DigLogs

Pilot Project Plan

Deliverable D5.3.1

5.3.3. Spatial Data Management System

Responsible partner: CFLI (PP1) **Involved partners: All**			
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0.1	Draft 1	30.11.2020	CFLI
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Notes:			

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Introduction: Spatial Data Management System

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.

The pilot action envisaged by the DIgLogs project for the Venice port community concerns the creation of a so-called **"Spatial Data Infrastructure" (SDI) at the Port Authority**. A Spatial Data Infrastructure is an integrated data system that allows centralizing the information and digital maps used by different Port Authority offices and also external actors, allowing both, efficiency in management and maintenance of each dataset, and shared access by multiple operators.

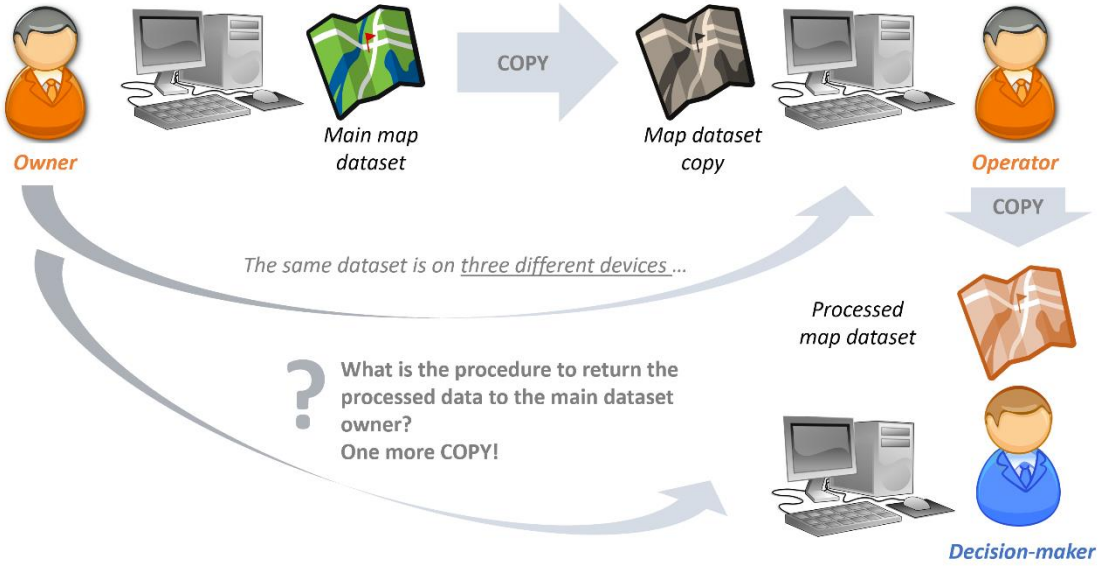
The current situation at the Venice Port Authority is such that the use of the available dataset generates several copies and reprocess data within many different and inhomogeneous systems. This kind of management reduces performance and the overall quality in usage and updating of data among various operators makes decision making process significantly inefficient. The Spatial Data Infrastructure (SDI) performs both, data storage and processing functions, making copies no longer necessary and allowing processing to be archived, both in the form of new data archives and as algorithms that provide results in real time, allowing operators to maintain the known methods and tools thanks to the interoperability protocols.

The pilot action envisaged by DigLogs project for the Venice context will include both the **technological implementation** and a **special training program** for the personnel of the Port System Authority.

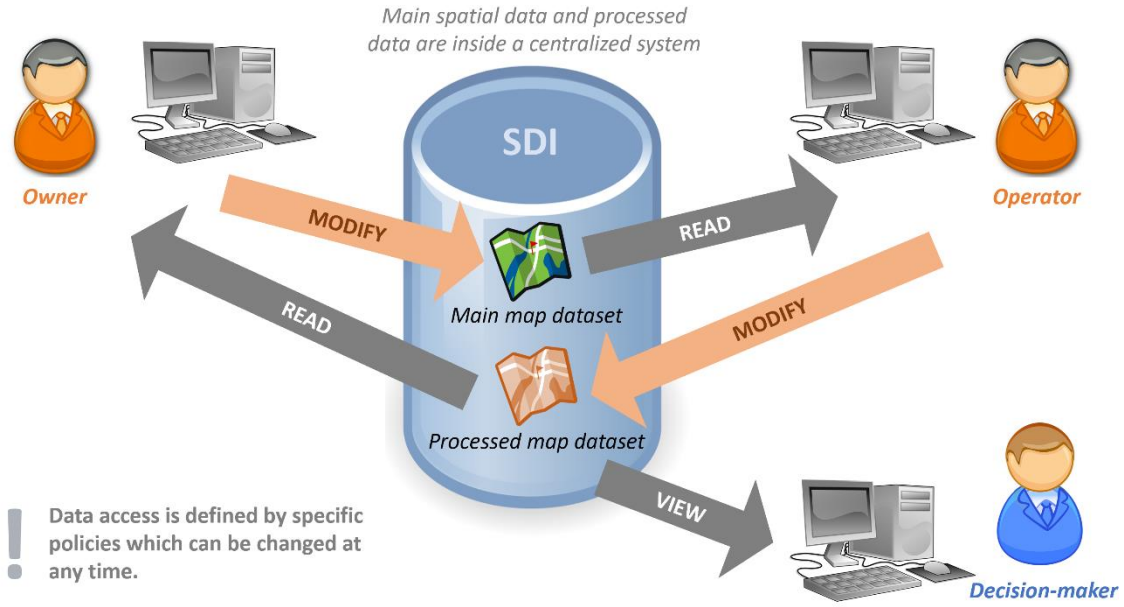
1. Pilot project goals

The pilot action main goal is to create a new geospatial data interoperable repository for the Port Authority, aimed at eliminating redundancy, speed-up data access and processing and foster interoperability.

As we can see in the picture below, in the current situation, most datasets have an owner that share it with other operators; during the processing phases, multiple copies of the datasets are created as well as some new derived datasets are deployed in different storage systems, especially when there is a need for special visualization to support decision making.



Clearly, this organization model is far from being efficient, effective and secure. The new Spatial Data infrastructure for the Port Authority is based on a centralized spatial database engine that enables multiple access by different operators on the basis of an accounting system with grants management and dynamic processing capability that eliminates redundancy and multiple copies of the datasets.



The hardware/software implementation is supported by a structured education/training programme aimed at making the Port Authority operators able to properly and effectively access the data, perform basic spatial and alphanumerical processing, configuring the connection between the Spatial Data Infrastructure and the tools in use.

The pilot action is the first step of the more complex evolution roadmap, since it consists of the two basic sub-actions related to the infrastructure and the introductive training programme.

The pilot action scope is limited to a small subset of the available information assets and number of participants to the training initiatives, while the **long-term goals** include the integration of some existing software platforms, the involvement of employees of all the internal areas and the implementation of new interoperable services for external actors.

The **pilot action implementation scenario** originates from the results of a previous study, conducted in 2018, within the Interreg project called “SUPAIR”, in which a special WP was aimed at deepening into the state of the information assets of the Port Authority, and to improve their efficiency and integration, especially regarding the spatial datasets. The picture returned by this analysis has provided some features of a sort of optimal situation, which has been partially

accomplished, but mainly still to be assessed, planned and implemented. Specifically, the study emphasized the need to reorganize the entire Information System beginning with the first stage of division of the complex datasets in simpler parts, continuing with a data quality assessment stage and then ending with correlations and georeferencing.

In the long-term, the migration of the main part of the Port Authority's information asset inside the new system will be quite easy and it will foster the development of new smart services and tools, as well as the update of some existing applications.

