “Development of New European Marine Casualty Information Platform (NEW EMCIP)”**

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## List of Abbreviations

B.I.	Business Intelligence
CARD	Centralised Access Rights Database
CMS	Content Management System
DB	Database
DBMS	Database Management System
EMCIP	European Marine Casualty Information Platform
EMSA	European Maritime Safety Agency
ESB	Enterprise Service Bus
GIS	Geographic Information System
GISIS	Global Integrated Shipping Information System
ICT	Information and Communication Technology
IdM	Identity Management
IMO	International Maritime Organization
JDBC	Java Database Connectivity
JNDI	Java Naming and Directory Interface
JSON	JavaScript Object Notation
LDAP	Lightweight Directory Access Protocol
MS	Member State
MVC	Model View Controller

OAM	Oracle Access Manager
OIM	Oracle Identity Manager
OWASP	Open Web Application Security Project
RBAC	Role-Based Access Control
REST	Representational State Transfer
RMI	Remote Method Invocation
SLA	Service Level Agreement
SOA	Service Oriented Architecture
SSO	Single Sign On
URL	Uniform Resource Locator
WFS	Web Feature Service
WMS	Web Map Service
WS	Web Service

## 1. Introduction

The purpose of this document is to provide a preliminary overview of the New EMCIP technical requirements for the design, development, configuration and implementation of the New EMCIP system.

The objectives of this document is to set down the preliminary technical specifications for the marine casualty information database application taking into account the input of EMSA experts and capitalising on the existing EU expertise and common practises

### 1.1. Purpose

The purpose this document is to describe the New EMCIP features based in the existing EMCIP system, the interviews with the EMSA ICT Managers and taking into account the current ICT Landscape and Maritime Applications portfolio.

This preliminary architectural overview is to be considered indicative. The final architectural approach will be agreed between EMSA and the contractor, taking into account the New EMCIP performance, cost efficiency, robustness and reliability and security.

### 1.2. Additional Information

Further details concerning the New EMCIP architectural approaches and decision and component model will be discussed with the contractor during the analysis and design phase, as deemed conducive to the successful completion of the New EMCIP system.

## 2. Architecture Overview

### 2.1. Logical Architecture

A preliminary overview of the New EMCIP architecture is provided below. The following figure shows the 3 main components and the most significant interface of each components:

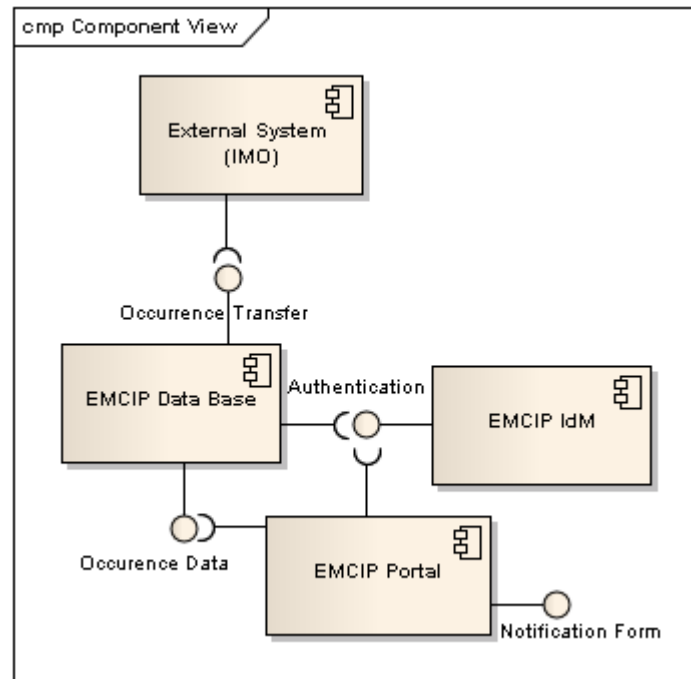


Figure 1 - High Level component view

The EMCIP Database component exposes an interface (Web Service) to transfer Occurrences to external systems (such as IMO), also exposes other interface to provide / receive information of the occurrence (depending on the role and organization of the user) to/from the EMCIP portal component. The EMCIP portal component will display the information provided by the EMCIP Database component in a user friendly way and will expose an interface allowing the notification of occurrences using web forms.

The Chapter 4. of this document describes in a details each component defined in Figure 1 - High Level component view.

In order to expose and to connect the New EMCIP web services in a standard way, an "Integration Services" component is foreseen. This component will provide a standard access to the required external web services already existing in the EMSA landscape (Jaspers Reports, IdM, Ship register, etc...) and will also publish New EMCIP web services in the EMSA Landscape to be consumed by other applications.

The following picture shows a very high level Logical Layer Architecture:

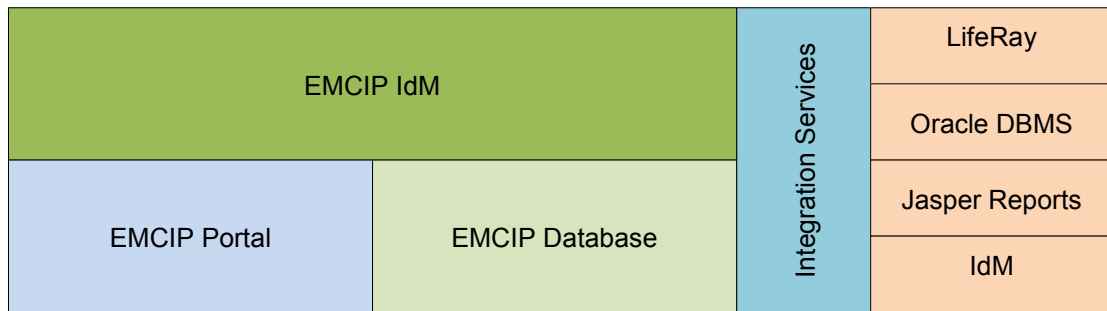


Figure 2 - Logical Architecture

The EMCIP Portal layer will provide the users the most typical web portal features (Forums, News, Events, Calendars, Notifications, Documents, etc....) and an advanced visual user interface of the New EMCIP stored occurrences, including search functionalities. This layer will include the following Core & Enhanced Modules of the New EMCIP:

- Human/machine web interface;
- Community portal and content management;
- Data query and extraction, to retrieve data from the future EMCIP database;
- Enhanced human/machine web interface.

The EMCIP Database layer is in charge of the management of the Occurrences (Create / Update / Delete) and provides data analysis tools and investigation analysis tools. This module includes advanced functionalities for the (EMSA) EMCIP Manager, such as Taxonomy, Verification Rules or Workflow Management. This layer will include the following EMCIP Core & Enhanced Modules:

- Human/machine web interface;
- Data entry, to create, modify and delete occurrences in the future EMCIP database;
- Data query and extraction, to retrieve data from the future EMCIP database;
- Data transfers (e.g. internal, external and to IMO);
- System workflow management;
- Data quality control and enforcement;
- Taxonomy management;
- Basic GIS interface;
- Ship reference repository.
- Enhanced GIS interface;
- Enhanced human/machine web interface;
- Enhancement of other Core Application modules.

