WP3: PORT LOGISTICS NEEDS ASSESSMENT

Identification of best practices (D3.4.1)

for Port of Ploče Authority

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# Introduction

Primary focus of is development of pilot system as prerequisite in order to upgrade ICT solution which are existing in in Port of Ploče area with aim to solve defined bottlenecks in port areas. Port of Ploče Authority has done great effort in development of Port Community System which cover logistic chains and will be integrated with other systems. With aim to upgrade and develop system for better control and management in all areas, with focus on ship arrival/departure procedures, Port of Ploče Authority will lower bottlenecks in transport and services regarding multimodality in the Adriatic-Ionian area. One of focused acquisition will be regarding AIS Base Stations and Traffic Image Application for the VTS Center and SAR MRSC operations of Port of Ploče Authority

The goal of the project is to create a pilot system with the outcome that must contain improvement suggestions, that can be used as prerequisites in the requirements engineering process for the development of pilot AIS Base Stations and a Traffic Image Application (application for VTS and SAR operations).

The following questions must be answered and covered by technical part:

1. What are the workflows, that are supported by the use of AIS data and a Traffic Image Application now or can be supported in the future?
2. Where are the bottleneck processes that can be solved by the implementation of better IT solutions in context of AIS and a Traffic Image Application?
3. How can an improved use of AIS data and data exchange lead to increase maritime safety within the port area and the Ploče VTS/SAR area?
4. What are the main optimum Traffic Image Application requirements for the operations at the Port of Ploče in general (in consideration of international regulations SAR and VTS perspective)?
5. What are the requirements for the use of AIS data in different contexts and therefore what are the functional requirements for new AIS Base Stations?
6. To what extent are the defined requirements future proof and considering current developments in the maritime business?

**Technology will be covered in a way that use of technology in port areas could be prerequisite for solving bottlenecks:**

* Commercial aspects
* Quality of the concept and approach
* Existence of relevant expert knowledge and experience

# Proof of Concept phase

The Proof of Concept is a quick and fast client-only solution. The focus is on demonstrating how the processes of Port of Ploče Authority (PPA) can be supported with this solution. The related backend services (database, servers) are not installed.

The Proof of Concept (PoC) phase will provide the initial demonstrative solution as prerequisite for pilot actions. The basic elements to be setup include the geographic information system (GIS) component which will allow geographic information to be added to the solution in the future, and the interface for AIS data, which is the first step for the integration of AIS data into the system.

A workshop onsite at Port of Ploče Authority (PPA) will provide the requirements for the incident form, GIS development, Data management and AIS interface customization. The incident form development will be important for the later ‘Incident phase’.

The Proof of Concept phase will be concluded with an installation onsite in Port of Ploče Authority.

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Figure 1 Common operation picture for demonstration purpose

# Foundation phase

The operational use case feature achieved by this phase is the visualization of vessel traffic and port infrastructure in GIS.

The focus of this phase is to provide the basic backend services and an enhanced and improved client, already customized to PPA’s needs, by enhancing the GIS layer tree. The solution will be developed in collaboration with PPA with the integration of PPA’s existing AIS data stream. This phase will provide the core functionalities which will be further built on by the next three phases.

The foundation phase will provide the core functionality to the system regarding monitoring and tracking ships. The visualization of the maritime ‘Common Operational Picture’ (COP) will be based on S57 standard maritime charts and AIS data. The main elements of the phase are the kickoff meeting, specification workshop and documents, environment setup, integration, development and testing.

The phase begins with a one day ‘Kick off’ meeting in Ploče where the expected outcomes, scope, schedule, communication and collaboration expectations will be discussed and confirmed. It marks the formal beginning of the project.

The next major milestone is the two-day specification workshop in Ploče, the outcome of which will be the system specification, interface specification, and customization specification. With these technical specification documents, the development team can start work on product adaption.

The essential features to be delivered include AIS, which will allow for ships to be visualized as tracks within the system, and the S57 maritime charts provide the SOLAS-standard of electronic navigation charts. To enable these features, a decoder interface, GIS layer integration, S57 implementation, an AIS table and AIS receiver interface will be developed.