2. Pilot project functions and scope

The main **pilot function** is to provide the Venice Port Authority with a new IT integrated system for the 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.

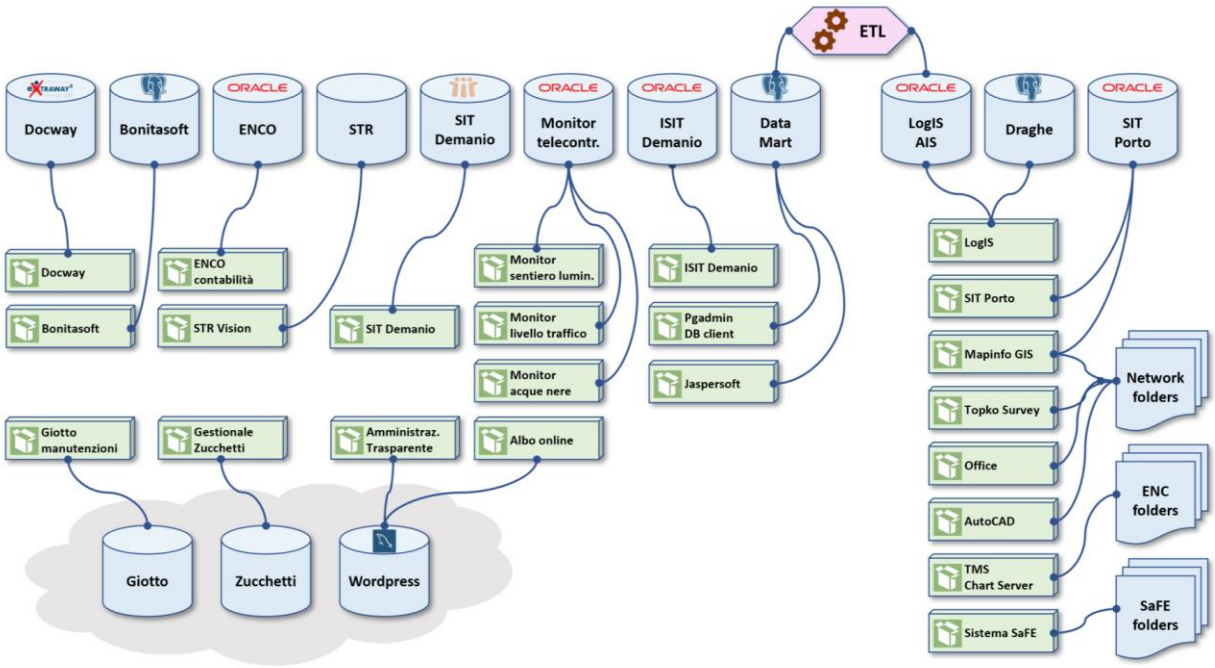
The **pilot scope** is to make a transition from a current situation in which data is ineffectively managed and used to an improved condition in which more different data can be integrated and dynamically accessed by several users according to different policies and objectives without replication and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

With the pilot action, a Geodatabase will be installed and configured as the main engine of the Spatial Data Infrastructure and operators will be trained to store and process data within the new system. In this stage, as **project input**, it will be required to select an adequate dataset package with which to perform the optimization and migration operations, as well as to select a group of employees to participate in the special training program aimed at enhancing their performance in using the new system for their working activities. **The output** will be a new working instance of the Geodatabase engine with a subset of structured and optimize spatial datasets, available through the platform for all Port Authority operators. The operators will be able to connect their workstations to the SDI, access and process data and produce outputs according to a special policy management protocols. The Spatial Data Management System will allow to store the

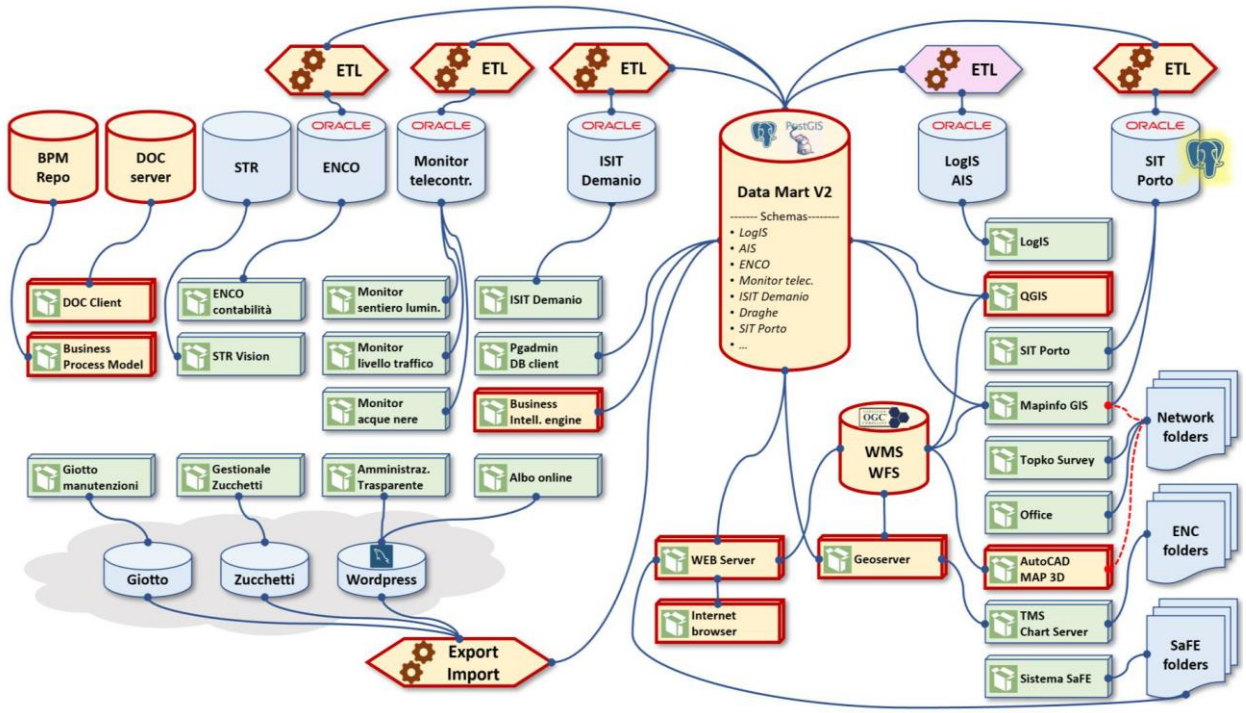
processed data and maps either as new datasets or as algorithms that process data in real time, without forcing operators to change the already known working tools.

The suggested activities won'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 skills improvement, fostering the awareness on how spatial data visualization and dynamic data processing can support decision-making process.

The **implementation scenario** is already outlined by a previous assessment study and it can be summarized by the following system architecture diagrams:



This first diagram shows the current situation in terms of data management systems (cylinders), applications (boxes) and computer folders (folder packets on the right). The main issue is related to the high fragmentation of the whole system.



This second diagram shows a possible long-term scenario in which some news items are added (red-edged/yellow items). The main new data management system is called “Data Mart V2” and it will include a geodatabase engine able to manage in a unified way most of the datasets.

The main **pilot limitation** is mainly related to the complexity of the future system architecture so only a reduced set of data sources can be optimized and integrated into the new system. A possible issue could also be related to the timely availability of some new data sources that should be obtained from a survey in 2021.

The project **prerequisites and assumptions** can be summarized as follows:

- New expected data sources are timely available and accessible
- Selected existing data sources are accessible
- The hw/sw solution can be implemented within the Port Authority IT infrastructure
- A minimum number of employees is interested in skills enhancement and will participate in the training program

3. Project methodology

Since the pilot project is relatively short, the **project management methodology** will be basically a custom methodology based on scheduled meetings for a dedicated coordination workgroup. It may also include best-practice based techniques if deemed necessary by the workgroup members.