The EMCIP IdM layer (access and identification management) allows the management of users and organizations and the assignment of the permits to the different roles defined in the EMCIP System. This



logical layer will include the authentication, authorization, user management and provisioning EMCIP Core module, considering EMSA corporate access and identification management implementation.

The integration services layer is the single point of access for the required / provided web services of the New EMCIP module. This logical layer will include the following EMCIP Core modules:

- Interfaces with other maritime applications;
- Integration with business intelligence tools;
- Integration with customized reports and reporting layouts.

The preliminary architectural overview is to be considered indicative. The bidder can propose alternative architectural approaches, justifying the proposed modification in terms of performance, cost efficiency, robustness and reliability, security, etc..

### 3. Architectural Decisions

The following chapter contains an overview of the preliminary key underlying assumptions the New EMCIP will be based upon, including advantages and disadvantages of the different architectural approaches of its main components.

This chapter includes a first section that includes architectural decisions common to all logical layers described in the previous chapter. It also includes one section per each logical layer, each one containing a description of different architectural approaches with possible advantages and disadvantages.

The provided architectural decisions are to be considered indicative. The bidder can propose alternative architectural approaches, justifying the proposed modification in terms of performance, cost efficiency, robustness and reliability, security, etc..

#### 3.1. All Logical Layers

The following Architectural Patterns should be applied in all Logical Layers. Using Architectural Patterns improves partitioning and promotes design reuse.

##### 3.1.1. Service Oriented Architecture (SOA)

A service-oriented architecture has advantages by allowing the business to respond effectively to changes both in terms of speed and costs. This style of architecture allows for reuse of components as services. This architecture also facilitates integration with external systems integrating as other services in the system.

SOA is a design pattern that aims to build systems with high interoperability capabilities through information exchange, reuse and composition, thus allowing the construction of complex software systems using a set of interdependent and universally interconnected services. Services can be invoked through a network or a client that uses a different type of technology and should therefore be interoperable. Discovery and lookup is another property of a service-oriented architecture that refers to the ability of a client to search for a service that matches your needs dynamically at runtime.

In the New EMCIP the communication between the various internal services should be configurable between direct calls (when they are deployed on the same server); RMI when deployed on the same network and REST-WS when interaction happens across domains.

The approach of the new EMCIP SOA based also allows the distribution of the various services over the network allowing, should you need to move a set of services to a different server in order to share the load among available servers.

##### 3.1.2. Multi-Layer Architecture

The whole New EMCIP system should be designed in independent layers with well-defined responsibilities. An N-Tier approach allows logical separation of the components between presentation layer, application-layer and data layer.

- **Presentation Layer:** Layer with the responsibility of presenting information to the user and allowing interaction with the system by inserting data and performing actions. On the figure they are represented as the interfaces.
- **Application Layer:** Layer responsible for the coordination of the application, where the business logic is implemented. This layer also has the responsibility to pass, filter and modify the data between the data layer and the Presentation layer and the Integration Layer.
- **Integration Layer:** The integration layer has as main responsibility the interaction and transformation of data for communication with external systems.

- **Data Layer:** The data layer has as a sole responsibility the storage of specific EMCIP data (Maritime Occurrences) for later retrieval, in the case of the New EMCIP it should interface with the Oracle database, as an abstraction to the Data Layer in New EMCIP project. The database should be located via a JNDI Lookup and a data source configured at the application server.

### 3.1.3. Model View Controller

The usage of the Model View Controller design pattern allows the isolation of the several components, restricting for example a change on the way information is presented to the user to the “View” component, thus increasing system maintainability.

The MVC splits between information presentation, user actions control and the domain model. The MVC design pattern is split into 3 large components:

- **Model:** the Model manages behaviour and application data as a whole, responding requests for the current state from the “View” and changing state information on requests from the “Controller”.
- **View:** the View is responsible to manage the information presented to the user from the “Model”.
- **Controller:** The Controller interprets the actions from the user and notifies the “Model” or the “View” so these change their state in accordance.

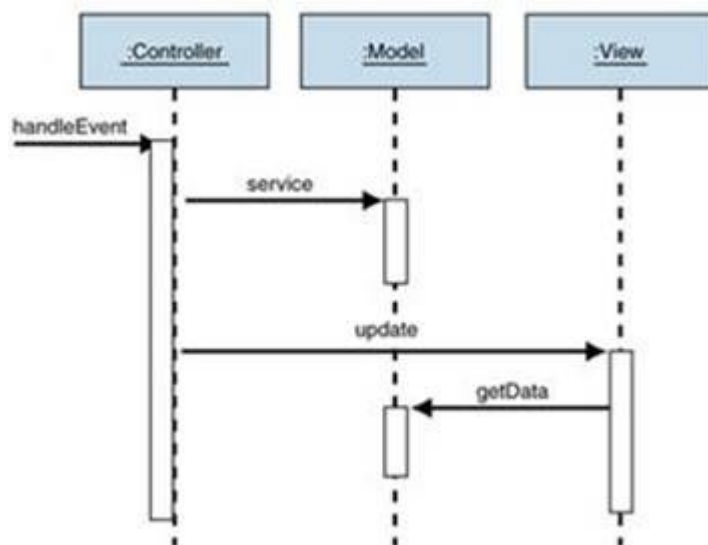


Figure 3 – MVC sequence

The MVC pattern follows this motto: “We need SMART Models, THIN Controllers, and DUMB Views”. On the New EMCIP system the MVC model should be allowed by the usage of MVC frameworks Libraries.

### 3.1.4. Role Based Security

In New EMCIP, following EMSA’s IdM and CARD, security will be implemented using profiles, roles and groups. ‘Profiles’ are the entitlements (actions) that can be performed in the system. The ‘roles’ group profiles together and represent subset of user permissions.. The ‘groups’ group roles together. Groups can be referred to as “Community groups”, as they represent different types of users. When a new user is created, a group is attributed to him so as to govern users permissions. If a new ‘type’ of user is to be

created, this will result in the creation of a new 'group'. In order to ease the attribution of profiles (entitlements) to users, profiles are gathered into 'roles'. The permissions are therefore assigned to users through 'groups' and 'roles' and not to specific system users.

The profile validation should be done on every layer of the application, providing security in depth; each access to the services available is validated ensuring the security at every level of the application.

The EMCIP IdM subsystem will be in charge of the role management (permission assignment) and will rely on the EMSA OIM / OAM for user authentication.

### 3.2. EMCIP Database Layer

The EMCIP Database sub-system can be considered the kernel of the new EMCIP system. It is in charge of the occurrence management and provides additional value tools to the investigator (navigation tree, business intelligence tools, etc...)

The following image shows the architectural alternatives to be used in the EMCIP database component of the New EMCIP system.