The test, development and productive environments will be stood up. There will be a period of interface and integration testing to ensure that the AIS track data is correctly visualized. Throughout the whole phase, project meetings will be held via Skype to ensure both sides of the project are up to date on the progress of the project.

At the end of the foundation phase, the system can be used in a productive state for monitoring ships in real time as per SOLAS and IHO standards. The foundation phase consists of the core functionality required for the system to be implemented and used by the customer. Additional phases will introduce more functionality to the system for the improvement of the operations of Port of Ploče Authority.

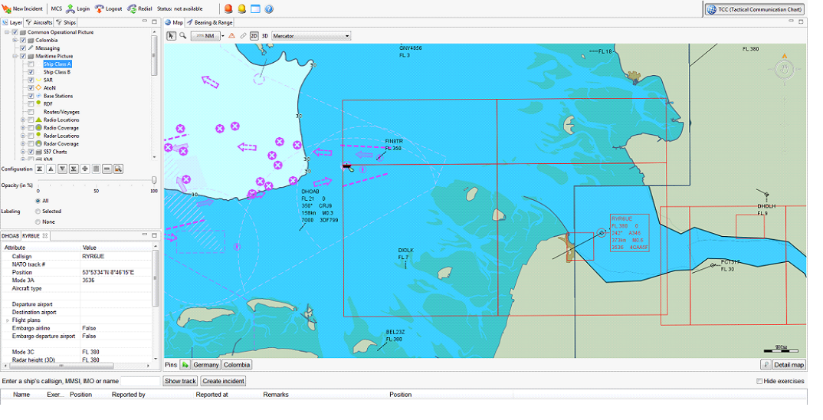


Figure 2 Maritime COP displaying S57 charts and AIS ship tracks

# Incident phase

The operational use case features achieved by this phase are the inbound/outbound ship handling, incidents with forms and checklists, and use of an automated log.

The focus of this phase is to add incident handling (incident form, checklist, action log) to the AIS visualization. The foundation phase has provided the AIS visualization, and now it will be combined with the incident form customization, to result in a multi-functional solution.

The incident phase is a major phase of the overall project. Until this point, the solution that has been developed enables the monitoring and tracking of vessels. This phase includes the activities required to implement a functional incident management solution in production.

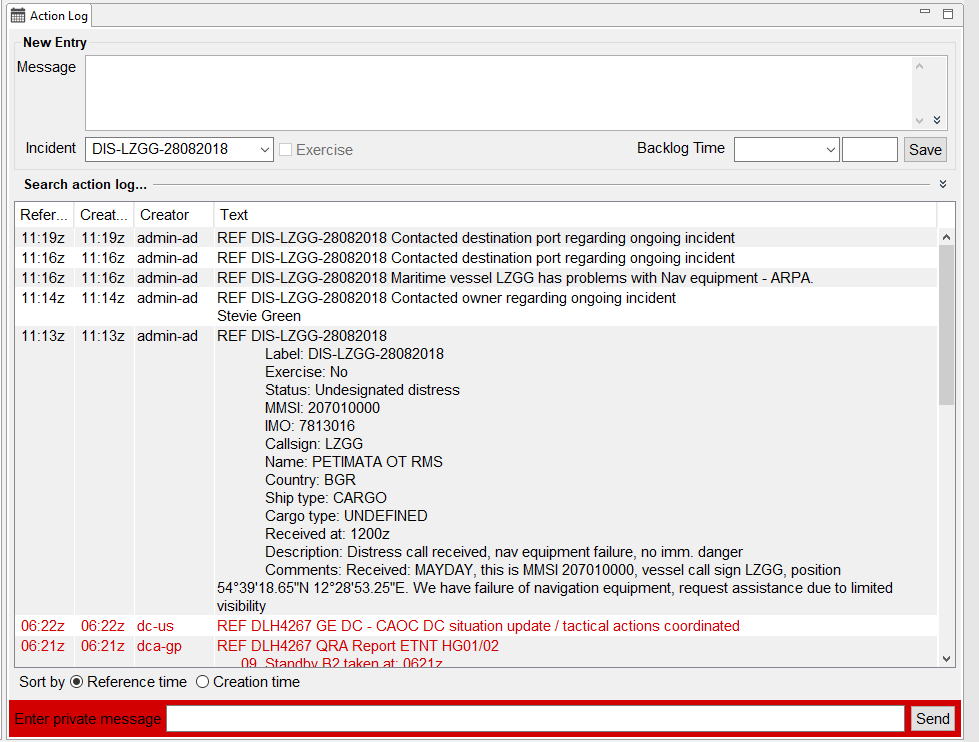
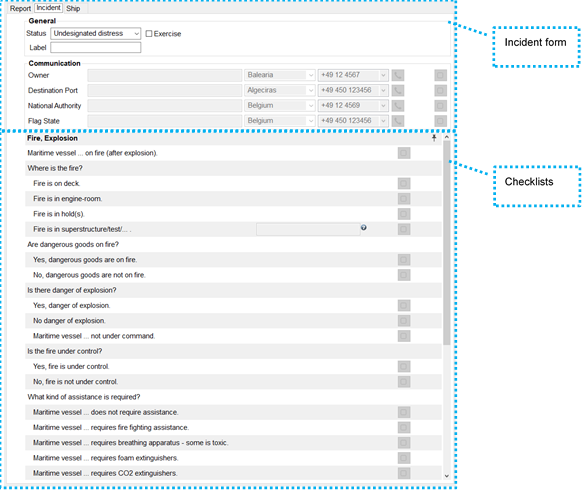
The forms specification as part of a specification workshop will inform the development activities for the incident forms and checklists. As part of this phase, the test procedure handbook will be developed. This test procedure handbook will form the basis for the testing components of the project.

