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DIGITPORTS

DIGITal Twins applications for safer and greener Adriatic PORTS operations

CROSS BORDER STRATEGY FOR DIGITAL TWIN APPLICATIONS

(O.1.1)

Foreword

The project's overarching goal is to lead the digital transformation of Adriatic ports through the development and application of digital twin technologies, thus , first and foremost, to review the processes, optimizing the public assets valorization and efficacy of port operations. These tools facilitate a vast array of operations such as dynamic scheduling of vessels calling at port, predictive maintenance of assets, real-time decision-making concerning safety of navigation ruling, and integration of administrative and operational processes into geographically based databases.

By aligning with international best practices, the DIGITPORTS initiative seeks to reduce operational costs, minimize carbon footprints, and improve resource allocation while fostering a sustainable and competitive Adriatic port ecosystem.

DIGITPORTS partnership is composed by main Core and Comprehensive European sea ports in the Adriatic area of Italy and Croatia, such as:

1. North Adriatic Sea Port Authority (ports of Venice and Chioggia) - Lead Partner
2. Port Network Authority of the Eastern Adriatic Sea (ports of Trieste and Monfalcone)
3. Port of Ravenna Authority
4. Port of Rijeka Authority
5. Port of Ploče Authority
6. Port of Zadar Authority
7. Port of Split Authority

In addition, Central Adriatic Sea Port Authority (representing the Ports of Ancona, Falconara, Pesaro, San Benedetto del Tronto, Pescara, Ortona and Vasto, hereafter ADSPMAC) si also taking part to the activities as Oberving Partner, to gain a more in-depth comprehension of the digitalization processes and the scalability of the investments that could benefit also their ports' network.

Scope of the document

Based on the benchmark analysis made in the project start-up phase and the outcomes of the lessons learned in the knowledge transfer and training sessions, DIGITPORTS partners have jointly defined a cross-border strategy that sets-up objectives and priorities aimed at the improvement of

digitalisation in Adriatic ports through innovative Digital Twin (DT) applications. It covers mid to long term perspectives to assure a common quality and scalability of the DT.

To summarize, seven pilot actions of cross-border relevance will lead to Digital twins re-engineer procedures for both port land and sea operations, as follows:

1. the Lead Partner, North Adriatic Sea Port Authority (Ports of Venice and Chioggia) will focus on engineering of DT forleanest concessions' procedures and predictive maintenance of maritime real estate buildings;
2. the Eastern Adriatic Sea port Authority (Ports of Trieste and Monfalcone) will develop a DT application for managing data on elements such as port concessions, bathymetries, nautical accessibility, territorial management and planning (PP2);
3. the Norther-Central Adriatic Sea Port Authority (Port of Ravenna) will further develop modules for the Just-In-Time Platform integrated with the Open Digital Twin Port of Ravenna and with the Ship Footprint Evaluator (PP3);
4. the Port Authority of Rijeka will use remote underwater vehicles to get a real digital replica map of all water seabed and surfaces of the port of Rijeka jurisdiction (PP4);

The following three pilot actions are also categorized as investments and precisely:

5. the Port Authority of Ploče will upgrade its Port Community System (PCS) and its interoperability with CIMIS (Croatian Integrated Maritime Windows) (PP5);
6. the Port Authority of Zadar will develop an automatic Port Reservation (Management) System (PRS) (PP6);
7. the port Authority of Split will also use Business Intelligence and AI (Artificial Intelligence) to monitor the conditions and movements of ships in the City Port Basin of the Port of Split (PP7).

Baseline of Adriatic Ports Digitalization so far

Generally speaking, the pace of digital transformation in the maritime industry is still slow due to industry specific characteristics, such as high asset costs, high development costs, aging workforce and strict regulations, negatively impacting the ability to digitize effectively. Also, due to the traditional set-up of the organizations, conventional players often lack the skills for successful digital adoption.
Common problems to be tackled are twofold: reducing operational costs and carbon footprint (both on containers, passengers and multipurpose terminals) with the use of less public resources.
DIGITPORTS aims to lead the full digital transition of Adriatic Ports through the adoption of a common strategy on applications of Digital Twin, creating a network of digital support – decision making tools, to be used at local and cross-border level.

Benchmarking analyses conducted in the first phase of DIGITPORTS project reveal significant disparities in digital adoption, with fragmented systems, limited interoperability, and underdeveloped data governance frameworks hindering efficiency.