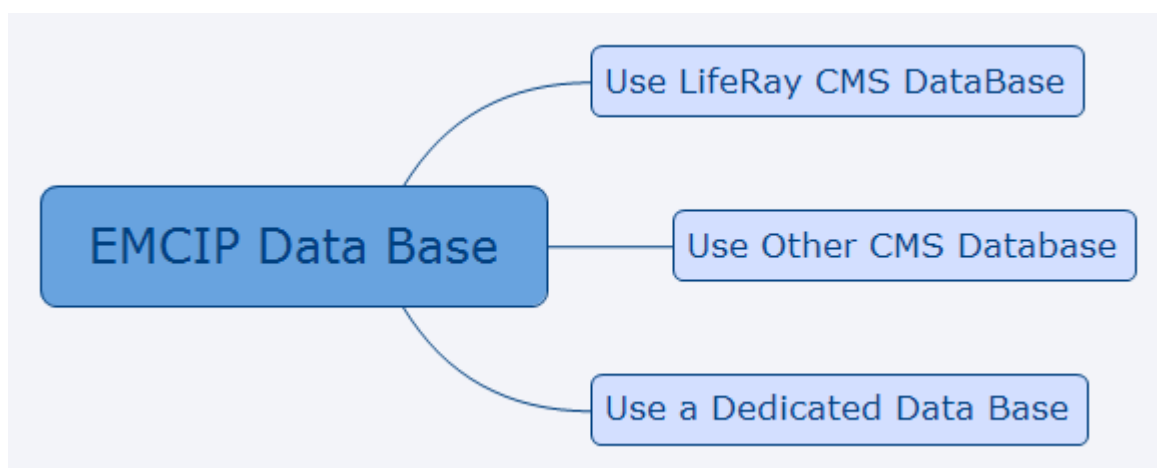


Figure 4 – New EMCIP Database main component architecture alternatives

#### 3.2.1. Use LifeRay CMS Database

With this architecture decision the current EMSA LifeRay CMS should be used to store the Occurrences and all the information of the EMCIP database. The EMCIP Occurrences will be treated as CMS assets.

##### Advantages:

- Rapid development and deployment;
- Re-use of existing LifeRay features (workflow, validation, search, etc....);
- Stable and validated commercial product;
- EMSA Land scape integration done;
- No additional hardware;
- EMCIP database migration using export / Import CMS functionalities;
- Easy maintenance.

##### Disadvantages:

- User interface restrictions (LifeRay user interface is used for the whole EMSA applications land scape);

- LifeRay plugin installation restrictions (The installation of plugins must not affect the existing EMSA applications );
- Restrictions on own functionalities developing (ex. Investigation analysis tools). LifeRay is not flexible enough to create custom client applications using the LifeRay components / functionalities (additional application server should be used to host specific EMCIP features);
- Data confidentiality restrictions (LifeRay content is stored in the same database for all EMSA applications) some confidential information should be stored in a different database.

### 3.2.2. Use Other CMS Database

With this architecture decision a CMS (e.g. a dedicated LifeRay deployment) will be used to store the occurrences and all the information of the EMCIP database. The EMCIP occurrences will be treated as CMS assets.

#### **Advantages:**

- Rapid development and deployment;
- Re-use of existing CMS features (workflow, validation, search, etc...);
- Flexibility in the taxonomy management;
- Flexibility in the workflow management;
- Stable and validated commercial product;
- EMCIP database migration using export / Import CMS functionalities;
- Including CMS additional features / style changes with no restrictions;
- Standalone database.

#### **Disadvantages:**

- User interface restrictions all CMS can customize its user interface, but layout, language, notifications, etc... restrictions are intrinsic to all CMS;
- Restrictions on own functionalities developing (ex. Investigation analysis tools). CMSs are not flexible enough to create custom client applications using their own components / functionalities (additional application server should be used to host specific EMCIP tools).

### 3.2.3. Use of dedicated Database

This architectural proposal suggests the development of the application from scratch, allowing complete customization of all components of the system.

#### **Advantages:**

- Fully configurable user interfaces and system messages;
- Fully configurable features (workflow management, analysis tools, etc...);
- Proprietary database model making the queries and data mining more efficient;

#### **Disadvantages:**

- Additional analysis, design, development and testing time on some CMS existing features (Taxonomy management, Workflow management, Data verification, etc...);
- Additional testing time of the whole application.

### 3.2.4. Conclusions

The degree of maturity of the current CMS (LifeRay) can cover in a quick and reliable mode most of the requirements involved in the EMCIP Database system (flexibility in the taxonomy data flow management, rules verification, document management, advanced searches, etc. ...). Given the importance of the added value of the investigation analysis tool and actual and a friendly user interface mixed solution is proposed: develop from scratch the analysis investigation tool including the decision support systems (related occurrences, suggest safety recommendations, etc...) and rely on the functionality embedded in existing CMS for occurrence management (taxonomy, workflow, storage, etc....) and search information. The use of an alternative CMS (e.g. a dedicated deployment of LifeRay) may assure a better customization of the user interface and database.

## 3.3. EMCIP Portal Layer

The EMCIP Portal module is the first point of access of all EMCIP users. This module will provide the users a single point of access to the Marine Casualties information, documents, news, etc... The following image shows the architectural alternatives to be used in the EMCIP Portal main component of the New EMCIP system:

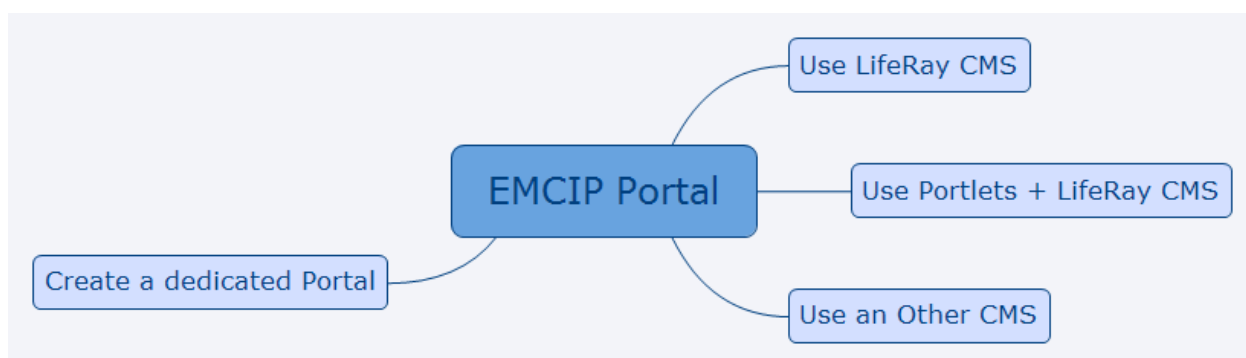


Figure 5 – New EMCIP Portal main component architecture alternatives

### 3.3.1. Use of LifeRay CMS

With this architecture decision the current EMSA LifeRay CMS will be used as the New EMCIP Portal. The manager of the EMCIP portal will create events, discussion boards, news, etc...using the EMSA LifeRay system.

