The International Maritime Transport and logistics Conference

Towards Global Competitiveness in Maritime Industry

"INVESTING IN PORTS"

The Trends, The Future

8 2019 Marlog

FUNDACIÓN valenciaport

Valenciaport Cluster Innovation Plan for 2025

valenciaport

Autoridad Portuaria de Valencia

MADRID

valenciaport

Autoridad Portuaria de Valencia

Who we are

The **Port Authority of Valencia (PAV)**, which trades under the name of **Valenciaport**, is the public body responsible for running and managing three state-owned ports, **Valencia, Sagunto and Gandia**.

What we do

The **Port Authority of Valencia** is dependent on the State-owned Ports Body, the umbrella organisation for Spanish ports. The **PAV** is responsible for developing the global strategy for the three ports it manages, including

- Sales promotion and marketing
- Infrastructure planning and public land management
- The quality of port and logistics services
- Technological developments
- Environmental sustainability

SAGUNTO

VALENCIA

GANDIA

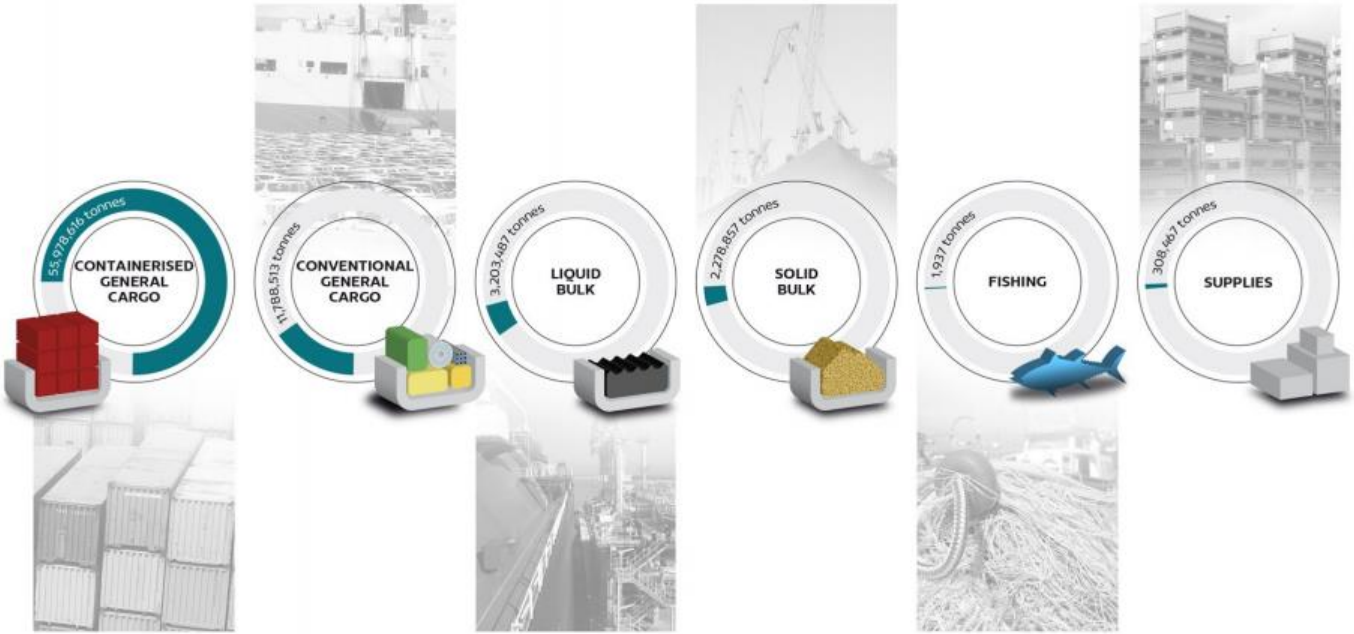
valenciaport
Autoridad Portuaria de Valencia