However, the potential benefits demonstrated and analyzed within the training sessions that followed highlight the transformative power of advanced technologies, such as IoT, AI, and predictive analytics, in achieving operational excellence and sustainability. Cybersecurity measures and data governance frameworks remain underdeveloped, exposing ports to risks in an increasingly digital ecosystem. Furthermore, alignment with sustainability goals, including carbon footprint reduction and energy efficiency, is inconsistent across the region.

Benchmarking against global leaders like the Port of Rotterdam, Singapore, and Shanghai highlights best practices in adopting digital twins, AI-driven logistics, and IoT-enabled automation. These ports demonstrate the transformative potential of advanced technologies, strong interoperability, and robust sustainability initiatives. The insights from these benchmarks provide a roadmap for Adriatic ports to elevate their operations to international standards.

However, it is equally important to note that the governance models (set by law) of Adriatic Italian and Croatian Ports compared to the Northern range ports (such as Rotterdam) and other mentioned international hubs (Singapore and Shanghai) are very different. The formers have a landlord port structure while the latters have a public service port structure (public companies with shareholders), and the differences do impact on the range of digitalization processes that can be put in place.

Althought the knowledge transfer is a valuable starting point for the Adriatic Ports to define a common baseline of digitalization requierements, these peculiar governance models must be kept in mind when trying to replicate digitalization processes and measuring them with metrics that address different ownerships and missions of port authorities.

It is acknowledge that there is the need for a strategic, phased approach to digitalization. Key recommendations include the following:

- **Technology Implementation**: Initiate pilot projects for digital twins, IoT devices, and AI-powered analytics in operational areas like cargo handling (operated by private companies on a concessions scheme) and assets and resource management.
- **Regional Cooperation**: Establish cross-border data-sharing frameworks and foster collaborative projects to leverage shared resources and knowledge.
- **Capacity Building**: Conduct comprehensive staff training programs to bridge skill gaps and enhance technological readiness.
- **Policy Reforms**: Develop a unified digitalization strategy aligned with EU directives, streamline regulatory processes, and strengthen cybersecurity policies.
- **Sustainability Alignment**: Invest in renewable energy infrastructure and green technologies to reduce environmental impact and meet EU Green Deal objectives.
- **Funding and Investments**: Explore public-private partnerships and optimize access to EU funding mechanisms to address financial gaps.

By adopting these recommendations, Adriatic ports can address their current challenges, capitalize on their strategic geographical position, and emerge as competitive, sustainable hubs in the global maritime network.

Lesson learned from Training and Knowledge Transfer Sessions

The training sessions, organized in Venice (with the possibility of remote connection) at the end of January 2025 and dedicated to the project's main target groups, provided valuable insights into the practical implementation of advanced digitalization techniques and fostered knowledge transfer among Adriatic port authorities, mainly tackling the following issues:

- Digital Twin Concepts and Global use Cases
- Digital Twin at the Port of Rotterdam
- Port of Sines – Digital Strategy and Digital Twin role
- Life Cycle Modelling: Examples of DT Usage in Design, Production and Operations
- Laying the foundation: Imagery technology for DT
- Drone and AI for production and operations
- DT applications for management of construction sites: environmental monitoring and interaction with surroundings
- 3D GIS and migration process from CAD – a case study
- DT as a foundation concept - Nexus Project Perspective
- Digital Twin applications for ports' accessibility, pilot's training, simulations and 3D modelling
- Enabling Stakeholder Engagement
- Internal communications: DT as Cultural Change Driver

Key lessons learned include the importance of adopting interoperable digital solutions, such as Digital Twins and IoT-enabled systems, which demonstrated significant potential to optimize resource allocation, enhance predictive maintenance, and streamline operations.

Training sessions highlighted the necessity of bridging the skills gap within port personnel, emphasizing the critical role of leadership and data-driven decision-making in supporting digital transformation.

Collaborative discussions during the training showcased best practices in sustainability and cybersecurity, underlining the need to align digitalization efforts with environmental goals and robust data protection frameworks. These findings reinforce the importance of a unified approach to digitalization, with port authorities working collectively to adopt scalable technologies and foster a culture of innovation and adaptability across the Adriatic region.