#### Advantages:

- No need to develop any additional module;
- Re-use of existing LifeRay features (News, Documents Manager, Calendar, etc....);
- Stable and validated commercial product;
- EMSA Land scape integration done;
- No additional hardware;
- Easy maintenance;

#### Disadvantages:

- User interface restrictions (LifeRay user interface is used for the whole EMSA applications land scape);

- Restrictions on events, discussion board and Calendar creation, due the EMSA LifeRay are common to all EMSA Applications / users;
- Restrictions on own functionalities developing (ex. Incident Notification Form);
- Data confidentiality restrictions (LifeRay content is stored in the same database for all EMSA applications) some confidential information should be stored in a different database;

### 3.3.2. Use Portlets + LifeRay CMS

With this architecture decision additional plugins and / or hooks will be included in the current EMSA LifeRay CMS to modify the user interface and default behaviour of the CMS functionalities. This approach allows greater customization of the EMCIP portal, but additional developments should be done.

#### Advantages:

- Rapid development and deployment;
- Re-use of existing LifeRay features (News, discussion Boards, Calendars, Document Management, etc...);
- Stable and validated commercial product;
- EMSA Landscape integration done;
- No additional hardware;
- Easy maintenance;

#### Disadvantages:

- User interface restrictions (LifeRay user interface is used for the whole EMSA applications landscape);
- LifeRay plugin installation restrictions (The installation of plugins must not affect the existing EMSA applications);
- Restrictions on own functionalities developing (ex. Incident Notification Form);
- Data confidentiality restrictions (LifeRay content is stored in the same database for all EMSA applications) some confidential information should be stored in a different database.

### 3.3.3. Use of another CMS

With this architecture decision all the portal typical features (news, discussion boards, calendars, document management, etc..) will be relying on an additional CMS (e.g. dedicated deployment of LifeRay) giving the contractor the possibility of full CMS features customization and keeping the events, calendars, documents, etc... in a separated database.

#### Advantages:

- Rapid development and deployment;
- Re-use of existing CMS features (News, discussion Boards, Calendars, Document Management, etc...);
- Stable and validated commercial product;
- EMCIP portal migration using export / Import CMS functionalities;
- Including CMS additional features / style changes with no restrictions;
- Standalone database.

**Disadvantages:**

- User interface restrictions all CMS can customize its user interface, but layout, language, notifications, etc... restrictions are intrinsic to all CMS;
- Restrictions on own functionalities developing (ex. Investigation analysis tools). CMSs are not flexible enough to create custom client applications using their own components / functionalities (additional application server should be used to host specific EMCIP tools).

### 3.3.4. Create dedicated Portal

This architectural proposal suggests the development of the application from scratch, allowing complete customization of all components of the system.

**Advantages:**

- Fully configurable user interfaces and system messages;
- Fully configurable features (news, discussion boards, calendars, document management, etc...);
- Proprietary database model making the queries and data mining more efficient;

**Disadvantages:**

- Increase the analysis, design, develops and testing time;
- Increase testing time of the whole application.

## 3.4. EMCIP Access and Identification (IdM) Layer

This subsystem is in charge of the New EMCIP authorization, the validation of every layer of the EMCIP System, providing security in depth; each access to the services available in the new EMCIP is validated by this module guaranteeing the security at every level of the system.

This module will rely on the EMSA IdM for user provision and authentication (SSO mechanism). More information can be found in "Appendix O – Access and identification Management Guide".

The user provisioning for the New EMCIP should follow a Role Base Access Control approach (RBAC). The New EMCIP has forcibly to adhere to the EMSA Security Model. This model defines the necessary levels of user permissions that allow any user to edit any other.

The EMSA security Model has five hierarchical levels:

1. **EMSA Administrator:** Identity Manager super users. Users belonging to this level are entitled to manage user accounts without restrictions and they also have privileges to access some normally restricted IdM functionalities. "EMSA Administrator" level can only assigned to a person belonging to EMSA and is normally limited to a very small number (no more than 3).
2. **EMSA Application Administrator:** Identity Managers for a specific Application. Users belonging to this level are entitled to manage user accounts related with a specific application (i.e. the Administrator's). "EMSA Application Administrator" can only be assigned to a person belonging to EMSA and should be limited to a small number (it's a business decision to define how many administrators exist for any given application). It should be noted that a single person can be associated (i.e. have this level) with more than one application.
3. **National Administrator:** Identity Managers for a specific Country/Institution inside a specific application. Users belonging to this level are entitled to manage user accounts that are simultaneously related with the Administrator's application and the Administrator's Country/Institution. "National Administrator" level can assigned to any user of a specific Country/Institution even though at the business level there is normally a very limited set of people that possess this privilege.



4. **Local Administrator:** Identity Managers for a specific Local Authority inside a specific application and Country/Institution. Users belonging to this level are entitled to manage user accounts that are simultaneously related with the Administrator application, Country/Institution and Local Authority. "Local Administrator" level can be assigned to any user of a specific Country/Institution for a given Local Authority.
5. **End-user:** End-Users have the most limited set of Identity Management privileges. They are only entitled to modify a limited set of their own personal attributes (i.e. the ones which are common to all applications).

It is highly recommended that this module create the relationship between the new EMCIP roles and the EMSA Security Model Levels.

### 3.5. EMCIP Integration Layer

The integration Services layer is the single point of access for the required / provided web services of the New EMCIP module. This module will provide the mechanism to publish the EMCIP services in the EMSA Enterprise service Bus and also will provide interfaces to facilitate connection of exposed services (LifeRay, JasperSoft, Oracle JDBC, etc..) in the EMSA ESB with the EMCIP components;

## 4. Component Model

This chapter introduces a preliminary overview of the logical layers defined in previous chapters .

The suggested component model is to be considered indicative. The bidder can propose alternative component models, justifying the proposed modification in terms of performance, cost efficiency, robustness and reliability, security, etc..

### 4.1. EMCIP Database

The EMCIP Database subsystem will be the main module of the new EMCIP system. This module will be developed following the Service Oriented Architecture and the interfaces with other modules will be implemented using web services.

The EMCIP Database subsystem should cover the implementation of the following New EMCIP core modules:

- Human/machine web interface;
- Data entry, to create, to modify and to delete occurrences in the future EMCIP database;
- Integration with business intelligence tools;
- Data query and extraction, to retrieve data from the future EMCIP database;
- System workflow management;
- Data quality control and enforcement;
- Taxonomy management;
- Basic GIS interface.

The EMCIP Database subsystem should cover the implementation of the following New EMCIP enhanced modules

- Integration with customized reports and reporting layouts;
- Enhanced human/machine web interface;
- Enhancement of other Core Application modules.