Standard **management tools** and methods will be used, such as shared folders and documents, office automation and communication tools.

The **project team** will include CFLI members and Venice Port Authority members. The team will be relatively small and will communicate directly in person or via web conference tools. The core workgroup will periodically check whether there is a need to include other temporary or permanent members.

The **documents** used within the pilot project will be the following:

- Pilot Work Plan (this document)
- DigLogs documentation
- SUPAIR project documentation:
    - D1.4.1 - Action Plan for a Sustainable and Low-carbon Port of Venice. Pilot intervention “Design and implementation of a Smart Traffic Management Tool to improve the port performances landside”
    - ANNEX 03 - Priority procedures in-depth analysis
    - ANNEX 04 - Optimization operations assessment of data sources for GIS georeferencing
    - ANNEX 05 - Processing procedures definition for the data sources stored in the Venice Port Authority Geographic Information System.
    - ANNEX 06 - Design of an IT solution for the identified priority procedures.
    - ANNEX 07 - Overall IT architecture of the Venice Port Authority Geographic Information System.

  - ANNEX 08 – Training programme proposal for geographical data support to decision making
- Additional documentation provided by Venice Port Authority

The following documents are expected to be produced as project output:

- Data sources documentation and metadata
- Hardware/Software technical specification
- Training materials
- Procedures documentation
- User manual

Project monitoring will be based on the following tasks and milestones:

- 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
    - MS 1: Planning completed
- 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
    - MS 2: Preparation completed
- Data migration

    - CE4. Workshop with involved users
    - CE6. Spatial data conversion and migration test
    - CE5. Spatial data conversion and migration training on the job
        - MS 3: Data migration completed
- 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
        - MS 4: Procedures tests completed

4. Project preparation

This chapter describes the phases of the Pilot project preparation before the actual development and later phases.

4.1 Project functional requirements

The first preparation step relates to the subdivision of tasks between Port Authority and PP1-CFLI that is defined as follows:

Tasks in charge of Venice Port Authority		
Hardware implementation		
	Physical / virtual server	
		Operative System: Linux / Windows
		Processor: 4-8 cores – CPU 2.x-3.x Ghz (affects processing time)

		RAM Memory: 16-32GB (affects the capability to manage huge datasets, especially raster images like orthophoto, with Geoserver, or to manage multiple requests). Generally, Windows OS requires more RAM.
		Storage: 2TB implementable if needed (affects the capability to store more data and manage replication/data historicization).
Software installation		
	Vector data segment (geoDBMS)	
		PostgreSQL version 10 or later with PostGIS extension
	[OPTIONAL] Raster data segment (mapping server)	
		Geoserver latest version (2.17)
Database access policy definition		
	Single account / groups / user accounts	
Definition of the users list (with contact information) for the training activity during the DigLogs duration period. *Estimated:*		
	12 training days in the workshop format or training-on-the-job format	
	10 meeting/brainstorming	

Tasks in charge of PP1	
New photogrammetric datasets analysis and evaluation	
	In case of unavailability, definition of an alternative dataset package
Support for the geodatabase configuration within the local network	
Dataset migration from the existing storage to the new system	
Teaching activities in the workshop format	
	Spatial dataset preparation and optimization
	Geodatabase access and data editing
	Creation of digital maps using the data stored in the geodatabase
	Data-driven decision-making support
	Result effectiveness evaluation
	Definition of a training programme (seminars or similar) for decision-makers
	Teaching for decision-makers in the format of seminar or similar
	Brainstorming about future development
Teaching activities in the training-on-the-job format	
	Spatial dataset preparation and optimization
	Conversion, optimization and loading data from the geodatabase
	Data access with different client tools

	Creation of digital maps based on dynamic procedures
	Spatial data visualization techniques
Organizational meetings	

This first basic task is followed by a review and update of the existing preliminary assessment documentation regarding the following three topics:

- **Organization model**
- **Data sources**
- **IT infrastructure**

Among these, the most important topic relates to the data sources that are been classified in different types, as they are heterogeneous entities mostly articulated in several datasets. Specific applicable categories have been identified with the aim of both grouping the elements by type and characterizing the relationships between them. For example, a basic descriptive dataset joined to a geographic layer through an alphanumeric key is typically what is called indirect georeferencing.

Currently, the identified dataset types are the following:

1. **Descriptive dataset**
   Single descriptive (table) dataset or simple set of organically managed descriptive datasets.
2. **Standard geographic layer**
   Single geographic dataset (GIS or geocoded CAD layer) or simple set of organically managed geographic datasets.
3. **Small scale overall geographic layer**
   GIS or CAD layer quite similar to a standard geographic layer but with a limited number of small-scale geometric elements such as global perimeter and / or delimitation of large territorial areas (e.g. administrative limits, boundaries of restricted areas, etc.), generally used for visualization purposes and not suitable for thematic maps or geoprocessing.
4. **Referencing geographic layer**
   GIS layer quite similar to a standard geographic layer but with a data structure and alphanumeric codes suitable for the indirect georeferencing of descriptive datasets.

5. **Descriptive macro-dataset**
   Relatively rich and complex set of descriptive (table) datasets also joined at multiple levels and with data aggregation structures, often organically managed within a procedure or application.
6. **Geographic macro-dataset**
   Relatively rich and complex set of both descriptive (table) and geographic (GIS or CAD) datasets also joined at multiple levels and with internal data aggregation and geo-referencing structures, often organically managed within a procedure or application.

From the above six dataset types mutually combined, the following 16 relationship types have been identified:

Geocoding / geoprocessing

- Direct primary georeferencing: *georeferencing obtained by joining a simple descriptive dataset with a standard geographic layer using an alphanumeric key. (One of the most typical and fundamental GIS operations).*
- Overlay geoprocessing: *correlation of two geographic layers by topological overlay process aimed at extracting added information. (Also, a typical GIS operation aimed at returning quantitative data summaries, such as the number of buildings affected by a constraint, or a risk band, etc.)*
- Indirect georeferencing / geoprocessing: *correlation of two geographic layers using either an alphanumeric key or a topological overlay.*
- Indirect georeferencing at macro-dataset level: *georeferencing performed by correlating a geographic layer to some elements of macro-datasets. (The real applicability must be assessed deepening the contents of the macro-class).*
- Complex georeferencing at macro-dataset level: *georeferencing performed by correlating some geographic layers belonging to a macro-dataset with other of a descriptive macro-dataset. (The real applicability must be assessed according to the contents and structure of the macro-datasets).*
- Small scale basic georeferencing: *correlation between a descriptive dataset and a small-scale overall layer. (This is a basic geographical reference in which the descriptive*

dataset can be complex and inhomogeneous; for example, the relation between an urban plan and the perimeter of the relevant territorial area).

