DigLogs

4.2.3 – Involvement of selected players and delivering of road maps final version - freight sector

CFLI

Responsible partner: CFLI Involved partners: All			
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1 Introduction

In the previous phases of the DIGLOGS project, the freight transportation logistics processes have been studied, selecting 4 innovation dealing with this topic. For each innovation, a dedicated pilot project will be carried out in the next phases of the DIGLOGS project. To assure an effective development of the selected technologies, a roadmap has been drafted for each of them. The road mapping process has been divided into three steps:

- Fist version of the roadmap (V1) carried out by the project partner in charge of the pilot project according to a common methodology.
- Stakeholders involvement aimed to revise the roadmap V1 to maximise the contribution of most important stakeholders in the project area and come to a V2 version.
- Final version of the roadmap (V3) revised on the basis of the stakeholder feedback.

This document includes the final version of the freight sector roadmaps (V3) drafted based on the V1 strategic version and the following consultation stage (V2). The final version includes all the remarks coming from stakeholders, finalising the strategy proposed for innovation deployment.

This document is expected to ease the deployment of the selected innovations, contributing to foster the digitalisation process in the project area. Moreover, the outcomes of the present study might serve as best practices and be useful in other contexts, after a proper re-elaboration based on the different application environment.

2 Objectives of this document

In this document, the final version (V3) of the roadmaps is reported, representing the result of two different stages: the first revision stage has reached a sort of expanded version of the V1 roadmap reported in D4.3.1. The strategic roadmap is based on a special “what-why-how” list that includes both physical and intangible elements that can be changed to achieve the goal of the innovation deployment.

The strategic roadmap V1 has provided the basic framework for the subdivision of pilot into deployment actions and activities and their first basic arrangement into a timeline.

According to strategic planning literature, the roadmap "what-why-how" list is based on the following questions:

- WHAT element of the context can be changed to achieve the objectives expected from the innovation pilot deployment?
- WHY a context element must be changed? What is the specific objective to achieve changing that element?
- Briefly, HOW to change the context element? What can be tools, methods procedure to change it?

The strategic roadmap has been divided into **11 "context elements"**:

1. **Errore. L'origine riferimento non è stata trovata.**
2. **Errore. L'origine riferimento non è stata trovata.**
3. **Errore. L'origine riferimento non è stata trovata.**
4. **Errore. L'origine riferimento non è stata trovata.**
5. **Errore. L'origine riferimento non è stata trovata.**
6. **Errore. L'origine riferimento non è stata trovata.**
7. **Errore. L'origine riferimento non è stata trovata.**
8. **Errore. L'origine riferimento non è stata trovata.**
9. **Errore. L'origine riferimento non è stata trovata.**
10. **Errore. L'origine riferimento non è stata trovata.**
11. **Errore. L'origine riferimento non è stata trovata.**

The second stage has been carried out by means of a consultation stage, based on the V2 version of the roadmap, and it has reached the final V3 version.

2.1 Multimodal transport services roadmaps deployment

The main objective of the 4.2 activity is to define a road map for innovative solutions deployment in the freight sector segment.

The DigLogs pilot action brief list is the following:

- **Action 5.1 Freight pilot implementation**
  - **5.1.2 - DSS Decision Support System (aimed at implementing multimodal transportation solutions)**
  - **5.1.3 - PCS Automation (new automation functions to be applied on existing PCSs)**

- Action 5.2 Passengers pilot test
  - 5.2.2 - Mobile APP for passenger security (mobile app and beacon WSN implementation) - UNITS
  - 5.2.3 - APP for data flows management of passengers (data integration for the development of new services for passengers) aimed towards Rijeka port
  - 5.2.4 - Digitalization of access control as a prerequisite for integration with the national PCS in Port of Šibenik

- **Action 5.3 Combined pilot implementation**
  - **5.3.2 - Management solution for passengers and freight transport combination. (Maritime Transport Management by linking PCS and national platform for Croatian ports)**
  - **5.3.3 - Big Data / Data management solution for planning (Spatial Data Infrastructure version 1 and skill enhancement for Venice port)**

Since this deliverable is focused on the **freight's sector**, it will include roadmaps for pilot actions 5.1.2 and 5.1.3. Furthermore, according to agreement from project video meetings held on 7th and 8th April, combined pilots' 5.3.2 and 5.3.3 are included in both deliverables, since a dedicated deliverable for them is not foreseen.

3 Freight sector final version of road maps

3.1 WMS 4.0

Typically, a multimodal transport operator (MTO) acts as a principal "carrier" transporting goods by one or more modes of transport on behalf of the shipper and carries total responsibility and liability to perform the transport contract. As a result, the MTO, being responsible for the whole transport chain, concludes a number of sub-contracts with individual carriers, road, rail, shipping lines, port authorities, terminal operators, thus performing the delivery of the goods from each actual sub-carrier and pass them to the next sub-carrier.