Strategic Vision for the Mid and Long Term

To position Adriatic ports as leaders in maritime digitalization and sustainability, strategic initiatives must focus on upgrading digital infrastructure and fostering cross-border cooperation and data-sharing frameworks.

DIGITPORTS common strategy will assure a quality and scalability of the digital tools put in place, helping port authorities to achieve full digitalization of administrative procedures and planning, striving for decarbonization of transport and better use of resources; developing new digital tools for training and planning activities (different levels of entry points: creation of digital mapping, software model development, integration of existing databases and similar).

Strategic alignment is a cornerstone for the successful adoption of Digital Twin (DT) technology in Adriatic ports, ensuring that digitalization efforts are cohesive, scalable, and aligned with broader regional and international goals. The findings from D1.1.1 emphasize the need for Adriatic ports to synchronize their digital strategies with global best practices while addressing region-specific challenges. This includes aligning DT initiatives with sustainability objectives, such as the EU Green Deal, by incorporating renewable energy solutions, reducing carbon footprints, and optimizing resource utilization.

The impact of a unified DT strategy extends beyond individual port improvements. By fostering interoperability and enabling seamless cross-border data sharing, DT applications can enhance regional collaboration and establish the Adriatic as a competitive maritime hub. The integration of advanced technologies like IoT and AI will empower ports to improve decision-making, reduce operational bottlenecks, and address cybersecurity vulnerabilities identified in the benchmarking report.

Strategically implemented, DT technology not only enhances operational efficiency but also contributes to long-term sustainability and resilience. It positions Adriatic ports as leaders in adopting cutting-edge digital solutions, improving their ability to compete globally while fulfilling environmental and economic objectives. The coordinated adoption of DT applications will ensure that the Adriatic port system evolves into a modern, efficient, and collaborative network that meets the demands of a rapidly changing maritime landscape.

These insights underscore the necessity for Adriatic ports to adopt a unified strategy, harmonizing their efforts to align with international standards while addressing specific regional challenges.

Digital Infrastructure Upgrades: upgrading a port authority's digital infrastructure can act as a facilitator by improving operational efficiency, safety, and sustainability. The adoption of digital platforms and IoT sensors optimizes vessel and cargo traffic management, reducing waiting times and congestion. Digital Twins integration enables advanced simulations for more accurate planning. Enhanced cybersecurity systems protect sensitive data and critical infrastructure. The use of blockchain ensures traceability and transparency in logistics operations. In addition, AI and Big Data solutions foster strategic decisions based on predictive analytics. A modern infrastructure attracts investment, improves competitiveness and supports the green transition with smart grids and optimized energy management.

Cross-Border Cooperation and Data-Sharing Frameworks: collaborative frameworks for cross-border cooperation and data sharing are essential to creating a unified and efficient Adriatic port network. Establishing a regional digital alliance will facilitate knowledge exchange and enable joint projects that maximize resource utilization. A standardized data-sharing framework supported by robust cybersecurity protocols will ensure secure and seamless integration of information across ports, enhancing interoperability and decision-making. Cooperation with international partners can also accelerate the adoption of best practices and foster innovation, while alignment with EU regulations and funding mechanisms will provide financial and technical support for these initiatives. By strengthening regional cooperation and leveraging shared resources, Adriatic ports can achieve a more cohesive and competitive maritime ecosystem, ensuring long-term resilience and sustainability.

Pilot Projects for Emerging Technologies: pilot projects serve as an effective approach to testing and demonstrating the potential of emerging technologies on a smaller scale before wider adoption. Adriatic ports should focus on implementing digital twin technology in specific operational areas, such as equipment maintenance, cargo tracking, and environmental monitoring. These projects will provide actionable insights into how such innovations can optimize workflows and improve decision-making processes. Similarly, deploying IoT sensors for real-time monitoring of port operations, coupled with AI-powered analytics, can enhance resource allocation and operational efficiency. Testing automation technologies, such as autonomous cranes and vehicles, in selected terminals can further showcase the potential to reduce operational bottlenecks and improve safety. Pilot initiatives should be aligned with sustainability goals by incorporating green technologies, such as electrified

equipment and renewable energy systems, to demonstrate their dual impact on efficiency and environmental performance.