Facilities at the Port of Valencia

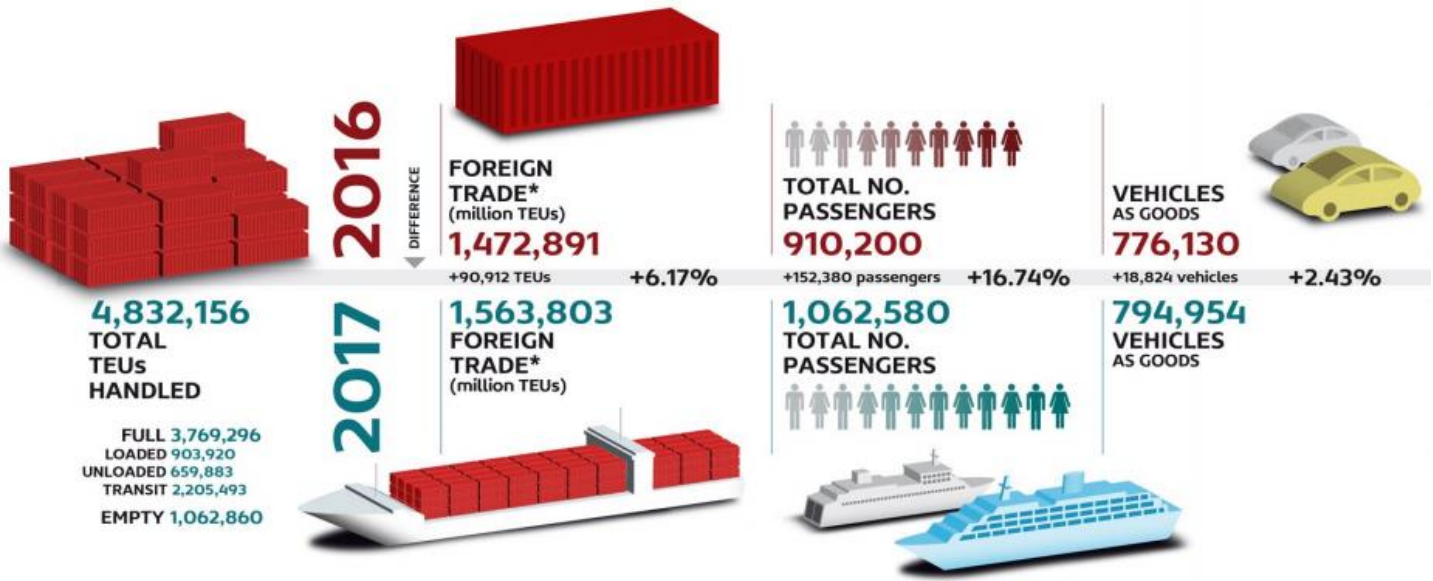
The **Port of Valencia** is highly specialised in container traffic, as well as liquid bulk, solid bulk, and Ro-ro traffic. It also offers regular passenger and goods services to and from the Balearic Islands, and welcomes large numbers of cruise ships every year.

The Port of Valencia is directly linked to Spanish **and international road and rail networks.** The V-30 (Valencia bypass) connects the Port of Valencia to the national road network and to all the other road links in its hinterland. In turn, rail connections from Valencia provide access to all the production areas in the Iberian Peninsula and in Europe.

VALENCIAPORT FIGURES



VALENCIAPORT FIGURES



* Full TEUs import / export


FUNDACIÓN
valenciaport
The knowledge centre for the leading port cluster in the Mediterranean.
FUNDACIÓN
VALENCIAPORT

WHO WE ARE

Fundación Valenciaport is a centre for Applied Research, Innovation and Training, serving the port-logistics cluster.

It is an initiative of the Port Authority of Valencia, bringing together key companies, universities and institutions in the port community.

Since its creation, it has developed projects in more than sixty countries, mainly in the Mediterranean, the rest of Europe, Asia and Latin America.