To these aims, it is therefore crucial for the MTO to have the ability to design and provide efficient and effective transport arrangements, especially in light of the multiple, heterogeneous activities that occur at each transfer point, e.g., loading/unloading, waiting or storage, weighing, packing, reconsolidation, which contribute to the resulting delivery time and costs, thus affecting the competitiveness of the overall multimodal transport chain.

Additionally, several disruptions occurring on a daily basis may severely impact terminal operations; for instance, truck arrivals may be delayed because of cargoes delay, a traffic jam on the way to the port, or bad weather conditions, but also terminal-related issues such as an unexpected breakdown of the crane, crane driver illness, a strong wind from the sea. To face these challenges, the terminal system operations should be designed to maintain the service to satisfactory quality standards.

Within Diglogs, the Pilot Action carried on by Elevante, the so-called WMS 4.0, aims to solve the challenges related to the last mile of the multimodal transport chain, that is making the conduction of road transport activities from the destination railroad terminal in Gorizia (SDAG), Friuli Venezia Giulia Region, Italy to the final destinations in the most efficient and convenient way.

The pilot will test a web application that is going be used by carriers, MTO, dry ports and public authorities in the Programme area which will perform an innovative service: an IT system delivering data and information enabling the realisation of intermodal appointments in the transport nodes.

A relevant functionality of the WMS that will be implemented in the Pilot Action is a DSS (Decision Support System), consisting in an open-source platform proving optimised transport arrangements for last mile segments by making use of specific algorithms and coordinated data from multiple stakeholders. WMS is a software application, designed to support and optimize warehouse functionality and distribution centre management, specifically facilitating the management of daily planning, organizing and staffing, as well as providing support to control the utilization of available resources, to move and store freight into within and out of a warehouse, to assist staff in the performance of material movement and storage in and around a warehouse. This DSS, linked with the WMS (and the Inland terminal involved at Gorizia) will provide an "intermodal transport network IT interface" which, by implementing a specific intermodal appointment solution, will allow logistics operators to be timely informed and choose among different possible scheduling solutions in order to optimise transport for specific legs of the multimodal chain.

The DSS part will consist in the test of a centralized collaboration platform with MTOs aimed at collecting from them useful data about their services (e.g., time schedules, origin/destination, delays, ETA/ETD) and providing scheduling support to carriers, other MTOs, dry ports and public authorities. The web application envisaged as part of the pilot will firstly be deployed for Gorizia terminal and will subsequently be open to other dry ports and MTOs in the Programme area willing to upload their data.

The system will serve as a DSS for key logistics stakeholders (carriers, logistic providers, transport operators and authorities) enabling them to optimize freight transport and interchange processes by finding the best solutions for transport services combining different parameters like prices, CO_2 emissions, load factor and others. The system could also function as a module integration for the WMS and TMS that could add this new source of information in order to improve the planning process, while synchronising the railroad terminal cargo operations with truck arrivals and departures.

The need for such a system in the broad context of inter and multi-modality can be found in the inefficiency of freight transport which is mainly due to the lack of real-time information between the actors and the subsequent lack of coordination. All these issues lead to high operational costs and complexity.

Moreover, the current situation of Northern Italy logistic hubs and dry ports, shows a proliferation of stand-alone and proprietary ICT systems which are not integrated and, thus, cannot exchange useful and already available information between them and with external entities.

In summary, the overarching goal of the pilot system is to improve operational efficiency by integrating heterogeneous sources of data which will be duly processed through specific algorithms to provide optimal real-time solutions in the complex space of freight transport problems (e.g. best price of combined transport, lower emissions of entire chain, e-procurement tools for maritime transport services, higher bi-directional load factor). As a result, the deployment process of the pilot will include the development of a software, mainly implementing and fine-tuning a pool of specific algorithms solving scheduling problems at key transport nodes.

3.1.1 Post questionnaire stakeholder assessment - Pilot action

- Current situation analysis
    - CE1. Identification of pilot project stakeholders
    - CE3. Administrative processes analysis
    - CE3. Operation processes and information source analysis
    - CE1. IT infrastructure assessment
- Overall Design
    - CE1. Interview with operators and actors of the system
    - CE1. SWOT analysis
    - CE1. Pilot project requirements analysis
    - CE1. Overall software architecture definition
    - CE1. Hardware and software technologies selection
    - CE1. Overall resources and time planning
    - CE9. Overall budget definition

3.1.2 Pilot action

- Pilot planning
    - CE1. Use case definition

  - CE1. Component definitions
  - CE6. Data model definition
  - CE6. Test data gathering
  - CE8. Test environment setup
- Pilot implementation
  - CE6. Data model implementation
  - CE8. Detailed functions definition (with different granularity: activities, sequences)
  - CE8. Unit tests definition
  - CE8. Functions implementation
  - CE8. Tests execution
  - CE8. System parameters tuning
  - CE8. Deployment process definition