Staff Training and Capacity Building: the success of digital transformation efforts heavily depends on the ability of port personnel to adapt to and effectively utilize new technologies. Comprehensive training programs are essential to bridge the gap between existing skill sets and the requirements of modernized port operations. Ports should offer targeted workshops and on-the-job training sessions to familiarize staff with digital tools, such as Port Community Systems, data visualization dashboards, and automated equipment. Collaboration with universities and training institutions can help establish certification programs focused on maritime digitalization. Additionally, leadership training for managers will ensure that strategic decisions align with technological advancements and operational goals. Capacity building efforts should also emphasize fostering a culture of innovation and adaptability, empowering staff to embrace changes and contribute to the ports' long-term digitalization strategies.

Scalability/transfereability: The Digital Twin transferability will be promoted by the Port of Ancona firstly (Associated Partner) but also by other Adriatic ports pertaining to the EUSAIR wider area, so to leverage the efficiency effect on both shores of the Adriatic Sea.

Ultimately, the digitalization scaling of the DIGITPORTS solutions could be presented and replicated to other ports in the EU or Med Area, for example, exploiting the regular meetings held by ESPO - European Sea Ports Organization, MEDPORTS Association, North Adriatic Sea Ports Association, AIVP The Worldwide Network of Port Cities or MEDCRUISE (or other thematic relevant associations). All DIGITPORTS participating ports are somehow associated to at least 2 of the above listed Port Executive Assemblies. The process to ease transferability start with the creation of "clusters" of technological solutions that could be replicated in ports that have similar constraints, and the said solutions could be presented during the many periodical meetings that are held by the above listed associations of ports and stakeholders. To make some examples of possible transferability of DIGITPORTS benefits, these could be relatable to a) better management of port-city relations and b) better accessibility of port services and assets by the general community and port operators. Typically, historic ports of EUSAIR area must balance the port-city relations in terms of ever-growing accountability of environmental spillovers of port operations, congestion and use of waterfront and land. On the other side, the port ecosystems area, in most cases, is the most important city economic engine for growth. Better utilization of public spaces and assets, with the help of Business Intelligence

and Digital twins applications can be transferred as data-led model of "debate-public" for investments plans and future sustainable development.

To enlarge the geographic perspective, the Med ports are also facing common climate-change related threats and DT applications can help planning mitigation responses and without risks for operators and critical infrastructures. Infrastructure resilience is a key factor due to strategic importance of ports as crucial nodes of the logistic chains and therefore, transferability and uptake of DT modelling bring benefits to other institutions that have not yet testbed these solutions.

By implementing pilot projects and investing in staff training, Adriatic ports can set the basis for a scalable digital transformation journey, ensuring both technological and human readiness to meet the challenges and opportunities of the modern maritime landscape.

Pilot Activities shaping the Adriatic Ports Digitalization Strategy

VISION

DIGITPORTS pilots enable Adriatic ports to start a "data-driven change-management" in their organizations, exploiting the best available technology applications, as Digital Twins are, they can prevent marine environment from adverse impact of maritime transport, while at the same time improve efficiency and safety in transport-services and port operations per se.
To achieve these goals, the ports, which are the crucial nodes in the global supply chain, needs to upgrade their assets and toolboxes so to become technology-facilitators of port ecosystems and communities, with the objective of full digitalization of information and culture-change drivers of innovation.

Indeed, Port Authorities, terminal operators, suppliers, and customers are becoming more closely aligned because of the processes and businesses becoming more and more digitally and globally connected, and Adriatic port authorities must play a pivotal role in this ever-changing playing field, using it also to better manage the public opinion's pressure for decarbonization. This is even more true in the context of the Adriatic Sea Basin where the congestion is posing serious challenges not only on the environmental footprint (and public health) but also in the port operations' performances, safety and security of the navigation and port operations and management, and, in turn, to the attractivity of the East-Med areas for reshoring and production sites.

DIGITPORTS local pilot activities will all contribute to create an open, data-smart common level playing field for final Adriatic ports' users (terminal operators, ship owners, carriers, lorry drivers, passengers of ferry, Ro-Ro or cruises, leisure boaters and tourists, among others). DTs are the basis for any further development of any Data-driven decision support system to gain a scientific knowledge of their technical and economic performances and to simulate different scenarios to jointly take strategic decisions.