The following picture show the main component and interfaces of the Database Module of the New EMCIP:

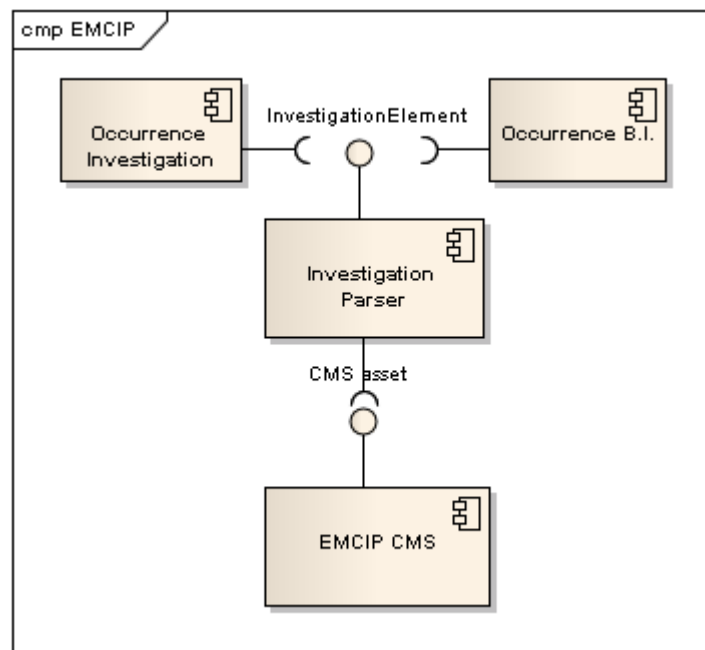


Figure 6 – New EMCIP Database main component Model

The main components identified in this chart are:

#### 4.1.1. Occurrence Investigation

This component will provide all necessary functionalities to allow the investigator to perform an analysis of the Maritime Incident. This Component will include an analysis chart and will allow the investigator to drag & drop and connect the different maritime investigation components (Casualty Events, Accidental Events and Contributing Factors). The main functionalities of this component will be:

- To provide the user a friendly investigation analysis framework (including the investigation chart);
- To suggest the investigator related occurrences and safety recommendations during the investigation phase;
- To provide to the investigation parser component the information provided by the user in order update the EMCIP CMS related asset.

#### 4.1.2. Occurrence Business Intelligence

This component will be in charge of the advanced search and analysis of the information stored in the EMCIP database module. In order to facilitate the data analysis to the end user and to separate the EMCIP CMS component structure (asset) to the Investigation structure defined in the Annex I Directive 2009/18/EC, this module will request the information to the investigation parser component.

This component will be in charge of:

- To provide the user a friendly data analysis framework (including the integration with the existing B.I tool already installed in the EMSA ICT Landscape)
- To manage (Create, Execute, Delete, Export) the advanced queries or reports templates generated by the end users.

### 4.1.3. Investigation Parser

This component will be the interface between the CMS model (database, objects, portlets, etc.) and the Annex I Directive 2009/18/EC data model. The main functionalities of this component will be:

- To get information from the EMIP CMS assets and transform into “investigation elements”
- To provide the investigation elements to the Occurrence Investigation, Occurrence Business Intelligence and Investigation Transfer components.
- To transform the investigation elements from Occurrence Investigator component or from external systems into EMCIP CMS assets and provide the information to the EMCIP CMS component.

### 4.1.4. EMCIP CMS

This component will be the Content Management System used for EMCIP database logical layer. This component could be the same component used in the EMCIP Portal logical layer. This component, in the EMCIP database scenario, will be in charge of:

- The New EMCIP database content visualization;
- The New EMCIP database content management;
- The New EMCIP database taxonomy management;
- The New EMCIP database workflow management;
- The New EMCIP Verification Rules Management.

With this approach all occurrences will be treated as CMS content assets (independently of the architectural decision taken in the EMCIP Database logical layer).

## 4.2. EMCIP IdM

This component will be in charge of the New EMCIP roles and specific business functionality access permission. This component will relay in the EMSA IdM system the Single Sign On (SSO) mechanism which only allows access to pre identified person. The IdM will be in also in charge of URL based access policies, allowing access to specific URL's when users belongs to specific LDAP groups. More information can be found in “Appendix O – Access and identification Management Guide”.

This component will implement a user provisioning web service to maintain user information integrated with EMSA IdM. The following methods should be implemented in the web service:

- **Constructormethod**, used for passing context variables.
- **addUser**, used for creating a new user.
- **revokeUser**, used for revoking users access permissions within the application (i.e. “deleting” the user). Maintaining auditing information is the applications responsibility, if needed;
- **enableUser**, used for stating that a user is “active” i.e. can access the application. A newly created user is always “active” by default;
- **disableUser**, used for stating that a user is “inactive”, i.e. cannot momentarily access the application. This action can be undone by the *enableUser* functionality;

- **updateUser**, used for updating user attributes. It should be noted that each call to this functionality updates only one attribute. If multiple attributes need updating then multiple calls will be made;
- **assignRole**, used for informing the application about the user's roles. Each role assigned will correspond to a single call of the service;
- **unassignRole**, used for revoking a user's role, one role at a time similar to the assign functionality.

## 4.3. EMCIP Portal

### 4.3.1. EMCIP CMS

This component will be in charge of the Content Management System used for EMCIP portal. This component will be in charge of:

- The New EMCIP portal content visualization;
- The New EMCIP portal user Calendars Management;
- The New EMCIP portal Document Management;
- The New EMCIP portal Discussion Board Management;
- The New EMCIP portal News Management.

With this approach all occurrences will be treated as CMS content assets (independently of the architectural decision taken in the EMCIP Portal and EMCIP Database logical layer).

The EMCIP Portal subsystem should cover the implementation of the following New EMCIP core modules:

- Human/machine web interface;
- Data transfers (e.g. internal, external and to IMO);
- Basic GIS interface;
- Ship reference repository.

The EMCIP Portal subsystem should cover the implementation of the following New EMCIP enhanced modules

- Enhanced GIS interface;

## 4.4. EMCIP Integration

The integration Services layer is the single point of access for the required / provided web services of the New EMCIP module. This module will provide the mechanism to publish the EMCIP services in the EMSA Enterprise Service Bus and also will provide interfaces to facilitate connection of exposed services (LifeRay, JasperSoft, Oracle JDBC, etc..) in the EMSA ESB with the EMCIP components.

This software layer has 3 main components:

- Investigation transfer;

- EMCIP GIS;
- EMCIP Ships.

The following picture shows the relation between the components:

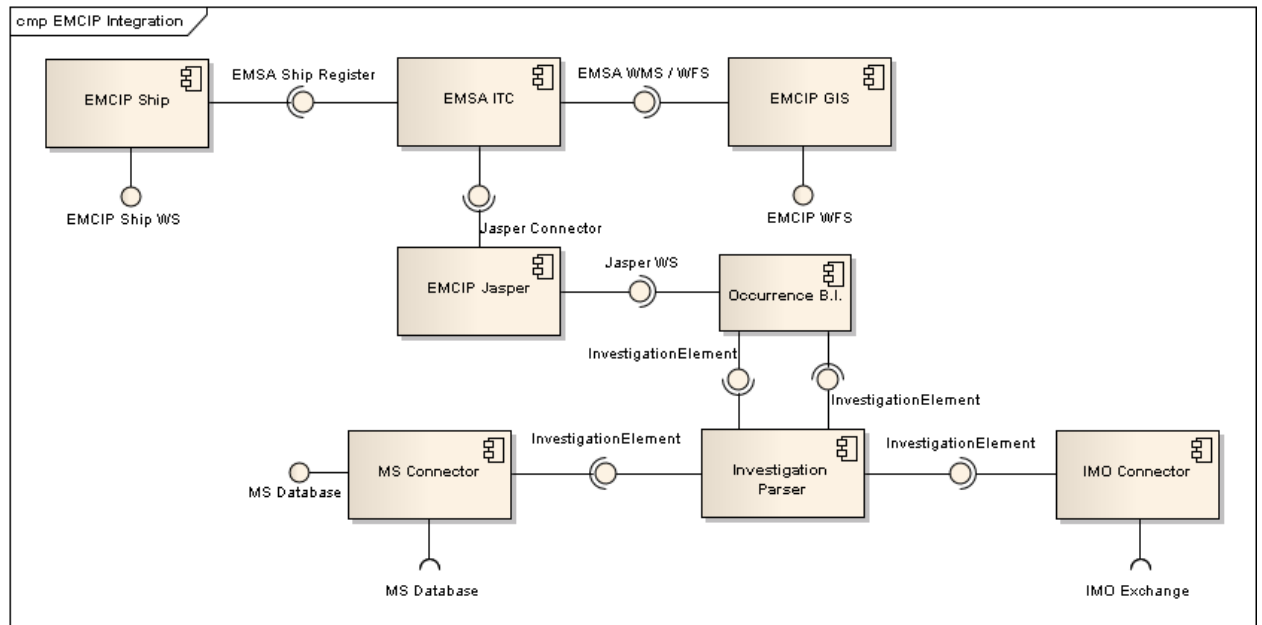


Figure 7 – New EMCIP Integration main component Model

The EMCIP Integration subsystem should cover the implementation of the following New EMCIP core modules:

- Community portal and content management;
- Data query and extraction, to retrieve data from the future EMCIP database.

The EMCIP Integration subsystem should cover the implementation of the following New EMCIP enhanced modules:

- Integration with customized reports and reporting layouts;
- Interfaces with other maritime applications.

#### 4.4.1. Investigation Transfer

This module will expose the web service to provide the data stored in the EMCIP database to external databases (MS databases or IMO data transfer).

This module will contain the different web services clients to get Marine Casualty Information from different sources (MS Databases, IMO, etc). These clients could be used by the end user to transfer information to the EMSA using the web services communication channel.

#### 4.4.2. IMO Connector

This module isolates the New EMCIP taxonomy model from the GISIS model. Any update of the EMCIP taxonomy should not affect to the IMO transfer module and any change in the GISIS model should not be reflected in the New EMCIP taxonomy model.

#### 4.4.3. MS Connector

This module isolates the New EMCIP taxonomy model from the MS Incident database taxonomy model. Any update of the EMCIP taxonomy should not be affect to the MS Incident database taxonomy and any change in the MS Incident database taxonomy model should not be reflected in the New EMCIP taxonomy model.

#### 4.4.4. EMCIP GIS

This module will manage the exiting WMS and WFS EMSA services and will provide the information to the web client developed in the EMCIP database layer.

This module will also provide a WFS external service providing information of the maritime incidents stored in the New EMCIP database.

#### 4.4.5. EMCIP Ships

This module will connect to the existing Web service part of SSN ecosystem to get common ship repository. Additionally, the external repository (reference) will be updated through files (e.g. MS excel or MS access tables) exported from other databases (e.g. EMSA MARINFO or national DBs).

This module also will include a web service to provide ship information of the New EMCIP internal operation vessel register.

#### 4.4.6. EMCIP Jasper

This component will be provide a web service to the “Occurrence Business Intelligence” Module to get / delivery the information from / to the Jasper Module installed in the EMSA ICT Land Scape.

This component will include a connector to the Jasper Business intelligence Software installed in the EMSA ICT Land scape.

## 5. Traceability matrix

This chapter includes a traceability matrix between the components (columns) described in Chapter “4. Component Model” and the uses cases (rows) described in Requirements and Functional Specification document.

	EMCIP CMS	EMCIP GIS	EMCIP IdM	EMCIP Jasper	EMCIP Ship	EMSA ITC	Investigation Parser	Occurrence B.I.	Occurrence Investigation
CMS.CU.01 Managemet	X								
CMS.CU.02 Tools configuration	X								
CMS.CU.03 Incident Notification Form	X						X		
CMS.CU.05 GUEST-Research Content	X								
CMS.CU.06 GUEST-Registered Content	X								
CMS.CU.07 GUEST-Not registered Content	X								
CMS.CU.08 Content Visualization	X								
CMS.CU.09 Restricted EMSA Users Contents	X								
CMS.CU.10 All EMSA user Contents	X								
CMS.CU.12 MS user content	X								
CMS.CU.13 All MS Content	X								
[I] EDB.CU.20 View occurrences Interested Authority	X								
[V] EDB.CU.18 View Occurrences of his own organization	X								
[W] EDB.CU.17 View Occurrences of Another MS	X								
[Z] EDB.CU.19 View Occurrences of his own state	X								
EDB.CU.01 Investigation Analysis							X		X
EDB.CU.02 Data Analysis							X	X	
EDB.CU.03 ReOpen Occurrence	X						X		
EDB.CU.04 Accept Occurrence	X						X		
EDB.CU.05 Change Investigator in charge	X						X		
EDB.CU.06 Lock & UnLock Occurrence	X						X		
EDB.CU.07 Reject Occurrence	X						X		
EDB.CU.08 Delete Draft Occurrence	X						X		
EDB.CU.09 Revoke Acceptance Occurrence	X						X		X
EDB.CU.10 Edit Occurrence	X						X		
EDB.CU.11 Transfer (IMO, Internal or External)	X						X		
EDB.CU.12 Submit Occurrence	X						X		



	EMCIP CMS	EMCIP GIS	EMCIP IdM	EMCIP Jasper	EMCIP Ship	EMSA ITC	Investigation Parser	Occurrence B.I.	Occurrence Investigation
EDB.CU.13 Workflow Management	X								
EDB.CU.14 Taxonomy Management	X						X		
EDB.CU.15 Verification rules Management	X								
EDB.CU.16 View All occurrences limited	X								
EDB.CU.21 Ship Register tool					X	X			
EDB.CU.22 Administrative Module	X								
EDB.CU.23 Related Occurrence	X						X		X
EDB.CU.24 Recommendations selection aid	X						X		X
EDB.CU.25 View Database data & Investigation Reports	X								
EDB.CU.26 GIS Viewer		X				X	X		
EDB.CU.27 Query System						X	X	X	
EDB.CU.28 BI System						X	X	X	
EDB.CU.29. Revoke Submission occurrence	X								
EDB.CU.30 Delete Submitted occurrence	X						X		
OIM.CU.01 Management			X			X	X		
OIM.CU.02 Authorization & Authentication			X			X			

## 6. Interface Specifications

This chapter provides a detailed description of all interfaces between the future EMCIP and EMSA maritime applications which the future EMCIP will be interfaced to, including data to be exchanged, technology, volume and frequency.

As described in previous chapter, the EMCIP integration layer will contains all interfaces between the Future EMCIP and EMSA maritime applications.