The release documentation will need to be provided throughout the project and pilot actions. As part of release management, release notes, impact assessments, and release control procedures will be conducted. Customer release management such as testing, and issue handling will form part of this phase.

The System Acceptance Testing (SAT) will occur onsite in Ploče for a three-day period. This testing will be conducted with Port of Ploče Authority to ensure that the requirements of the users have been met. The SAT report will be provided to PPA. The SAT and SQT issue handling will be also managed.

A user manual and an end user manual will be delivered, and training will be delivered on site in Ploče by for both end users and the administrator.

Figure 3 Maritime incident form & checklists (left), and action log (right) during a maritime incident



# Analytics phase

The operational use case features achieved by this phase are legal proof recording and incident analysis.

The focus of this phase is to provide the necessary modules to load historic events and incidents from the database and save them to external files. This phase goes beyond the ‘real time’ monitoring and incident management features. The core features provided in this phase will support operators with post incident attribution processes, as well as the ability to export incident information for training purposes.

The analytics phase consists of further development of the solution, such as more advanced S57 GIS feature implementation. The replay functionality is a feature allowing the replay of historic sequences from within the last 30 days. This provides a quick view back in time for incident analysis. The system can record all sensor data in the database and replay it. The analytics component supports the examination and wrap-up phase for incident. Complementing this feature is the use of an oracle database as a central data repository. All data modifications not done by the application will be logged in the audit log module.

Project meetings such as project management (PM) meetings will be held during this phase of work. These meetings allow for the managers of both teams to meet in Ploče and discuss the status of the project.

The System Qualification Testing (SQT) will take place during this phase. This testing phase will consist of testcases as documented in the test procedure book. The purpose of the qualification testing is to verify the design process.