Join / relationship

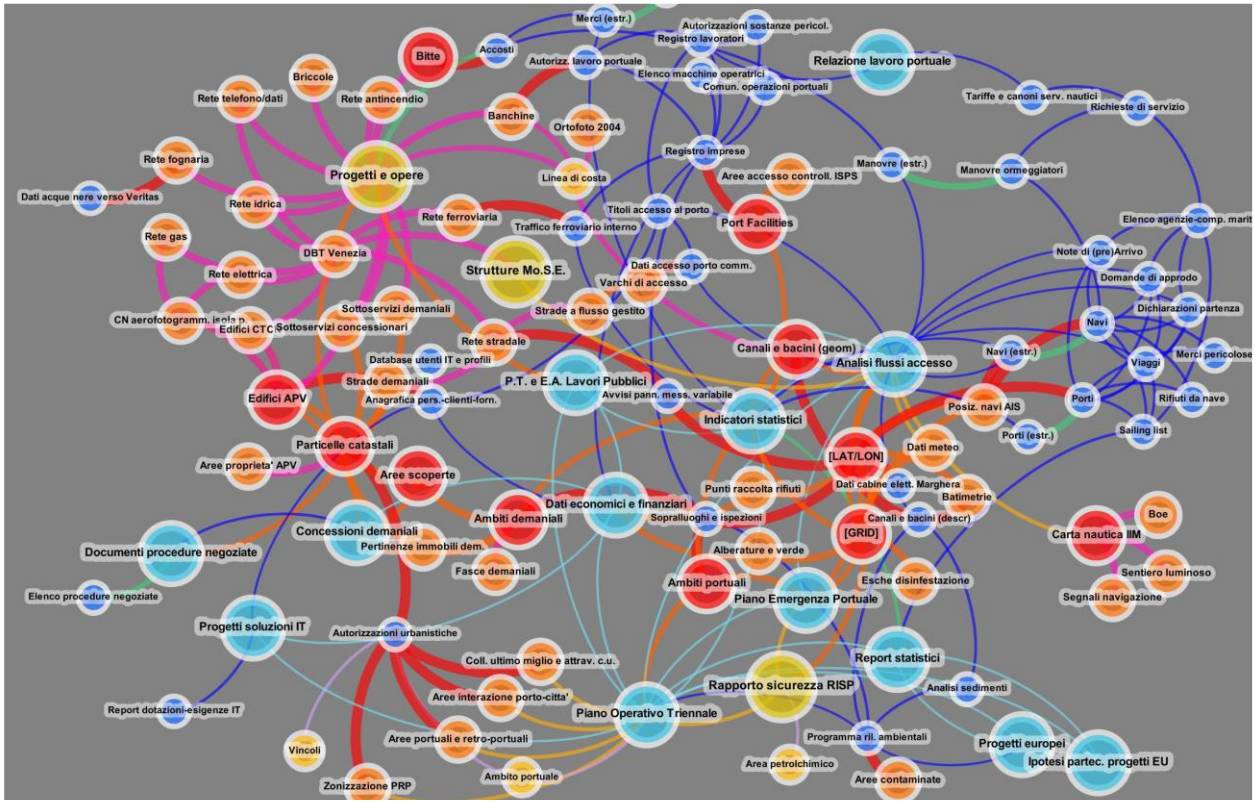
- Descriptive dataset join: *join between simple descriptive datasets using an alphanumeric key. (Classic alphanumeric JOIN operation).*
- Descriptive macro-relationship: *relationship between some elements of two descriptive macro-datasets using different alphanumeric keys and / or elaborations. (The real applicability must be assessed according to the contents and structure of the macro-classes).*
- Descriptive macro-dataset join: *relationship (JOIN through alphanumeric key) between a simple dataset (or a specific dataset belonging to macro-dataset) and datasets belonging to another macro-dataset. (The real applicability must be assessed by declining the contents of the macro-class).*
- Complex relationship at macro-dataset level: *complex / multiple relationship between two different macro-datasets. (The real applicability must be assessed according to the contents and structure of the macro-classes).*
- Geographical macro-dataset relationship: *complex / multiple relationship between two different macro-datasets containing some spatial datasets. (The real applicability must be assessed according to the contents and structure of the macro-classes).*
- Geographical relationship/derivation at macro-dataset level: *relationship between a geographic layer and a macro-dataset with both related and derived contents.*

Derivation

- Geographic layer derivation: *geographic layer derived from another. (Typical operations of creation / updating of GIS or CAD geographic layers with manual or automatic extraction of features from other datasets, e.g. layer of building assets derived from public databases).*
- Reference geographic layer derivation: *relationship similar to the previous one but aimed at obtaining a reference geographic layer.*
- Descriptive dataset derivation: *relationship similar to the previous one but aimed at obtaining a descriptive dataset.*

- Descriptive macro-dataset derivation: *derivation of several datasets of a descriptive macro-dataset from another macro-dataset. (The real applicability must be assessed according to the contents and structure of the macro-classes).*

The following picture shows a sample graph visualization of the 204 already identified relationships between datasets. Size/colour of nodes refers to the dataset type classification while connection width/colour to the correlation type classification (e.g. thick-red connections are "direct primary georeferencing").



4.2 Resource tendering

The Pilot project does not include any external resource to be engaged with a specific tender.

The IT infrastructure is going to be provided by the Port Authority IT area, while the expertise needed for the data migration and the training programme directly by PP1.

The software that is going to be used for the project will be under free-open-source licence.

4.3 Pilot solution design

The pilot detailed design will be performed by the management CFLI/Venice Port Authority workgroup on the basis of the roadmap implementation tasks:

Spatial Data Infrastructure core application design

- Target definition:
  better definition of the overall expected results
- User needs (requirements) analysis:
  definition of a panel of users to be interviewed in order to deepen issues and expectations
- Hardware/Software prerequisites definition:
  specifications for the hardware and software to be implemented
- Spatial data set to be used for the pilot implementation:
  Identification of an optimal dataset package to use for the pilot implementation
- Involved processes and services analysis:
  analysis of potential impact of the infrastructure modification on processes and services
- Training and educational programme:
  programme for the training actions including contents and didactic modes

Process and services optimization design

- Definition of data-driven processes to be included in the pilot:
  selection of specifically data-driven processes to include in the re-design stage

- Identification of spatial-data-driven support to processes and services:
  analysis of the specific support and added value provided by data for the selected processes and services
- Workshop with involved users / first educational programme:
  detailed didactic programme for the operators involved in the selected processes and services
- Process / service re-design assessment
  re-design assessment and prototypal tests for the selected processes and services

5. Project development

5.1 Preparation of the Pilot environment

The first task of pilot environment preparation is related to spatial dataset acquisition. It will be performed on the basis of the existing information assessment that has provided the following dataset list:

Dataset list
Dockings
Trees
Port tax rates
Rates and fees of port services
Public property areas
Port areas
Venice Port boundary
Staff, customers and supplier's registry
Analysis and reporting for port access policy support
Analysis of sediments
ISPS Restricted access areas
Polluted areas
Port areas and inland
City-Port interaction areas
Venice Port property areas
External common spaces

Variable message signs contents
Quays
Seabed bathymetry
Bollards
Buoys
Dolphins
Canals and basins (text attributes)
Canals and basins (geometry)
National Hydrographic Institute official navigational chart
Aerial photogrammetry digital map
Last mile road/railway and urban crossing connections
Current port activities declaration documents
Public property concessions
IT services user accounts
Marghera electric cabins monitoring data
Weather station data
Sewage dump to Veritas collector pipe
Data of gates access to commercial port
Economic and financial data
Venice official topographic database
Departure declaration
European projects reports and documentation
Work within port area permission documents
Harmful substances usage permissions
Public notices and calls for tenders' documentation
Docking requests
Buildings layer from Venice official digital map
Buildings owned by Venice Port Authority
Projects technical drawings
Agencies and shipping companies registry
Port Facilities operating machines registry
List of public notices and calls for tenders
Public property coastal strips
Processed data, indicators and classifications for statistic usage
Participation proposals on funded national or European projects
Coastline
Manoeuvre (database extraction)
Mooring manoeuvres
Goods
Goods (database extraction)
Dangerous goods
Ships
Ships (database extraction)