3.1.3 Post-project activities

- Promotion, dissemination, and consultation
  - CE11. Publications on sector magazines
  - CE11. Web site publication and placement
  - CE11. Newsletter and social network dissemination
  - CE11. Participation in relevant events
  - CE11. Promotion through word of mouth and direct contacts

3.1.4 System Exploitation and Maintenance

- System exploitation planning and execution
  - CE4. Internal resources allocation and training
  - CE9. Budget allocation
- System maintenance planning an execution
  - CE4. Assistance and IT team definition
  - CE8. IT technologies/system update policy
  - CE5. Helpdesk and maintenance procedures definition
  - CE9. Budget allocation

3.2 PCS Automation

The current situation of Mid-Adriatic ports on the Italian side is characterized by a general lack of large-scale PCS, mainly due to small infrastructure dimensions and traffic flows. For these reasons, and for the general lack of information, transport operators have high operational costs and complexity due to the activities connected with the management of intermodal shipments. At the same time, the decision-making process when setting a specific route for a service could be affected by the personal opinion of the operator, not supported by actual numbers. Inefficient routing processes could lead to unsustainable and wrong choices.

The creation of an automated Deliveries Planning system can prevent these issues, guiding the operator throughout the decision-making process, showing the various alternatives for an intermodal service, allowing to book in advance the service needed, simplifying the procedures for Custom Declarations and the processing of Dangerous Goods. At the same time, the system would allow a track and trace system to guide the whole service, reprocessing ETD considering traffic and weather conditions.

In order for the system to work, Polo Inoltra considers essential the participation of all the actors of the supply chain to the system. Ports, Transport Operators, Terminal, MTOs, Shipping Companies and Shippers. The more actors do take part in the system creation, the better the information would be. Also, in order to fully make use of the system potential, it is necessary to have updated and real-time information from the various actors of the chain, making it essential in the mid to long run to connect the ERP Systems of the operators to the main system.

Due to the various nature, dimension and some times the absence of PCS in port communities, Polo Inoltra has decided to create an independent module, that would be included in existing PCS, automatizing processes, or, for smaller ports which do not have a PCS in place, a stand-alone system that could still function without a PCS.

The Deliveries Planning system would need several routes, ports and transport operators in order to fully function. During the Pilot Phase, due to the current absence of RoRo routes in the central Adriatic, it will be lab-simulated the presence of multiple RoRo routes, starting from several ports

of the Adriatic, in particular, the simulation will consider at least three different RoRo Services. These three services will have different time schedules, different booking procedures and availabilities. On the other hand, the system will consider actual intermodal rail-road connections to local Terminals. Actual Transport Operators and Shipping Companies will participate in the Pilot Test as operators needing to plan intermodal services, rail-road-sea or sea-road-sea one, from Italy to Croatia. They will access the Deliveries Planning platform, compare the different options available, book the chosen service, proceed with the operational organization of the service. Ports and Sea Liners will receive the information, integrating them into their system.

Once booked, it will also be considered in the Pilot the re-routing of service due to traffic or other issues. This process will happen based on real-time information. The system, once ended the journey, will also provide basic admin information and the CO2 saving certificate.

It is clear that in the Pilot Phase the system will be considered as an external module, while in the mid to long term it could be integrated with the existing systems of the Transport Operators and Shipping Companies. By doing that, and fully advertising the potential of the platform, it will be possible for operators to join the system at a later stage, fully benefiting from the saving provided and starting a process of organizational change, once the automatization of processes will have given for granted and job roles would have been positively impacted by the system.

A stakeholder questionnaire was presented to estimate the impact of the pilot action and to better examine the opportunities and the threats of this kind of system.

The main results of the questionnaire indicated the fear of the stakeholders that the system would not be effective due to lack of data, low quality data, data which is not up to date, or not data which is not integrated with the various stakeholders' ERP systems. Therefore, in order to match the stakeholders' expectations, it is essential to review the roadmap in order to take into considerations the insights provided by the stakeholders.