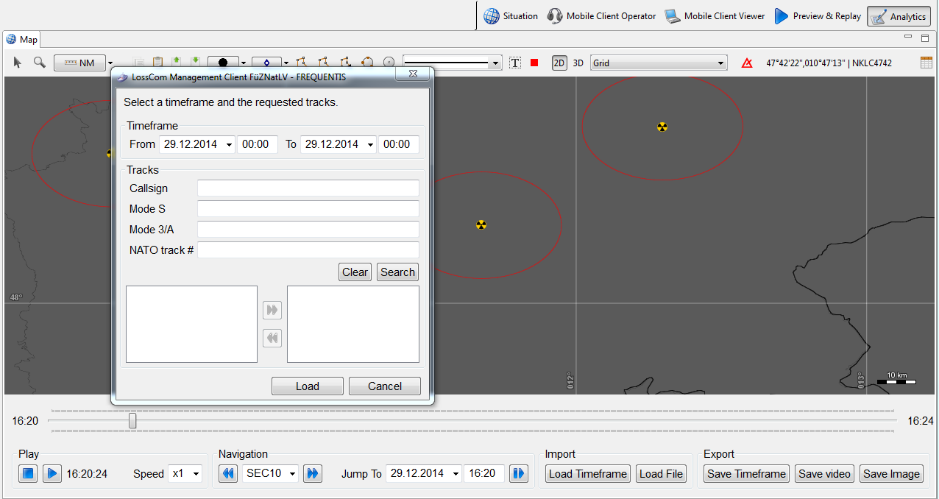


Figure 4 Analytics component of the solution showing the controls

# Ship database phase

The operational use case features achieved by this phase are the access to ship information at the touch of a button and administration of the own resources/contacts.

The Ship DB’s focus is to create an automatically updated repository of ships, useful for supporting incident management. This phase complements the incident phase to provide operators with reference information during routine and disruptive events. This phase builds on functionality developed in previous phases to result in a more advanced system.

The Ship database (DB) phase consists of further feature development, customization and project management activities. The ship database itself will be development along with a user interface. This feature will allow the ship information to be stored.

Customization included in this phase is the import of shipowner and contact lists – these are required to populate information in the incident forms for the incident phase of the project. This master data will provide the operator access to important contact information during an incident.

As the whole project is underway, the project management activities that will be part of this phase include an onsite project management status meeting, where the progress of the project can be discussed in person at a managerial level. There will also be project management activities within occurring to ensure the advancement of the whole project.

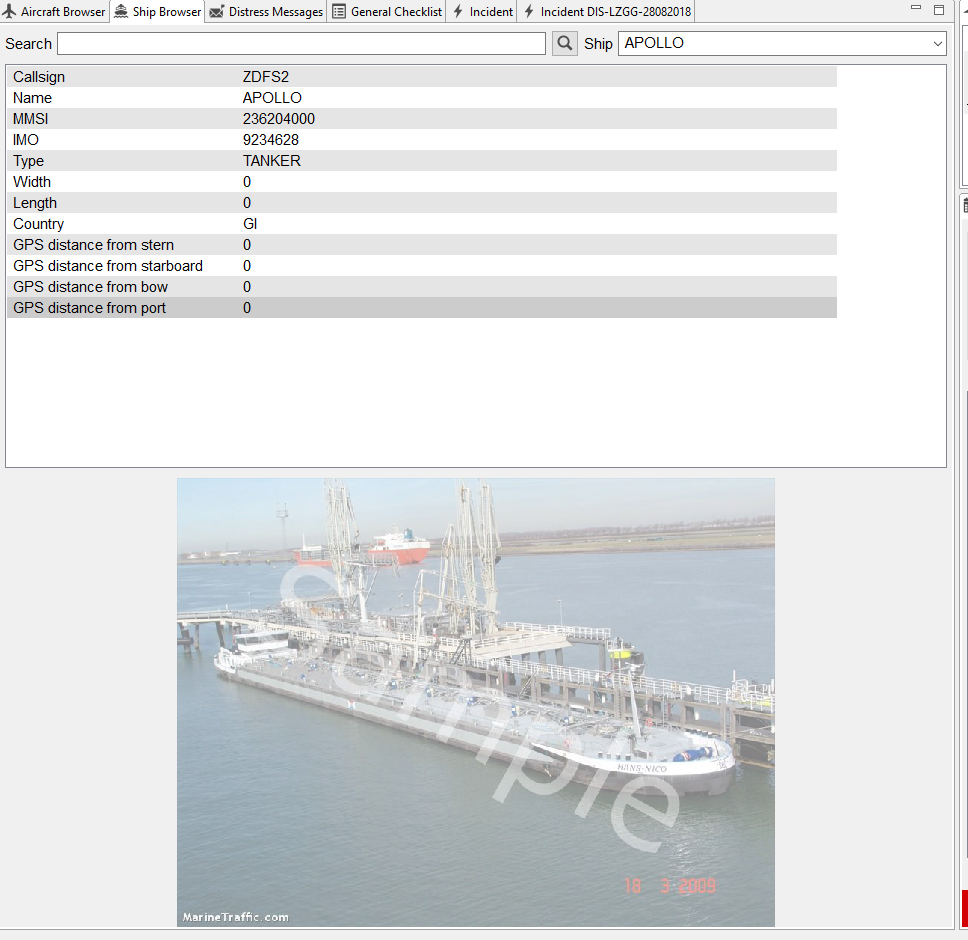


Figure 5 Sample ship information to be available as part of incident management

# Future expansion

The future expansion of the solution could include further modules, such as the maritime communication system and its integration, as well as the mobile client, both of which are of interest to PPA.