Arrival and pre-arrival documents
Orthophoto 2004
Cadastral parcels
Port Facilities boundaries
Petrochemical area boundary
Public properties annexed areas
Port Emergency Plan
Three-year Operational Plan
Ports
Ports (database extraction)
AIS ship location
Baits for disinfestation
IT solutions projects
Environmental surveys program
Three-year program and annual list of public works
Waste bins location
Integrated Report of Port Security
Register of companies working inside port area
Register of employees working inside port area
Work within the port area annual report
Summary reports, indicators and statistics about port activities
IT assets and needs
Fire network
Gas network
Electricity network
Railway
Sewerage
Water supply network
Streets
Telephone network
Operator's underground utilities
Public underground utilities
Port services requests
Ship waste
Sailing list
Lighted pathway
Navigation aid systems
Inspections
Restricted access streets
Public property streets
Mo.S.E. system structures
Urban planning and building permits
Port access permits documents

Internal rail traffic
Accesses to Port and Port Facilities
Trips
Environmental, historical, archaeological and landscape constraints
Port Master Plan zoning

For the identification of related data-driven processes and tools, the following process and ICT tools lists will be used and integrated:

Processes list
General management (macro-process)
IT solutions design
Open Government ("Amministrazione Trasparente")
Hardware, software and IT system maintenance
IT technical support and internal needs monitoring
IT security and accounting management
Accessibility and trade flows analysis
Data processing for monitoring, statistical analysis and reporting
Economic studies, statistics and assessment about port development
Three-year Operational Plan
Mo.S.E. system effects monitoring
Research and European Projects management
Chances scouting and searching on national and European funding programs
Topographic surveys, mapping management and GIS
VIA, VAS, VINCA assessment procedures
Three-year program and annual list of public works management
Port Master Plan (PRP)
Urban planning and building permits granting
Strategic System Master Plan Document
Work within the port area permits granting
Coordination of port operators
Analysis and reporting about work within port area
One-Stop Administrative Desk
Companies and employees work management
SOI system of Venice Port ("Sistema Operativo Integrato Porto di Venezia")
Port Security
Corporate safety, risk prevention and controls
Harmful substances usage permission granting
Emergency planning
Access permissions granting
Control inspections

Topographic surveys and projects / works mapping
Building and infrastructures works management
Remote control systems management
Water supply and sewage service management
Remote monitoring of sewage dump system
Environmental technical support
Green spaces management
Waste management and remediation
Hygiene and cleaning services
Canals and basins maintenance
Budget, accounting and taxes management
Public notices and calls for tenders management
State concession management
Development and promotion of state property exploitation
Expropriation for public use
IT infrastructure management

ICT tools list
LogIS Port Community System
Data Mart
Jaspersoft
DocWay
SIT Demanio
SIT Porto
ISIT Demanio
Bonitasoft
Mapinfo professional 8.5
Giotto services
STR Vision
Outflow sewage remote management
Traffic sensors remote management
Office
AutoCad
SaFE
Zucchetti occupational safety
Topko Survey
Lighted path remote management
ENCO
"Amministrazione Trasparente" web application
TMS Chartserver

Based on the selected dataset package to be used for the pilot test, a detailed optimization and pre-processing operations plan and a related training programme for this kind of activities will be drafted.

The second task of pilot environment preparation is about the infrastructure implementation that will include:

- The design of the data model to be implemented within the Spatial Data Infrastructure
- The performance analysis for the hardware/software environment
- The implementation of the hardware/software environment, including the network configuration

5.2 Development of the Pilot application

The pilot development stage is basically divided in two tasks: data migration and procedures implementation. The first task aims at populating the SDI with the optimized selected datasets, while the second at defining and testing modes and procedures to support decision-making processes.

Data migration

This is one of the operations included in the pilot action. It includes some sub-tasks needed to ensure that the spatial datasets are properly stored and managed through the new system, such as first visualization and content quality evaluation, format conversions, optimizations, possible transformation, and load.

- Spatial data conversion and migration
  This is the task that physically enables the use of the existing data assets through the new Spatial Data Management System. The main engine of the system is the GeoDBMS that enables effective data access, share and processing. Anyway, the conversion and migration task is limited to the collection of the datasets, the first visualization aimed at evaluate its contents and possible issues, problem fixing and optimization if needed,

format conversion (mainly from file format to database table format) and load of the data inside the database structure.

Procedures implementation

Once the datasets are migrated and accessible through the database connection, some processing procedures and functions need to be implemented based on the fuelled decision support processes.

- Procedures objectives assessment
  This task is aimed at identifying some goals to pursue by integrating and processing spatial data in relation to some selected procedures or services.
- Grants policy integration
  Different actors will have different grants accessing datasets and database functions.
- Procedures development
  Spatial data sources integration will be performed by saving special SQL functions with spatial operators into the database.
- Information design and delivery
  In many cases, the visualization of spatial data integration results can be done by thematic maps. Summary tables and graphs are also effective information tools to provide data-driven support to decision-making processes.

The development stage includes three different training and educational actions for both executive and decision-makers:

- Data migration
  - Spatial data conversion and migration training on the job
- Procedures implementation
  - Procedures development training on the job
  - Information design and delivery workshop / training

The training and educational actions will be planned and designed based on the following framework:

Training modules types:

- Seminars
- Workshop/training-on-the-job
- Project work

Seminars content reference grid:

ICT scenario:

- Smart Cities & Communities / Sustainable Cities
- Geography and knowledge about territory: ICT based approaches
- Data interoperability, Open Source and Open Data approaches
- Big Data and Data Analytics
- Mobile APPs and Mobile Web
- IOT – Internet of Things
- Internet, knowledge sharing and participatory processes
- Institutional data sources and spatial data: the regulatory scenario

City, environmental and territorial issues:

- Hydraulic and Hydrogeological risk management
- Biodiversity protection
- Energy and sustainability
- Logistics and transportation
- Tourism, landscape and cultural heritage
- Sustainable land use
- Territorial planning and regulations
- Technological network and infrastructures maintenance
- Urban life quality, comfort and health

ICT technologies

- Geographic Information System and Spatial Data Infrastructures

- Geodatabase Management System
- Geo-Web solutions
- Big Data and Data visualization
- Geostatistics
- Terrestrial and marine sensing
- Satellite and airborne remote sensing
- Satellite active sensors monitoring
- Thermographic monitoring
- Mobile APP and Web application for geospatial data
- Wireless Sensor Networks and IOT
- Mobile Mapping Systems for road networks maintenance
- GPS, Laser scanning and UAV survey and monitoring
- Information Design and Data Visualization with geospatial data

Workshop/training-on-the-job content reference grid:

- Cartography and spatial data management:
  Introduction to Geographical Information Systems, digital cartography, institutional data sources, geocoding techniques.
- Database
  Database design basis, SQL, DBMS applications, geospatial extensions.
- GIS. Geographic Information System:
  Basics of geospatial data modelling, visualization and thematic mapping techniques, data integration techniques and geoprocessing.
- Remote Sensing:
  EOS - Earth Observation Systems introduction, remote sensing data types and formats, raster data processing techniques, raster data classification.
- Web / Geo-Web:
  Web browser, web services, basics of HTML, CSS, Javascript, mapping servers, geographic web services.

- Information Design:
  Information Design and User Centered Design, data visualization techniques and tools, mapping tools design, basics of Interaction Design.

Project work content reference grid:

- Air, water and soil pollution risk
- Hydraulic and hydrogeological risk
- Mobility, Infomobility and logistics, road safety, intermodality and transportation
- Biodiversity protection
- Production and sustainable use of energy sources
- Protected areas management
- Cultural heritage enhancement and sustainable tourism
- Emergencies management
- Urban quality and services
- Waste management
- Infrastructures, green areas, and services maintenance

5.3 Pilot application testing and acceptance

The pilot action is intended to carry-on some kind of in-progress effectiveness and assessment stages during the migration and procedure implementation, leveraging the training empowered approach. Indeed, employees and operators will be directly involved in the operations in order to both learn techniques and assess result quality and limitations.