A web page presenting PP6’s stakeholder questionnaire is shown in the Figure below:

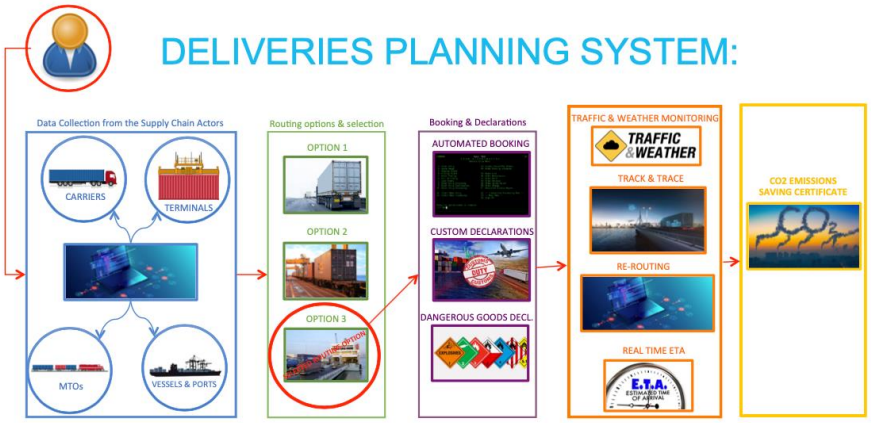


Figure: Subpage of PP6's pilot action leading to stakeholder survey

3.2.1 Post questionnaire stakeholder assessment - Pilot action

- Current situation analysis
  - CE1 - Analysis of DigLogs Pilot Project Requirements
  - CE1 - Analysis of the current technology available for Ports, Terminals, Transport Operators, MTOs and Shipping Companies
  - CE8 - Analysis of Pilot Requirements in terms of IT capabilities
  - CE6 - Analysis of Pilot Requirements in terms of information
  - CE1 - Identification of Pilot candidates
  - CE8 - Study of the current IT systems available for the pilot candidates
  - CE3 - Study of the organizational model in place for pilot candidates
  - CE4 - Study of the Employees capabilities of the pilot candidates
  - CE5 - Study of the Processes and Procedures of the pilot candidates
  - CE1 - SWOT analysis

- Overall Design
  - CE1 - Workshop with the pilot actors
  - CE1 - Selection of the Technologies to be applied
  - CE1 - Overall Planning
  - CE1 - Feedback from stakeholders

- CE1 - Required resources mapping (staff/time/quality)
- CE9 - Overall Budget definition

3.2.2 Pilot action

- Pilot planning
  - CE2 - Identification of the Pilot Areas of Action (Operational and Geographical)
  - CE1 - Identification of actual sea and rail routes available in the areas of action
  - CE1 - Definition of the lab-based integrations to enrich the system while on Pilot Phase
  - CE8 - Definition of the stakeholders IT systems in detail with areas of integration
  - CE4 - Definition of the staff of the Pilot Actors that will be nominated for the use of the system
  - CE5 - Definition of the Processes and Procedures of the Pilot Actors in order to use the system
- Pilot implementation
  - CE2 - Definition of the Test Scenario
  - CE6 - Check the variables and data for the IT real-time update
  - CE5 - Testing of re-routing processes
  - CE8 - Check the real-time information flow
  - CE4 - Check the impact on staff response to the routing options and track&trace information
  - CE8 - Check errors of the system connected to PCS integration with other systems

3.2.3 Post-project activities

- Pilot Review
  - CE3 Evaluate Organisational Changes the System would bring on a wider scale on organizations, considering the savings that could be brought
  - CE4 Define the impact of the system on jobs roles and the productivity increase
  - CE5 Define the impact of the system on processes and procedures
  - CE6 Define the information integration needed to increase the performance of the system
  - CE8 Define the IT infrastructure needed to perform a complete system integration

across the supply chain to make the system more effective

- Promotion, dissemination, and consultation
  - CE11 Definition of a promotion campaign and promotional channels to be used
  - CE11 Definition of the dissemination material
  - CE11 Dissemination of the pilot results
  - CE11 Pilot actors testimonial
  - CE11 Social networks dissemination
  - CE11 Digital newsletters publishment
  - CE11 Relevant Events participation
  - CE11 Direct contact with relevant stakeholders

3.2.4 System Exploitation and Maintenance

- System exploitation planning and execution
  - CE2 System Services Map Definition
  - CE3 Organisational Model definition and integration
  - CE4 Staff identification
  - CE5 Processes definition
  - CE6 Stabilizing information flow
  - CE7 Needed equipment acquisition
  - CE8 IT Integration with PCS and other stakeholders' systems
  - CE9 Financial Planning
  - CE11 Marketing Plan for the System Services
- System maintenance planning and execution
  - CE4 Definition of the assistance team
  1. CE5 Assistance/maintenance procedures definition
  2. CE7 Acquisition of the material/infrastructures required for assistance
  3. CE8 System update definition
  4. CE9 Budget allocation

3.3 Maritime Transport Management by linking PCS and national platform for Croatian ports

The greater part of the port area of the Rovinj Port Authority is intended for passenger traffic and mooring of nautical boats, passenger and excursion boats, yachts, and cruisers, but one part of their operation also pertains to fishing boats and transhipment of fish, which represent freight transport. Regarding this, improving the operations of the Rovinj Port Authority and introducing IT innovation can be considered as a combined pilot activity.