# Hardware Architecture

A screenshot of a cell phone

Description automatically generated

Figure 6 Basic logical architecture diagram

## Software List

|  |  |
| --- | --- |
| **Software** | **Description** |
| Windows 10 (64bit) | ICM operator client operating system |
| Java Runtime 1.8 | ICM operator client application environment |
| Luciad Lightspeed | ICM operator client GIS Component (provisioned as 3rd party license) |
| Red Hat Enterprise Linux 7.x+ or comparable Linux distribution (incl. CentOS) | Application Server Operating System (incl. Application Server, GIS Server, Reporting Server, File Server). |
| Red Hat WildFly 8.2+ (former JBoss) | Application Server |
| Oracle 12.2+ | Database environment |
| ActiveMQ 5.15.0 | Messagebus |

## Hardware List

|  |  |
| --- | --- |
| **Hardware** | **Description** |
| Standard Client Workstation, Dual Core CPU, 8 GB RAM, 10 GB free HDD, OpenGL 3.0 | Minimum requirements for an ICM operator client working position. *Please note that 3D rendering in the common operational picture will require an Open GL 3.0 compatible graphics card with at least 1GB of video memory.* |
|  | Requirements for all backend server systems. (1 server, 2 clients)  Mono or Dual-Socket Motherboard  **Minimum requirement:**  1x Intel Quadcore i5-5xxx  8GB DDR4 RAM  100GB HDD  RAID 1  1x100BASE-T Ethernet  Single PSU    **Recommended:**  1x Intel Quadcore i5-7xxx or better  32GB DDR4 RAM or more  1TB SSD  RAID 5 or better  2x Gbit Ethernet  Dual PSU |
| Storage | An overall storage space requirement for all server applications at one site of up to one TB, highly dependent on the actual number of documents and transactional data that have to be stored, retention periods, required audited tables etc. |

This Hardware should:

* Serve 2 operator seats
* Handle a limited number of vessels at the same time (Ploce harbour area)

## Technical Delivery – rough and basic scope split

|  |  |  |  |
| --- | --- | --- | --- |
| **Layer** | **Procurement** | **Installation** | **Configuration** |
| System Housing | Customer | Customer | Customer |
| Networking (incl. NTP) | Customer | Customer | Customer |
| Server Hardware | Customer | Customer | Customer |
| Client Hardware | Customer | Customer | Customer |
| Operating System | Customer | Customer | Customer |
| Domain Setup | Customer | Customer | Customer |
| Security | Customer | Customer | Customer |
| Remote Access | Customer | Customer | Customer |
| Database (Oracle) | Customer | Customer | Adaptions for the Application done by |
| Active MQ (Message bus) | Customer | Customer |  |
| Middleware (Wildfly) | Customer | Customer |  |
| GIS Client Module (Luciad) | (will be embedded into Application) |  |  |
| AIS interface integration | Customer (=provide an AIS Data stream) | Customer (=integrate AIS datastream to ICM on network layer) | (provide an AIS interface within ICM to read AIS data) |
| ICM Server & Client application | n/a |  |  |

# Added value for pilot actions and INTESA project

All the data collected in real time will be at disposal of all the port community and in particular will be available to ship masters and port pilots to optimize nautical maneuvering for port entering/exit operations via the use of system.

The pilot project that will be develop in the framework of Intesa project consists in providing advanced tools for ship maneuvering which should be integrated with national system to share data and Port Community System already used in Port of Ploče. The tools will be surely based on advanced hardware and last generation devices but will be effective only because constantly provided with real time meteorological data shown in an update geo referred cartography.

The constant connection in real time will be assure through the national AIS network managed by the Croatian VTS. The above-mentioned system architecture will warrantee a safe, solid and standard data transfer. Such and architecture, following IMO standards could be easily replicable in any other port contests.