PILOT ACTION OF LP NORTH ADRIATIC SEA PORT AUTHORITY (PORTS OF VENICE AND CHIOGGIA
Engineering of DT for leanest concessions' procedures and predictive maintenance of maritime real estate buildings (SUA Desk - *one-stop-shop concept*) for the ports of Venice and Chioggia **GOAL:** to achieve full digitisation of the concession and authorisation process for works and assets and computerisation of the relevant fee schedule; availability on a cartographic map of the state of the assets (free, occupied) and of the main characteristics under the concession profile and the tariff values of all state-owned assets that may be the subject of concessions Digitisation of the management and investment planning process for new works and the process of maintenance operations; effective management and control of both the technical plan and the economic-financial plan of the projects and interventions, supporting the internal and external users involved; Appropriate preparation of management databases and unstructured archives to feed dashboards and analytical reporting systems, guaranteeing the quality and consistency of managed data; consolidation and introduction of innovative technologies to contribute to the knowledge creation process and foster analysis (traditional and predictive) on historical, statistical and process data **EQUIPMENT:** no equipment is needed **BUDGET:** 220.000,00 € in external expertise and services budget line

PILOT ACTION OF NORTH EASTERN ADRIATIC SEA PORT AUTHORITY (PORTS OF TRIESTE AND MONFALCONE)
SW development of a Digital Twin for managing data on elements such as port concessions, bathymetries, nautical accessibility, territorial management and planning in the ports of Trieste and/or Monfalcone **GOAL:** the DT infrastructure will have an integrated data platform (so called Single-truth database) with webGIS for trusted data accessibility, building on target data layers such as concessions, utilities, bathymetries and updated cartography. The system will include also real-time data for BIM – GIS interoperability and set the common nomenclature and meta-documentation for the Port of Trieste and/or Monfalcone The DT will provide increased data accessibility and reliability through single-truth data platform, a better situational awareness, an integrated Facility Management, safer port operations and better spatial and marine planning support to a wide array of stakeholders beyond Port Authority, such as Service and Maintenance companies, Utilities, Port Community and other Public bodies **EQUIPMENT:** no equipment is needed **BUDGET:** 235.000,00 € in external expertise and services budget line

PILOT ACTION OF RAVENNA PORT AUTHORITY
Design and development of a Just-In-Time Platform integrated with the Open Digital Twin Port of Ravenna and with the Ship Footprint Evaluator **GOAL:** Design and development of a Just-In-Time Platform integrated with the Open Digital Twin Port of Ravenna and with the Ship Footprint Evaluator developed in the past programming period with Interreg Italy-Croatia project INTESA. It includes the use of computational resources for the duration of the activity **EQUIPMENT:** no equipment is needed **BUDGET:** 250.000,00 € in external expertise and services budget line

PILOT ACTION OF RIJEKA PORT AUTHORITY

Digital Twin replica map of all water seabed and surfaces of the port of Rijeka jurisdiction

GOAL: Via Underwater inspections, enhance safe berthing, serving as a proactive measure to identify potential hazards and structural weaknesses. With the use of remotely operated vehicles (ROVs) equipped with advanced imaging systems, reaching difficult or hazardous area, such as deep or confined spaces, with sonar technology providing detailed imaging of submerged objects and surfaces. Multibeam and side-scan sonars will enable inspectors to generate comprehensive maps of the underwater terrain, allowing for thorough assessments of potential obstructions. Inspectors utilize specialized diving equipment to conduct close-up inspections of these vertical surfaces, meticulously examining for signs of corrosion, cracks, or other structural anomalies. By embracing these methods, maritime operators can mitigate risks associated with berthing, safeguarding both vessels and the surrounding marine environment. The emergence of underwater digital twins, crafted through visual methodologies, presents a revolutionary approach to ensuring ship and environmental safety. Remarkably, the cost of implementing these digital underwater and above water 3D replicas falls within a range of 10 to 15 euros per square meter. Market research was conducted and all tools for underwater inspections were analysed to determine this price, while closely observing the tools capable of supporting Industry 4.0 initiatives. Thoroughly examining the vertical walls is of great importance, highlighting the necessity of selecting a method with an error margin of less than 1 degree in vertical inspections. In this regard, special attention was paid to choosing a technology capable of ensuring the specified level of accuracy