The operation and functioning of the Port Authority are very complex, especially given the need to communicate with a large number of stakeholders. It needs to be balanced between the administrative requirements of the state on the one hand and the private interest of the users on the other. The function of the Port Authority is to manage the port area in such a way that it optimizes the operation of all processes and always strives to maximize commercial results. Of course, taking into consideration the business conditions prescribed by the state government and which all port users must satisfy and fulfil.

In that sense, the Port Authority must strive to improve all processes in order to provide users with the best conditions. This especially concerns functioning and administrative operation. First and foremost, whether concerning the fishing boats (freight) or cruisers/yachts/nautical boats (passengers), their users require information from the Port Authority about the availability of berths, the possibility of booking berths and, later on, information regarding the water and electricity supply. This operational information must be accurate and prompt, as well as approved in the National Single Window System (CIMIS). Furthermore, in administrative terms, the usage of berths should be formalized by signing a contract and issuing an invoice that must be accurate and transparent. This is just one segment of interaction and communication between the users, the State Administration (NSW - CIMIS), and the Port Authority. Unfortunately, it currently includes several separate and unrelated applications. This results in unnecessary piling up of documents, the longer procedure duration, and, consequently, reduced efficiency of the port and economic competitiveness of the users.

Rovinj Port Authority will implement an application that integrates the operational and accounting system of the Port Authority's operations and it will serve as PCS. The application enables mooring reservation system, graphic mooring occupancy management, billing via mobile

application, creating daily, monthly and annual reports, generating mooring contracts, automatic invoicing, CRM-Integrated Email System, accounting, paying invoices and automated importing of bank statements.

Rovinj Port Authority currently uses several different unrelated software systems that make it difficult to operate and monitor all business processes. The implementation of a system that integrates all aspects of the Port Authority's operations will enable optimal control over the operations of the Port Authority in all port areas it manages, and at the same time, enable the control of the mooring capacity occupancy. The application enables better integration of the operational part of business and management. Additionally, it solves the problem of duplicate data entry and possible errors that occur during the input, facilitates access to the data since all the data is digitized and in one place, the software is also available through the mobile application, statistical reports on traffic in the port are generated, significantly reduces the paperwork, radically speeding up processes, digitizing business and enabling better financial control.

The application's output documents are a prerequisite for future automation of the communication process with NSW, which is not technically possible at this time. As soon as NSW - CIMIS enables electronic data to be automatically entered and accepted from an external application/source, this system will be ready to establish M2M dialogue.

Web page presenting PP9’s stakeholder questionnaire is shown in Figure on the next page.

Figure: Subpage of PP9's pilot action leading to stakeholder survey

3.3.1 Post questionnaire stakeholder assessment - pilot action

- Current situation analysis
  - CE1. Analysis of DigLogs AF pilot project requirements
  - CE1. Identification of resident technologies for PCS integration
  - CE1. Analysis of fit of the pilot project with IT and project portfolio
  - CE1. Outline of pilot project candidates
  - CE1. Enumeration of pilot project candidates
  - CE1. Selection of the viable pilot project
  - CE1. Listing of initial project considerations

- Overall Design
  - CE1. Overall planning
  - CE1. Workshops with stakeholders
  - CE8. Select technologies for application
  - CE1. SWOT analyses
  - CE1. Feedback from stakeholders

- CE4. Definition of required resources (time/personnel/quality requirements)
- CE9. Overall budget planning

3.3.2 Pilot action

- Pilot planning
  - CE1. Definition of pilot action targets
  - CE8. Definition of pilot installation requirements
  - CE3. Analysis of all operation processes
  - CE3. Analysis of all administrative processes
- Pilot implementation
  - CE8. Procurement and installing of equipment
  - CE8. Modification of the application to the needs of the Port Authority
  - CE5. Definition of the internal test scenarios
  - CE5. Identification of the test scenarios
  - CE3. Define development/testing team
  - CE4. Training of employers
  - CE4. Training of stakeholders

3.3.3 Post-project activities

- Promotion, dissemination and consultation
  - CE11. Definition of a promotion campaign towards stakeholders and target groups
  - CE11. Decision on the dissemination of project visibility materials
  - CE11. Individual dissemination of pilot results (publications, conferences, events)
  - CE11. Creation of digital newsletters
  - CE11. Web information placement
  - CE11. Social networks pilot project reach
  - CE11. Direct contact with stakeholders within target groups
  - CE10. Exploration of venues to reach end-users (passengers and freight)
  - CE11. Decision of expositions participation

3.3.4 Commencing with operative system exploitation and maintenance

- Exploitation and maintenance planning
  - CE9. Budget allocation

    - CE5. Assistance/maintenance procedures definition
    - CE8 System update definition
    - CE3. Definition of the assistance team
- Exploitation and maintenance execution
    - CE8. Acquisition of the material/infrastructures required for assistance
    - CE3. Internal resources reallocation
    - CE4. Internal resources training
    - CE8. Corrective maintenance deployment

3.4 Maritime Big Data / Data management for planning

The pilot action is to be implemented in the context of the North Adriatic Sea Port Authority and it regards the adoption of a centralized and interoperable spatial data repository aimed at giving a robust structure to the information and data used within the internal processes and to provide services to external operators and institutions.