KNOWLEDGE AREAS

Maritime market

Port planning and management

Logistics chain

Smart port

Sustainability: energy use and environmental challenges

Security and protection

Port-city-people integration

WHAT WE DO

- Promoting **INNOVATION**, by fostering the design, implementation and execution of **R&D&I PROJECTS** aimed at enhancing the competitiveness of companies and institutions in the sector.
- Knowledge management, offering specialized and high value-added **TRAINING** for the continuous professional development of the port-logistics community's human capital.
- Active **COOPERATION** policy with port communities **AROUND THE WORLD** by providing **TECHNICAL ASSISTANCE** and support to Spanish logistics operators undergoing a process of **INTERNATIONALIZATION**. Internationally showcasing the Port of Valencia's know-how
- **MARKET INTELLIGENCE** service to develop indexes, databases and reports of strategic interest to the sector.
- Support for the **PORT-LOGISTICS COMMUNITY**, encouraging cooperation within the sector as well as outreach initiatives and dialogue with the general public, within the framework of a collective **SOCIAL RESPONSIBILITY** strategy.

| PORT- MARITIME MARKET:

- Strategic reports for the port-maritime sector
- Analysis of foreign trade and international traffic
- Databases of shipping lines
- Price indexes for the container transport market

| PORT PLANNING AND MANAGEMENT:

- Traffic and demand forecasting
- Financial and socio-economic analysis of port and logistic projects
- Strategic and master plans
- Port community quality systems

| PORT-LOGISTICS CHAIN:

- Port integration in global supply chains
- Port connectivity with the hinterland (rail, road and logistics platforms)
- Short Sea Shipping
- Automation and integration processes of autonomous vehicles (ships, trucks, machinery)
- Sea traffic management systems and synchronization with port operations

| INTEGRATION BETWEEN THE PORT, THE CITY AND ITS PEOPLE:

- CSR
- Sustainable mobility
- Port-City Planning
- Urban logistics
- Sustainable tourism and cruises

| SMART PORT

- Collaborative environments (single windows, PCS and traffic management systems)
- Innovation in management systems (PMIS, TOS...)
- Traceability technologies
- Port 4.0 (Internet of things, cyber-physical systems, Big Data and Artificial Intelligence)
- New architectures and tools (blockchain, 5G and cloud computing)

| SUSTAINABILITY: ENERGY USE AND ENVIRONMENTAL CHALLENGES

- Clean energy: renewables, hydrogen, LNG and other alternatives for port and maritime use
- Energy efficiency in port operations
- Circular economy in ports
- Measuring emissions in ports, ships and logistics chains
- Analysis of the impact of climate change on infrastructures and logistics operators

| SECURITY AND PROTECTION:

- Physical security environments (drones, wearables, new identification and control systems, non-intrusive technologies and advanced visualization systems)
- Cyber security
- Cyber-physical management (integrated control centres)

FUNDACIÓN VALENCIAPORT IN NUMBERS:

242 PROJECTS

87 SOFTWARE SOLUTIONS FOR PLANNING AND MANAGEMENT

15 INDUSTRIAL PROTOTYPES

9 HARDWARE SOLUTIONS

8 DATABASES AND SIMULATORS

60 COUNTRIES

450 MEMBERS

408 COURSES

39,337 HOURS OF ONLINE AND CLASSROOM-BASED TRAINING

171 WORKSHOPS

10,782 STUDENTS

* 2018 figures

Valenciaport Cluster Innovation Plan for 2025

WHY AN INNOVATION PLAN?

Innovation as the key driver for competitiveness

In a global economy such as maritime transport, innovation is a key element in the development of the cluster and constitutes one of the most important factors in increasing the productivity and competitiveness of logistics-port companies.

As the environment becomes more dynamic and complex, conservative behavior turns into a loss of market positions, a fall in profits, or even the failure of the company.

WHY AN INNOVATION PLAN?

Importance of clusters for port efficiency

It is important to emphasize the need to integrate all participants in the innovation process, creating a system that links technology, companies and institutions, taking care of the numerous interactions between agents to adapt to continuous change.

The **port of Valencia** has a cluster of **companies** and **institutions** that is conformed as one of the most important economic motors of the Valencian Region. The leadership position of Valenciaport has been achieved, thanks to the consolidation of an **efficient and integrated logistics-port community**, endorsed by a high capacity for innovation, which has been reflected over time in pioneering initiatives on a global scale, in areas such as IT, quality or environmental management systems.

That link created in the cluster make a **dynamic interaction** that explains the **increase of productivity and efficiency**, the **reduction of transaction costs** and the **diffusion of know-how**.