Special workshops will also be scheduled and carried-out when needed according to the progress of the work, especially to assess the decision support effectiveness of the implemented procedures.

Issues, optimizations, and adopted remedies and measures will be included in the reporting documentation of training-on-the-job activities and workshops.

5.4 Pilot deployment and documentation

Due to the adopted training-based approach, the deployment stage will not be only a “final stage” to make operational the results of some test actions, but rather it will be a continuous stage during which a core dataset will be optimized and made interoperable and new organizational and technical setups will be applied and reviewed. According to this approach, the final production environment will be the result of a series of integrations, tests, and tuning carried out in close collaboration with the “end users”, and the Spatial Data Management System will evolve in the post-pilot stages to become the core module of the new Geographical Information System of the Venice Port Authority.

The **documentation** that will be provided by the pilot will come as the result of two kind of operations:

- technical implementation details and procedures
- skill improvement and training materials and methodologies

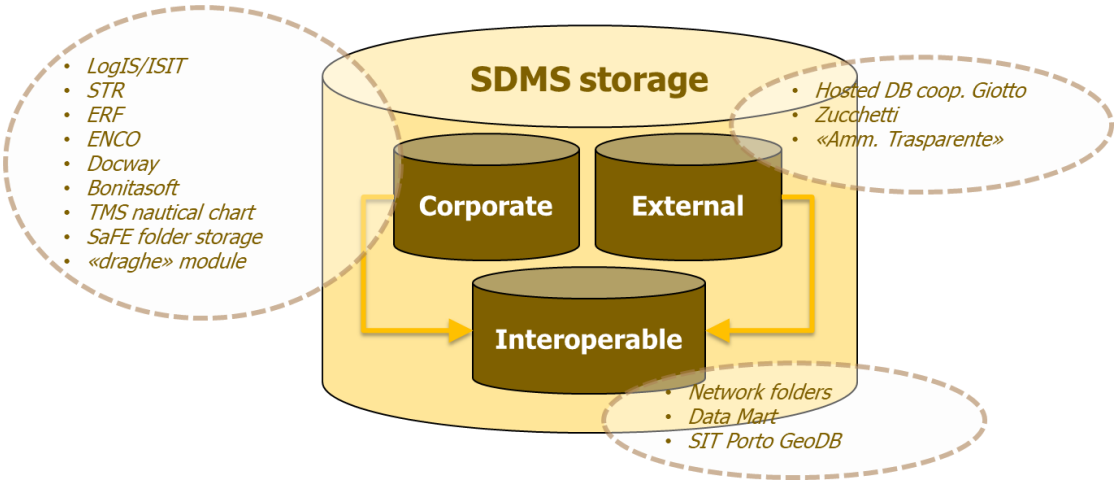
The technical documentation will be basically helpful to maintain the system performance or to enhance it as well as to provide technical details to implement new sub-systems or to replicate it within other contexts.

The training and educational documentation will also be helpful for a system replication but mainly it will be drafted in a way to be easily accessed and re-used by other employees and operators or the new work force that will be recruited in the future and that will need to be trained about the new ICT environment.

For the above reasons, the Spatial Data Management System is not intended to be decommissioned after the end of DigLogs project, but it will be the core section for the re-design of the existing application as well as of new data driven solutions.

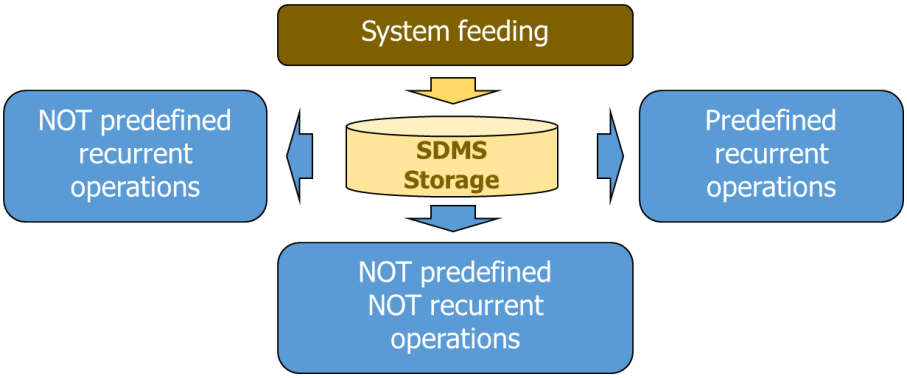
The following four sections provide the overall framework for the post-pilot long-term data-driven application design and solution development actions:

***Section 1**: macro-level storage structure*



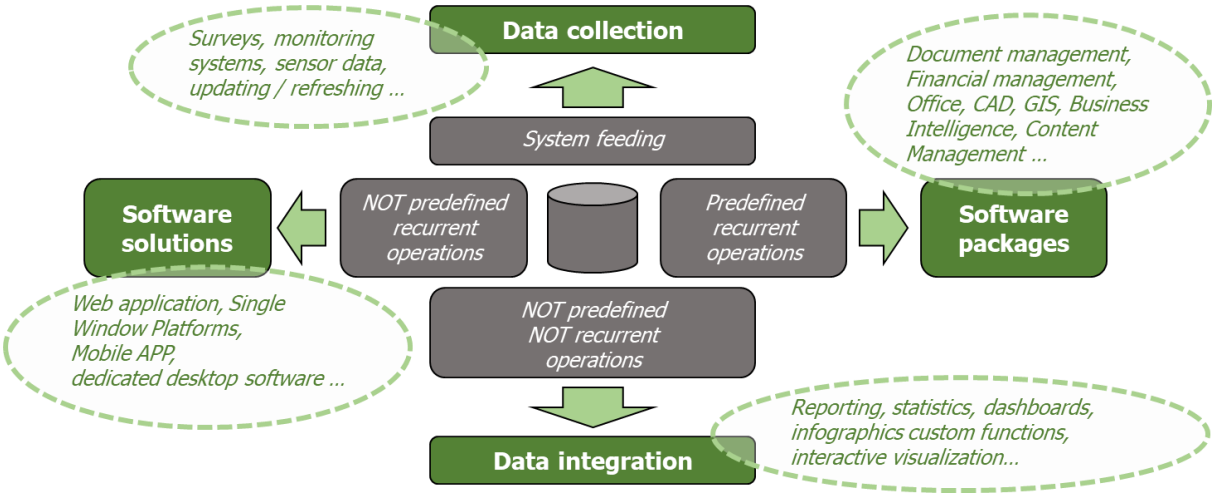
The Spatial Data Management System storage engine aims to integrate in-use corporate databases, externally hosted databases and provide interoperable access to them