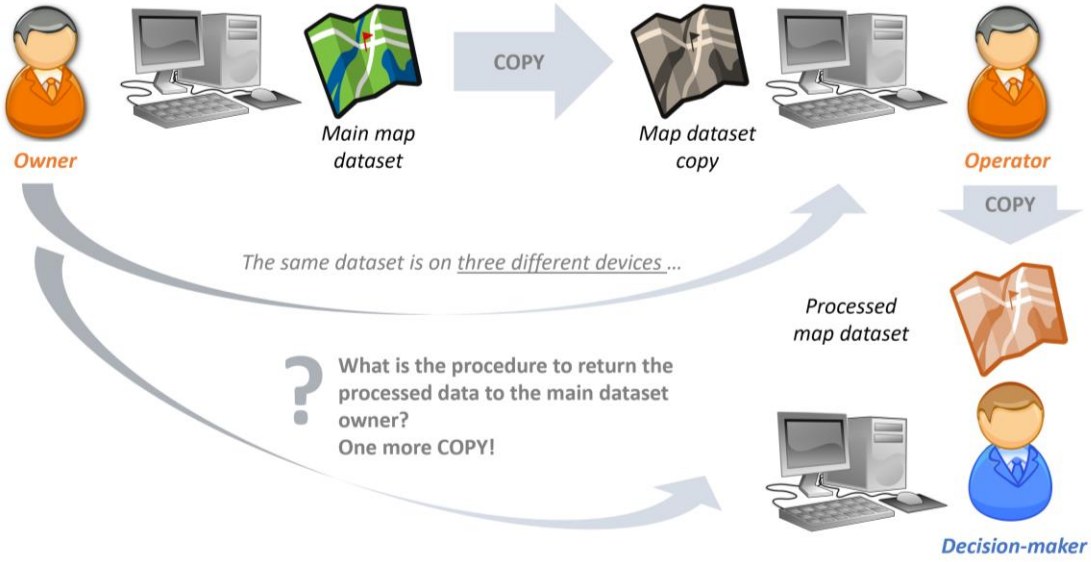
The pilot belongs to the innovation named “Maritime Big Data / Data management” aimed at obtaining the best results from integrating different data sources in terms of added value in knowledge and management capability.

Within the broader context of the innovation, the narrower objective of the pilot action is to enable an integrated management and utilization of standard data, real time data and georeferenced (spatial) data both to support decision making processes and improve Port Authority services overall quality.

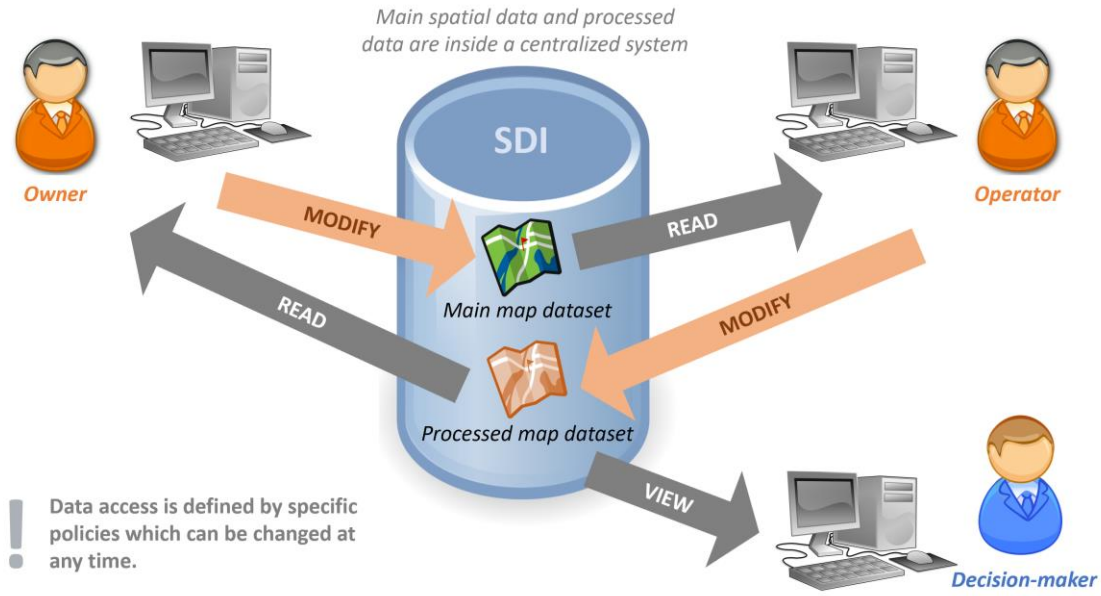
The pilot action is mainly aimed at making a transition from a current situation in which data is ineffectively managed and used to an improved condition in which more different data can be integrated and dynamically accessed by several users according to different policies and objectives without replication and corruption.