EQUIPMENT: no equipment is needed

BUDGET: 138.000,00 € in external expertise and services budget line

PILOT ACTION OF PLOCE PORT AUTHORITY (INVESTMENT 2.1)
Upgrade of PCS and its interoperability with CIMIS (Croatian Integrated Maritime Windows), purchasing of equipment as Servers, monitoring system for EDI center and integrated sensors for traffic ramps' control **GOAL:** Upgrade of the PCS system for the integration with National maritime system, TOS systems and API interface, Ship announcement and integration of the PCS and CIMIS (Croatian Integrated Maritime Windows). The integration with TOS systems will cover information about ships, cargo, customs, border police etc. Integration with the CIMIS will be done based on EU regulation 2019/1239 for establishing European Maritime Single Window environment (EMSWe). Dasboards will be used to log and monitor all the messages which are exchange between the systems so that we can have better control of transport flows, enhancing security and have digital and visual perspective regarding the exchange of the information in port environment. This will lead to reduce the port congestion, higher cargo handling capacity and at the same time, lesser the air pollutants due to truck queuing at the entrance gates of the port. The upgraded DT application of a mathematical algorithm for better planning (data driven process) will be combined with machine learning in real-time. Other ports with similar structure of the traffic/yards operation setting may benefit from the experience by implementing DT similar predictive systems **EQUIPMENT:** Servers and networking system infrastructure for the primary DC site: Upgrade of the server and networking infrastructure equipment to enhance the infrastructure, security and ICT system. Monitoring system for EDI message exchange through APIs and based on the delivered pilot upgrades of the PCS system - EDI center; Delivery of the traffic ramps for the control of the port areas with integrated sensors and access control **BUDGET:** 60.000,00 € in external expertise and services budget line and 105.000,00 € in equipment budget line.

PILOT ACTION OF ZADAR PORT AUTHORITY (INVESTMENT 2.2)
Development of Port Reservation Management System (PRS) software to automatically managing vessel arrivals, departures, berth occupancy planning and communication between shipping companies and port authority **GOAL:** Development of Port Reservation (Management) System (PRS) software (Main function of Port Reservation (Management) System software is planned as improvement of currently completely manual process of managing vessel arrivals, departures, berth occupancy planning and other related port operations as well as easier processing of associated statistical data, allowing easier and more intuitive way of port operations planning and data management and easier communication between shipping companies and port authority. The new DT aims at implementation of (long-term) data-driven reservation system in order to improve port infrastructure management system on cruise, cargo and passenger terminals. PRS will be used for improving, centralizing and digitalizing existing data input processes by various port services related to cruise (long term planning - 3+ years), cargo, fishing as well as small cruise vessels. This will provide Port of Zadar Authority with implementation of Business Intelligence on named topics thus enabling optimization and upgrade of existing port management processes. **EQUIPMENT:** server for hosting developed PRS **BUDGET:** 55.000,00 € in external expertise and services budget line and 5.000,00 € in equipment budget line.

PILOT ACTION OF SPLIT PORT AUTHORITY (INVESTMENT 2.3)
DT for improvement, supervision and monitoring of conditions and movements of ships in the City Port Basin of the Port of Split **GOAL:** Development of Port Reservation (Management) System (PRS) software for Split City port basin. With 5.8 million passengers and around 20 thousand arrivals of ships per year, this will enhance monitoring of conditions and movements of ships. At the moment, there is no automatic system for monitoring the arrivals, stays and departures of ships in the passengers' basins. The operations officers are assisted by the cameras in the City Port Basins where they are located they may not visually see every ship due to congestion, so that the officers rely on 25 cameras, especially four cameras stationed on higher level. In Resnik they mainly use cameras. Thus, the current system is not completely adequate for safe and efficient monitoring the arrival, stay and departure of ships, which is not optimal from the traffic, security and environmental point of view. The investment is primarily envisaged for the major passenger port basin of the Port of Split, the City Port Basin with more than 5 million passengers per year and more than 900 hundred thousand vehicles **EQUIPMENT:** LoRaWAN and ultrasonic sensors for the detection of the presence of vessels in the port and specific berth; RFID technology for the detection of the presence of vessels in the port and specific berth; BLUETOOTH TECHNOLOGY for the detection of the presence of vessels in the port and specific berth; SURVEILLANCE CAMERAS with machine learning as a technology for detection of the presence of vessels in the port and specific berth; DETECTION OF THE PRESENCE OF VESSELS in the port and specific berth in connection using surveillance cameras in combination with machine learning (artificial intelligence) using Bluetooth technology **BUDGET:** 24.600,00 € in external expertise and services budget line and 5.000,00 € and 190.000,00 € in equipment budget line.