***Section 2**: macro-level operations categories*



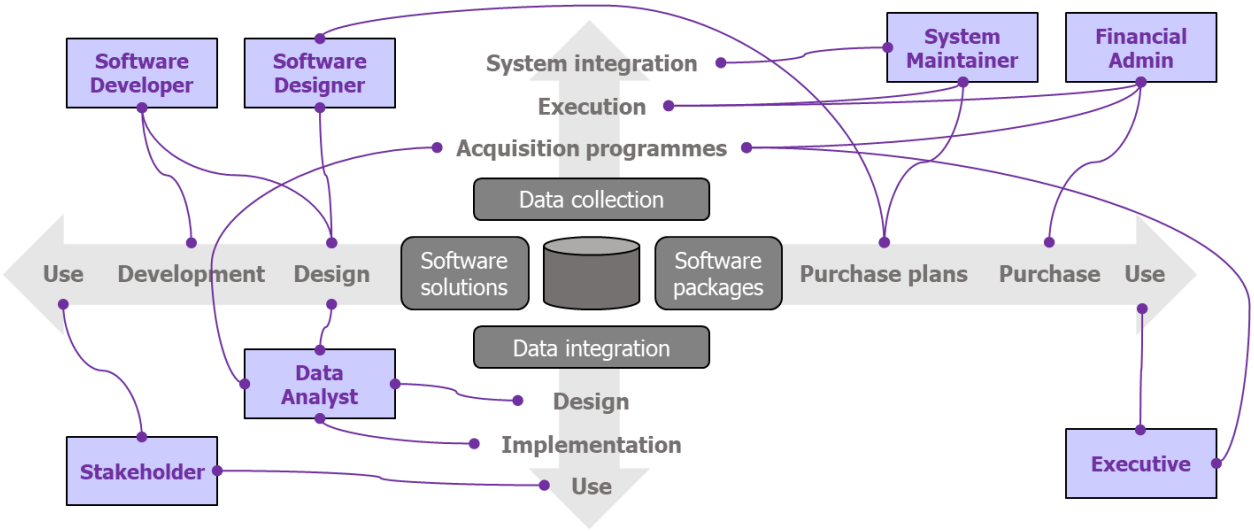
The Spatial Data Management System will provide data to support three different kinds of predefined / not predefined and recurrent / not recurrent operations

***Section 3**: software solution typification*



According to the predefined / not predefined and recurrent / not recurrent feature, three different types of software tools will be needed: packages, solutions, and data integration procedures.

***Section 4**: actions, actors, and roles framework*



The actions framework includes one integration type and three use type, as well as seven different actor roles that are directly involved in the ICT development processes.

6. Project team

CFLI project team:

1. Enrico Morgante: *CFLI director, overall project supervision and coordination*
2. Claudia Forzan: *CFLI expert, project & financial management*
3. Giovanni Borga: *CFLI technical and ICT expert, responsible of pilot project data management and procedures development*
4. Marco della Puppa: *CFLI expert, responsible of stakeholders' consultation stages*

Venice Port Authority project team:

5. Antonio Revedin: *Venice Port Authority – Director of Strategic Planning and Development Department and responsible ad interim of ICT and Digital Agenda Areas*
6. Paolo Menegazzo: *Venice Port Authority – Responsible of Strategic Transportation Planning Area*
7. Luigi Trevisan: *Venice Port Authority – ICT and digital agenda Area*
8. Leonardo Cortiana: *Venice Port Authority advisor – ICT and digital agenda Area*

DigLogs project team:

9. Karmen Krivičić Spajić: *PP5 project manager, WP5 steering*

7. Project Timeline

The following GANTT diagram shows the expected timeline of the pilot action.

	2020						2021											
	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December
Pilot planning																		
Spatial datasets acquisition																		
Spatial Data Infrastructure implementation																		
Data migration																		
Procedures implementation																		
Process and services optimization analysis																		
Dissemination																		
				MS1			MS2			MS3		MS4						

The main milestones are the following:

1. Planning completed (oct 2020)
2. Preparation completed (jan 2021)
3. Migration completed (apr 2021)
4. Procedures tests completed (jun 2021)

8. Project risk management

8.1 Overall approach

The main reference for the project risks management is the Common Risk Register developed by the LP in the earlier stages of DigLogs progress. The risk register is based on a strategy that goes from risk prevention to mitigation and risk transfer actions or even remedies actions when necessary.

The Common Risk Register can be summarized as follows:

#	Risk description	likelyhood	impact	severity
1	Pilot project purpose and need is not well-defined	Medium	High	High
2	Project design and deliverable definition is incomplete	Low	High	High
3	Project schedule is not clearly defined or understood	Low	Medium	Medium
4	No control over staff priorities	Medium	Medium	Medium
5	Consultant or subcontractor delays	Medium	High	High
6	Estimating and/or scheduling errors	Medium	High	High
7	Unplanned work that must be accommodated	Low	High	Medium
8	Lack of communication, causing lack of clarity and confusion	Medium	Medium	Medium
9	Pressure to arbitrarily reduce task durations and or run tasks in parallel	Low	High	Medium
10	Scope creep	Medium	High	High
11	Unresolved project conflicts not escalated in a timely manner	Low	Medium	Medium
12	Proposed pilot action becomes obsolete or is undermined	Low	High	High
13	Delay in earlier project phases jeopardizes ability to meet fixed date	Medium	High	High
14	Added workload/time requirements due to new direction, policy, other changes	Low	Medium	Medium
15	Inadequate testing leads to large post go-live snag list	High	High	**High**
16	Legal action delays or pauses project	Low	Medium	**Medium**
17	Stakeholder or PP refuses to approve deliverables/milestones or delays approval	Medium	Medium	**Medium**
18	Theft of materials, intellectual property, or equipment.	Low	High	**High**
19	Acts of God leads to loss of resources, materials, premises etc.	Low	High	**High**
20	Pilot project stakeholder's action (or lack of) delays project	Low	High	**High**

For this pilot project, the main risk in this stage is related to the unavailability of some data sources that have been identified as optimal for the system implementation. This risk can be related to #13 item of the risk register which suggests tracking the stages and schedule slippage early; in case of occurrence, an alternative data source package among the available datasets will be defined.

The covid-19 emergency may also make it difficult to carry out the training activities, a risk that can be related to #14 item in the risk register. In case of occurrence, some forms of distance-learning will be implemented.

No risks of delay due to tendering procedures is envisaged since no tenders are needed for the whole pilot project, as well as very low risks related to technical aspects are anticipated due to the low impact of the hardware and software equipment on the overall implementation.

For this pilot project, we can also change #1, #4, #5, #17 risks likelihood to low, and #15 to medium.

The full adopted Common Risk Register is shown in the following paragraph.

8.2 Common risk register

Severity: *rating based on impact & likelihood.*
Owner: *party who will manage the risk (LP = Lead Partner; SC / PSC = Project Steering Committee; PP = Project Partner)*
Mitigating action applicable to pilot project action: *actions to mitigate the risk e.g. reduce the likelihood*
Contingent pilot project action: *action to be taken if the risk happens.*

ID	Date raised	Risk description	Likelihood of the risk occurring	Impact if the risk occurs	Severity	Owner	Mitigating action applicable to pilot project action	Contingent pilot project action	Progress on pilot project actions	Status of the registered pilot project risk
1	[risk identification date]	Pilot project purpose and need is not well-defined	Medium	High	High	LP/SC	Complete a business case for the harmonization pilot if not already completed and ensure purpose is well defined according to project plan	Escalate to the LP/SC and inform WP5 leader with an assessment of the risk of runaway costs/never-ending project.	Business case re-written with clear deliverables and submitted to the LP/SC for acknowledgement	[Open/Closed]

2	[risk identification date]	Project design and deliverable definition is incomplete.	Low	High	High	LP/SC	Define the scope in detail via design details, workshops and meetings with PP/LP and input from subject matter experts.	Document assumptions made and associated risks. Request high risk items that are ill-defined are removed from scope.	Design workshops and meetings scheduled.	[Open/Closed]
3	[risk identification date]	Project schedule is not clearly defined or understood	Low	Medium	Medium	PP	Hold scheduling workshops with the project team (internal and external providers) so they understand the plan and likelihood of missed tasks is reduced.	Share the plan and go through upcoming tasks at each weekly project progress meeting.	Workshops scheduled.	[Open/Closed]
4	[risk identification date]	No control over staff priorities	Medium	Medium	Medium	PP	PP should brief internal team managers on the importance of the project. Soft book resources as early as possible and then communicate final booking dates ASAP after the scheduling workshops and meetings. Identify back ups for each project team member engaged on the project.	Escalate to the PP's top management and bring in back up resource, inform LP/PSC and inform WP5 leader.	PP's top management has to agree to hold briefings. Identification of suitable arrangements (meeting room, teleconferencing tools)	[Open/Closed]