In the current situation of the Port Authority, the decision-making support based on the use of spatial data is provided copying several times the main datasets and the processed datasets, due

to the utilization of different storage systems and processing techniques within the same organizational context. This makes difficult both to keep dataset up-to-date and share it in an effective way, and it significantly reduces processes performance.



Port Authority data management process current situation



Port Authority data management improved situation

For the innovation deployment, a Spatial Data Infrastructure will be implemented integrating existing tools and platforms. It will perform both the storage and dynamic processing functions, making different users able to directly access data and processing results and visualization according to a special policy management protocol. This Spatial Data Management System will allow to store the processed data and maps either as new datasets or as algorithms that process data in real time, without forcing operators to change the already known working tools.

The suggested activities don't need any software development, therefore the pilot action will have a "training-empowered" approach in order to achieve both an organizational improvement and a workforce skill improvement, fostering the awareness on how spatial data visualization and dynamic data processing can support decision-making process.

Main results from the stakeholders' consultation

The main results from the stakeholders' consultation mainly refer to the following instances:

- The efficiency of the organizational model should take place carrying out application tests on the basis of specific needs analysis.
- There is a widespread belief that it is necessary to improve the exchange of information between actors, applying best practices, also pushing for an update of laws and regulation.
- Many companies could innovate their services having more effective communication channels and updated and detailed information.
- Improving skills through training or specialization programs is also useful for decision makers as they can increase their ability to use and understand data and processes and better assess scenarios using different data-driven resources.
- There is a great need to integrate different data sources and improve data quality, reducing redundancies and inconsistencies.
- Many useful data must be analysed in real time, implementing automatic extraction systems.
- The overall community system can be more integrated, connecting different software platforms such as document and financial management systems and real-time monitoring systems, fostering dematerialization, better relationships between actors and fast information update.
- The opportunities of adopting open source digital resources must be exploited so to eliminate avoidable royalty costs.

About the feedback related to the roadmap, the most frequent answers are related to the interest of being informed about the results and outputs of the activities; closer interests especially refer to:

- User needs analysis in the pilot action stage
- Processes' analyses and re-design
- Some involvement in training and educational programmes

The following chapters are the final version of the roadmap.

3.4.1 Preliminary assessment

- Current situation analysis
  - CE1. Organizational assessment
  - CE1. Data source assessment
  - CE1. IT infrastructure assessment
- Overall design
  - CE1. Long-term targets definition
  - CE1. Pilot objectives
  - CE1. Stakeholders consultation
  - CE1. Pilot objectives review
  - CE9. Overall time and resources plan

3.4.2 Pilot action "Spatial Data Management System"

- Pilot planning
  - CE1. Target definition
  - CE1. User needs analysis
  - CE8. Hardware/Software prerequisites definition
  - CE6. Spatial data set to be used for the pilot implementation
  - CE1. Involved processes and services analysis
  - CE4. Training and educational program
- Spatial datasets acquisition
  - CE6. Data acquisition
  - CE6. Analysis of the spatial data packages for the pilot test
  - CE6. Optimization and pre-processing training on the job
- Spatial Data Infrastructure implementation
  - CE8. Data model design
  - CE8. Performance requirements analysis
  - CE8. IT infrastructure implementation (HW/SW)
  - CE8. Network configuration
- Data migration
  - CE4. Workshop with involved users
  - CE6. Spatial data conversion and migration test
  - CE5. Spatial data conversion and migration training on the job

- Procedures implementation
  - CE1. Procedures objectives assessment
  - CE8. Grants policy definition
  - CE5. Procedures development training on the job
  - CE5. Information design and delivery workshop / training
- Process and services optimization analysis
  - CE2. Definition of involved processes and services
  - CE2. Identification of spatial-data-driven support to processes and services
  - CE4. Workshop with involved users
  - CE2. Process / service re-design assessment
- Final assessment and dissemination
  - CE5. Decision support effectiveness assessment and review workshop
  - CE11. Dissemination plan