The following picture shows the relation between the components:

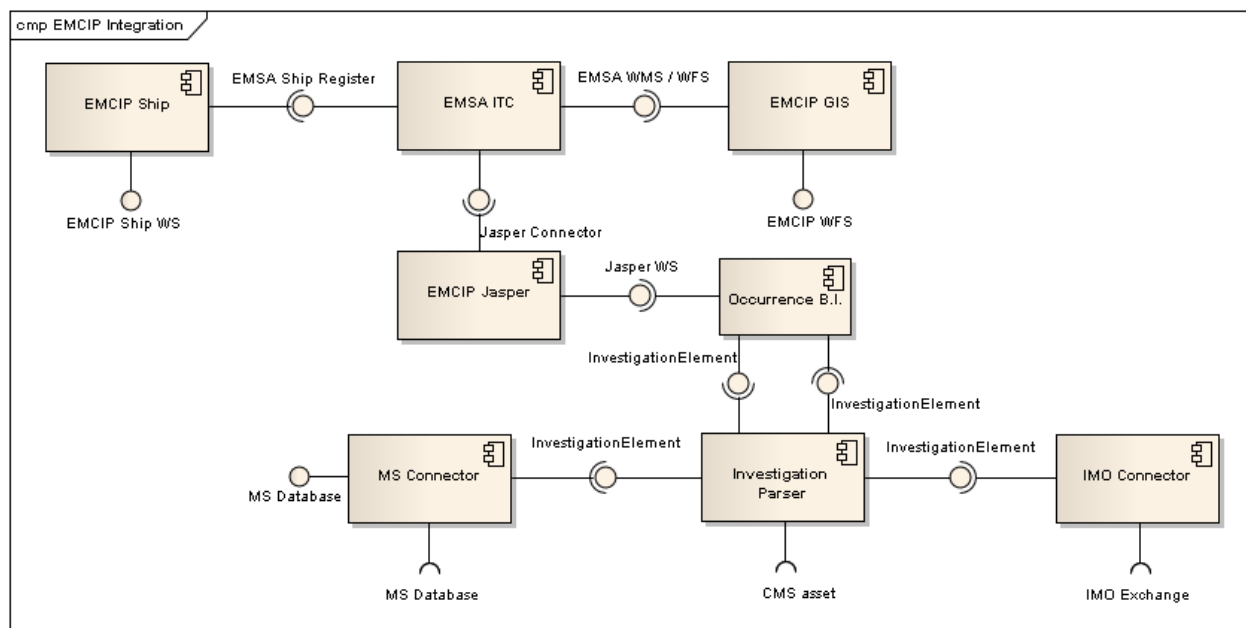


Figure 8 –EMCIP Integration Component Interfaces

### 6.1. EMCIP Ship WS

This web service provides information about the internal EMCIP vessel registry. The information to be exchanged will be the Vessel Entity defined in the New EMCIP taxonomy (the final version of the data indicated below will be confirmed by EMSA before the implementation):

Table 6-1 EMCIP Vessel Entity

Attribute	Type
Action taken by crew	Text
Adequacy	Text
Adequate air supply	Code
Angle immers.2 upperdeck	Decimals
Angle max. stability	Decimals
Angle vanish. stability	Decimals
Assistance from MS	Text
Auxiliary propulsion	Decimals
Bilge keel longit. extent	Decimals
Bilge keel width	Decimals
Block coefficient of fineness of displacement	Decimals

Attribute	Type
Bollard pull	Decimals
Brand name of craft	Alphanumeric
Breadth	Decimals
Building yard	Alphanumeric
Call sign	Alphanumeric
Cargo Loss	Entity
Cargo Quantities	Entity
Centre of gravity above moulded base line	Decimals
Classif. Society	Code
Classif. Society (ISM)	Code
Coefficient of fineness of midship section	Decimals
Company name	Alphanumeric
Company nr.	Alphanumeric
Contain/extinguish fire	Text
Contributed to ext.	Code
Damage	Entity
Date keel laid	Alphanumeric
Deadweight	Decimals
Deck	Code
Deck cargo quantity	Decimals
Depth of bar keel	Decimals
Design category	Code
Directive 94/25	Code
Displacement	Decimals
Distance ships profile exposed to wind and waterline	Decimals
Double bottom present	Code
Draught (amidships)	Decimals
Error modes	Decimals
Estimated rolling period (P-S-P)	Decimals
Event	Entity
Failure mode	Decimals
Fire detection	Code
Fire duration total	Decimals
Flag State	Code
Freeboard	Decimals
Gross tonnage	Decimals
Habitat degradation	Code
Height centre of buoyancy above moulded base line	Decimals
Height struct. deck D	Decimals

Attribute	Type
Hull breadth	Decimals
Hull construction	Code
Hull identification nr.	Alphanumeric
Hull material	Code
Hull number	Alphanumeric
Hull shape type	Code
IMO number	Number
KG lightship displac.	Decimals
Lateral area of ships profile exposed to wind	Decimals
Length between PP	Decimals
Length of the hull	Decimals
Length overall	Decimals
Length struct. deck D	Decimals
Lightship displacement	Decimals
Lives lost - Other - Total	Decimals
Maintenance records	Code
Manufacturer's name	Alphanumeric
Max. Draught	Decimals
Max. engine power	Decimals
Max. nr. of persons	Number
Maximum load	Decimals
Maximum nr. of people	Number
Maximum righting lever	Decimals
Maximum speed	Decimals
Means propulsion	Code
Metacentric height (GM uncorrected)	Decimals
MMSI nr.	Number
Modification made by	Code
Moulded depth	Decimals
Name of ship	Alphanumeric
Name struct. above deck	Alphanumeric
Nature occurrence	Code
Nr. main engines	Number
Nr. of crew	Number
Nr. of hulls	Code
Nr. of masts	Code
Nr. of passengers	Number
Nr. propellers or jets	Number
Obs./comments	Text
Owner name	Alphanumeric
Owner nr.	Alphanumeric

Attribute	Type
Persons alerted by	Code
Polar class	Code
Port of registry	Code
Position transmitted	Decimals
Previous CS	Code
Previous experience	Code
Previous flag	Code
Previous name of ship	Alphanumeric
Propulsion type	Code
Protection escape means	Text
Quantity ballast water	Decimals
Ranks/crew	Entity
Rated amplitude of roll (maximum)	Decimals
Reduction in GM due to any free surface of liquids	Decimals
Registry nr.	Alphanumeric
Righting levers (GZ) based on (G), for angles of heel :	Code
The Sail area	Decimals
Sequence	Number
Service conditions	Text
Special instructions	Text
Time to control fire	Decimals
Time to extinguish	Decimals
Time to sink	Decimals
Transverse metacentre radius	Decimals
Under action of helm	Text
Vulner. openings closed	Text
Water trapped on deck	Decimals
Water trapped on deck?	Code
Weather conditions	Code
Weather in SAR ops.	Code
Y1	Decimals
Y2	Decimals

It is recommended the use of REST web services and the codification of the entity in JSON format for a more efficient data transfer.