5	[risk identification date]	Consultant or subcontractor delays	Medium	High	High	PP	Include late penalties in pilot project contracts. Build in and protect lead time in the schedule. Communicate schedule early. Check in with supplier's progress regularly. Query statements like '90% done'. Ask again and again if the supplier or consultant requires additional information.	Escalate to LP, SC and top management of the supplier and inform WP5 leader. Implement late clauses.	Lead time from each contractor built into the project schedule. Late penalties agreed to and contracts signed.	[Open/Closed]
6	[risk identification date]	Estimating and/or scheduling errors	Medium	High	High	PP	Break this risk into two parts: 'cost estimating' and 'scheduling errors'. Use two methods of cost estimation, and carefully track costs and forecast cost at completion making adjustments as necessary. Build in 10% contingency on cost and scheduling. Track schedules	Escalate to LP and SC and inform WP5 leader. Raise change request for change to budget or schedule. Pull down contingency.	Contingency agreed by the top management of the PP; LP informed.	[Open/Closed]

							daily and include schedule review as an agenda item in every project team meeting. Flag forecast errors and/or delays to the Project Board early.			
7	[risk identification date]	Unplanned work that must be accommodated	Low	High	Medium	PP	Attend project scheduling workshops. Check previous projects, for actual work and costs. Check with peer companies for actual events during similar projects. Check all plans and quantity surveys. Document all assumptions made in planning and communicate to the vendor's project manager before project kick off.	Escalate to the vendor's project manager with plan of action, including impact on time, cost and quality.	PP's team attending scheduling workshops.	[Open/Closed]

8	[risk identification date]	Lack of communication, causing lack of clarity and confusion.	Medium	Medium	Medium	LP/SC/ PP	Write and discuss a communication plan which includes frequency, goal, and audience of each communication. Identify stakeholders early and make sure they are considered I the communication plan. Use most appropriate channel of communication for audience e.g. don't send 3 paragraph email to developers, have a call instead.	Correct misunderstandings immediately. Clarify areas that are not clear swiftly using assistance from Project Sponsor if needed.	Communication plan in progress.	[Open/Closed]
9	[risk identification date]	Pressure to arbitrarily reduce task durations and or run tasks in parallel which would increase risk of errors.	Low	High	Medium	PP	Share the schedule with key stakeholders to reduce the risk of this happening. Patiently explain that schedule was built using the expertise of subject matter experts. Explain the risks of the changes. Insist on contractual obligations	Escalate to LP and SC with assessment of risk and impact of the change and inform WP5 leader. Hold emergency risk management call with decision makers & source of pressure and lay out risk and impact.	Awaiting completion of the schedule.	[Open/Closed]

							towards pilot project vendors.			
10	[risk identification date]	Scope creep	Medium	High	High	PP	Document the pilot project scope in a Project Initiation Document or Project Charter and get it authorised by the PP. Include the full scope in the contract. Refer to it throughout the project and assess all changes against it also ensuring alignment of any changes with the business case.of the pilot project.	Document each and every example of scope creep NO MATTER HOW SMALL in a change order and get authorisation from the project board BEFORE STARTING WORK. This includes ZERO COST changes.	Scope clearly defined in the contract.	[Open/Closed]
11	[risk identification date]	Unresolved project conflicts not escalated in a timely manner	Low	Medium	Medium	PP	Hold regular project team meetings and look out for conflicts. Review the pilot project plan and stakeholder engagement plan for potential areas of conflict.	When aware immediately escalate to LP and PSC and gain assistance from LP to resolve the conflict. Inform WP5 leader.	Project team meetings scheduled.	[Open/Closed]
12	[risk identification date]	Proposed pilot action becomes obsolete or is undermined by external	Low	High	High	PP	No ability to reduce likelihood, but make sure early warning is given by reviewing pilot action on regular basis	Initiate escalation and project close down procedure.	Project close down procedure confirmed with Project Board.	[Open/Closed]

		or internal changes.					with the LP/PSC prior to stipulating the contract.			
13	[risk identification date]	Delay in earlier project phases jeopardizes ability to meet fixed date. For example delivery of just in time materials, for conference or launch date.	Medium	High	High	PP	Ensure the project plan is as accurate as possible using scheduling workshops and work breakdown structure. Use Tracking Gantt and Baseline to identify schedule slippage early.	Consider insurance to cover costs and alternative supplier as a back up, if possible.	Awaiting completion of the schedule.	[Open/Closed]
14	[risk identification date]	Added workload or time requirements because of new direction, policy, or DigLogs project changes	Low	Medium	Medium	PP	No ability to reduce likelihood.	Acquire advanced notice from PSC/LP if possible. Inform WP5 leader.	Pilot project management reviewing options.	[Open/Closed]
15	[risk identification date]	Inadequate testing by the project team or involved (aimed) stakeholders leads to large post go live snag list.	High	High	High	PP	Ensure that test cases/quality checks are timely prepared and testing/quality assurance window is protected.	Raise risk immediately and raise issue if it is clear that UAT testing is inadequate. Stakeholders could extend testing & bring in additional resource.	Stakeholders preparing test cases.	[Open/Closed]

16	[risk identification date]	Legal action delays or pauses project.	Low	Medium	Medium	SC/LP/ PP	Ensure all contracts signed before starting the pilot project. Follow all regulatory requirements and complete stakeholder management plan.	Escalate to the PP's management who will notify legal department. Follow instructions from legal department and inform LP/PSC.	Contracts issued.	[Open/Close d]
17	[risk identification date]	Stakeholder or PP refuses to approve deliverables/ milestones or delays approval, putting pressure on project manager to 'work at risk'.	Medium	Medium	Medium	PP	Ensure that PP's decision maker with budgetary authority is identified before project start and is part of the project board. Communicate dates for sign-off points up front.	Escalate to PP's management and LP and recommend action e.g. - to stop the project. Inform WP5 leader.	Pilot project manager is confirming their sponsor / top management of the supplier.	[Open/Close d]
18	[risk identification date]	Theft of materials, intellectual property or equipment.	Low	High	High	PP	Follow security procedures, ensure Non-Disclosure Agreements (NDAs), & compliance certificates are in place along with required confidentiality clauses. Verify all physical security measures in place. Secure insurance, if applicable.	Notify appropriate authorities e.g. police, legal department, LP, PSC and initiate internal investigations. Inform WP5 leader.	NDAs issued. Security certificates confirmed for contractors/s uppliers working on the pilot project.	[Open/Close d]

19	[risk identification date]	Acts of God for example, extreme weather, leads to loss of resources, materials, premises etc.	Low	High	High	PP	Ensure insurance in place and valid. Familiarise project team with emergency procedures. Where cost effective put back up systems in place, if applicable.	Notify appropriate authorities. Follow health and safety procedures. Notify stakeholders, LP and PSC. Inform WP5 leader	Public Liability Insurance confirmed along with additional premises insurance at site / for the pilot project.	[Open/Closed]
20	[risk identification date]	Pilot project stakeholder's action (or lack of) delays project.	Low	High	High	PP	Identify interested and dedicated stakeholders before start of the pilot project, analyze power and influence and create a stakeholder engagement plan. LP/PSC to check and if applicable, authorise the plan. Revisit the plan at regular intervals during pilot project execution to check all external stakeholders are managed. Consider getting additional insurance.	Notify appropriate authorities and follow internal procedures e.g. for activist demonstrations. Inform WP5 leader.	Stakeholder involvement analysis in progress.	[Open/Closed]

References and attachments

[1] Screenshots – N.A.
[2] Links – N.A.
[3] Documents used – N.A.
[4] Information sources – N.A.
[5] Other references – N.A.