3.4.3 Implementation Strategic Planning and Development department core dataset

- Stage planning
  - CE6. Spatial data set to be migrated
  - CE2. Definition of data-driven processes to be improved
  - CE1. Involved processes and services assessment
  - CE9. Detailed time and resources plan
  - CE4. Training and educational program
- Spatial datasets acquisition
  - CE6. Definition of the spatial data packages to be migrated
  - CE6. Data acquisition/integration
  - CE6. Optimization and pre-processing
- Data migration
  - CE5. Spatial data conversion and migration training on the job
- Procedures implementation
  - CE1. Procedures objectives assessment
  - CE8. Grants policy integration
  - CE5. Procedures development training on the job
  - CE5. Information design and delivery workshop / training
- Processes and services optimization
  - CE2. Definition of processes and services to be re-designed

- CE2. Identification of spatial-data-driven support to processes and services
- CE2. Process / service re-design
- CE2. Performance assessment and review

3.4.4 Metadata system implementation

- Metadata system implementation
  - CE9: Make-or-buy analysis
  - CE8: System design
  - CE8: System implementation
  - CE4: Training-on-the-job

3.4.5 Implementation of Technical Department core dataset

- Stage planning
  - CE6. Spatial data set to be migrated
  - CE2. Definition of data-driven processes to be improved
  - CE1. Involved processes and services assessment
  - CE9. Detailed time and resources plan
  - CE4. Training and educational program
- Spatial datasets acquisition
  - CE6. Definition of the spatial data packages to be migrated
  - CE6. Data acquisition/integration
  - CE6. Optimization and pre-processing
- Data migration
  - CE5. Spatial data conversion and migration training on the job
- Procedures implementation
  - CE1. Procedures objectives assessment
  - CE8. Grants policy integration
  - CE5. Procedures development training on the job
  - CE5. Information design and delivery workshop / training
- Processes and services optimization
  - CE2. Definition of processes and services to be re-designed
  - CE2. Identification of spatial-data-driven support to processes and services

- CE2. Process / service re-design
- CE2. Performance assessment and review

3.4.6 Implementation of Financial and State Property management Departments core dataset

- Stage planning
  - CE6. Spatial data set to be migrated
  - CE2. Definition of data-driven processes to be improved
  - CE1. Involved processes and services assessment
  - CE9. Detailed time and resources plan
  - CE4. Training and educational program
- Spatial datasets acquisition
  - CE6. Definition of the spatial data packages to be migrated
  - CE6. Data acquisition/integration
  - CE6. Optimization and pre-processing
- Data migration
  - CE5. Spatial data conversion and migration training on the job
- Procedures implementation
  - CE1. Procedures objectives assessment
  - CE8. Grants policy integration
  - CE5. Procedures development training on the job
  - CE5. Information design and delivery workshop / training
- Processes and services optimization
  - CE2. Definition of processes and services to be re-designed
  - CE2. Identification of spatial-data-driven support to processes and services
  - CE2. Process / service re-design
  - CE2. Performance assessment and review

3.4.7 System integration

- Document Management System geospatial integration
  - CE9: Make-or-buy analysis
  - CE8: System prerequisites analysis

    - CE9. Resources plan and procurements
    - CE8: System design
    - CE8: System implementation
    - CE4: Training-on-the-job
    - CE8: System test and performance assessment
    - CE8: System revision
- Financial Management System integration
    - CE9: Make-or-buy analysis
    - CE8: System prerequisites analysis
    - CE9. Resources plan and procurements
    - CE8: System design
    - CE8: System implementation
    - CE4: Training-on-the-job
    - CE8: System test and performance assessment
    - CE8: System revision

3.4.8 Interoperability protocols deployment for external actors' cooperation

- Stage planning
    - CE1. Target definition
    - CE1. Stakeholders needs analysis
    - CE1. Involved processes and services analysis
    - CE6. Related spatial data set to be integrated
    - CE5. Needed interoperability protocols identification
    - CE8. Hardware/Software prerequisites definition
    - CE2. Definition of data-driven processes to be improved
    - CE4. Definition of training modalities and programme
- Process and services optimization
    - CE4. Workshop with stakeholders
    - CE2. Identification of spatial-data-driven support to processes and services
    - CE2. Process / service re-design workshop
    - CE2. Performance assessment, evaluation and review workshop
- Spatial datasets acquisition
    - CE6. Definition of the spatial data packages to support selected processes

    - CE6. Data acquisition
    - CE6. Optimization and pre-processing workshop
- Spatial Data Infrastructure improvement and adaptation
    - CE8. Data model review
    - CE8. Performance requirements test and assessment
    - CE8. IT infrastructure implementation (HW/SW/Network)
- Data migration
    - CE5. Spatial data conversion and migration workshop
- Procedures implementation
    - CE1. Objectives analysis
    - CE5. Procedures development workshop
    - CE5. Information design and delivery workshop
    - CE5. Decision support effectiveness assessment and procedures review workshop
- Educational program for executives and decision-makers
    - CE4. Spatial-data management and processing workshop
    - CE4. Spatial-data-driven decision-making workshop
- Dissemination
    - CE11. Publications, conferences, events, web and social media