## 6.2. EMSA Ship Register

This web service provides information about the ship external reference repository. The information to be exchanged will be the Vessel Entity defined in the ship external reference repository (the final version of the data indicated below will be confirmed by EMSA before the implementation):

Table 6-2 External reference repository Vessel Entity

Attribute	Type
Attribute	Type
IMO Number	Decimals
Name of Ship	Text
Call Sign	Text
Registry nr.	Text
MMSI nr.	Decimals
Flag State	Code
Ship/craft type	Code
Additional ship type	Code
Port of Registry	Code
Ship's boat	Code
Classif. Society	Text
Classif. Society (ISM)	Text
Polar class	Text
Gross tonnage	Decimals
Displacement	Decimals
Deadweight	Decimals
TEU	Decimals
Hull material	Code
Year of build	Decimals
Date keel laid	Date
Year of major conversion	Decimals
Major conversion type	Code
Nr. of hulls	Decimals
Hull construction	Decimals
Hull number	Decimals
Building yard	Text
State of the shipyard	Code
Length between PP	Decimals
Length overall	Decimals
Breadth	Decimals
Moulded depth	Decimals
Max. draught	Decimals
Freeboard	Decimals
Reg. length	Decimals
Freeboard type	Code
Service speed	Decimals
Total propulsion power	Decimals
Propulsion type	Code

Attribute	Type
Nr. main engines	Decimals
Unatt. Machinery space	Text
Nr. propellers or jets	Decimals
Bollard pull	Text
Nr. of crew	Decimals
Nr. of passengers	Decimals
Maximum nr. of persons	Decimals
Owner name	Text
Owner identification nr.	Decimals
Company name	Text
Company identification nr.	Decimals

It is recommended the use of REST web services and the codification of the entity in JSON format for a more efficient data transfer.

### 6.3. Investigation Element WS

This web service will provide information about any occurrence stored in the New EMCIP database and its related entities (Events, Factors, Safety recommendations, etc....). The information to be exchanged will be the entities defined in the Requirements and Functional Specification document.

It is recommended to use different methods to get / provide the different entities defined in the new EMCIP system.

It is recommended the use of REST web services and the codification of the entity in JSON format for a more efficient data transfer. The JSON objects exchanged by this web services must be flexible enough to support the taxonomy changes reports by the EMSA EMCIP Manager.

This web service will be the most active in the system so the implementation of this web service must be optimal in order to reduce the load of the overall system.

### 6.4. CMS asset

This web services will accepts and provides the assets stored in the New EMCIP CMS.

The data structure of the elements to be exchanged in this web service is highly dependent on the CMS used for the implementation.

This web service will be one of the most active in the system so the implementation of this web service must be optimal in order to reduce the load of the overall system.

### 6.5. EMCIP WFS

This service will provide the most significant features of the New EMCIP taxonomy entities using the WFS protocol. The information of the new EMCIP taxonomy the entities are defined in the Requirements and Functional Specification document. This service will be used by the GIS core application (not very frequently).

### 6.6. EMSA WMS / WFS

This component represents the whole WMS / WFS services provided by the EMSA ITC landscape and it is supposed to be integrated in the New EMCIP GIS Core application.

The information provided by these services are defined in each application of EMSA ITC Landscape  
This service will be used by the GIS core application (not very frequently).

### 6.7. Jasper Connector

This connector allows the connection from the New EMCIP system to the existing Jasper B.I system deployed in the EMSA ITC Landscape. The information provided by this connector is dependent from the current Jasper implementation at EMSA.

This service will be used by customized reports and reporting layouts enhanced module (not very frequently).

### 6.8. Jasper WS

This web service allows the communication between the Occurrence B.I component and the Jasper Connector.

The information exchanged in this web service will be the queries and reports layouts to be performed in the Jasper B.I.

This web service makes the Occurrence B.I component self-contained allowing the upgrade / change of the current EMSA B.I solution with no additional changes in the New EMCIP system.

Note: In the current EMSA Jasper implementation, Jasper WS are disabled as they have been never used by any of the existing projects. Before enabling Jasper WS, EMCIP requirements for using Jasper WS need to be elicited and impact on the current Jasper implementation assessed.

### 6.9. MS database

This web service allows the communication between the New EMCIP and the MS local database.

This web service will provide a standard taxonomy model that the MS should be compliant with in order to exchange information with the New EMCIP.

This web service makes the Investigation Parser component self-contained allowing the upgrade / change of the taxonomy to be exchanged with MS and external applications with no additional changes in the New EMCIP system.

### 6.10. IMO exchange

This web service allows the communication between the New EMCIP and the IMO system.

This web service will provide the Investigation data in the standard model proposed by the IMO.

This web service makes the Investigation Parser component self-contained allowing the upgrade / change of the IMO investigation standard with no additional changes in the New EMCIP system.



## 7. Non-Functional Requirements

This chapter provided a detailed description of non-functional requirements such as scalability, availability, security, performance;

### 7.1. Availability

Application design shall propose the implementation of redundancy, failover and load balancing techniques whenever considered appropriate.

The new EMCIP should be compliant with the following SLAs:

- 95% availability of the time over any 24 hours period;
- 99% availability over 1 month; and
- 99.5% over a year.

### 7.2. Integrity / Reliability

The ratio of Maritime Incident lost or corrupted in data transfer between MS or IMO and the New EMCIP shall be less than 1%.

The system must be designed and developed to ensure that the architecture supports the reliability and availability of the individual services (defined in the chapter “4.4. EMCIP Integration”) and the whole EMCIP system.

Support for active-active clustering techniques must be provided, in order to ensure maximum availability and load balancing between nodes.

### 7.3. Scalability / Performance

The New EMCIP must be designed and developed so as to ensure that it can accommodate rapid and unexpected increases in transaction volume through the increasing of end users.

The New EMCIP shall be designed in order to be scalable both:

- Vertically (taking benefit from multiprocessor computing); and
- Horizontally (as a distributed application allowing for deployment on multiple nodes of a cluster).

The contractor shall provide precise indication on how to configure and tune the various infrastructure elements (e.g. web-logic server, clusters, loads balancers, etc.).

The New EMCIP, as well as its services, shall be accessible to MS and end users through Internet.

The time for execution of an action by a user utilising the web-interface (e.g. submit an occurrence, include an element in the analysis tool, perform a query, etc..) should be less than 3 seconds.

The contractor must indicate in the test plan the tools methods recommended for conducting load and stress test.

### 7.4. Security

The system must be compliant at least with the level 2A defined in the OWASP Application Security Verification Standards. (<https://www.owasp.org/index.php/ASVS>).

Each external system interacting with the new EMCIP must use Transport Layer Security protocol (TLS version 1.0 or latter).

## 7.5. Other requirements

The contractor shall define and document the deployment proper procedures for each configurable item ensuring, as much as possible, continuity of operations.

END OF DOCUMENT

**European Maritime Safety Agency**

Praça Europa 4  
1249-206 Lisbon, Portugal  
Tel +351 21 1209 200  
Fax +351 21 1209 210  
[emsa.europa.eu](http://emsa.europa.eu)