METHODOLOGY

1 STATE OF ART

Study & Benchmarking

2 IDENTIFICATION

·Main Trends

·Main components of port-logistics chain

3 FIELDWORK

25 Valenciaport cluster representatives surveyed

IMPORTANCE
CONSOLIDATION
AFFECTATION

4 WORKSHOPS

DIGITALISATION

ENERGY & ENVIRONMENT

AUTOMATION & ROBOTIZATION

SAFETY & SECURITY

NEW BUSINESS MODELS

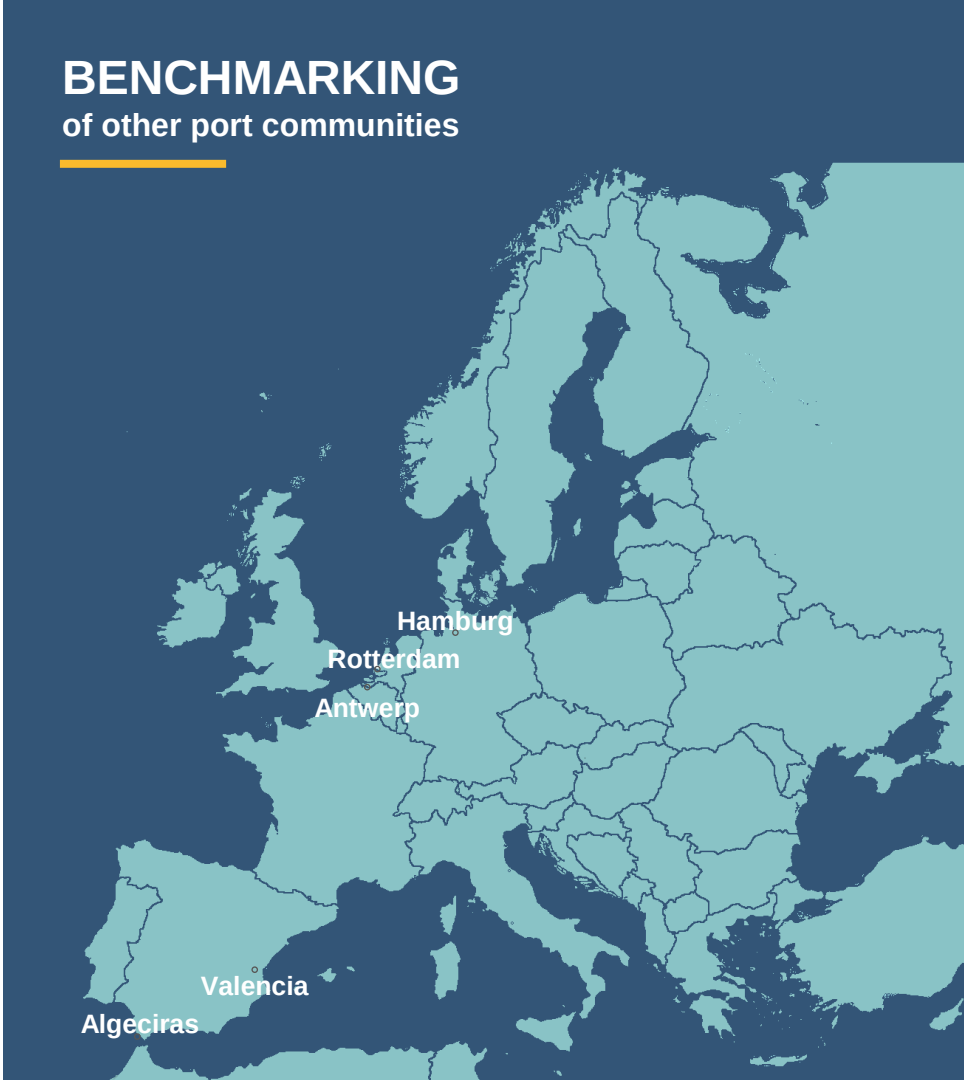
5 ACTION PLAN

6 INNOVATION COMMITTEE

BENCHMARKING
of other port communities

Benchmarking is important to keep companies at the forefront and continue to invest in innovation without losing competitiveness in the port business, a market that is constantly changing. In the dynamic world of logistics and industry, stagnation means decline. And it is not only important to adapt what other ports do well, but also to correct possible mistakes made by competitors in the implementation of innovations and take advantage of their experiences.

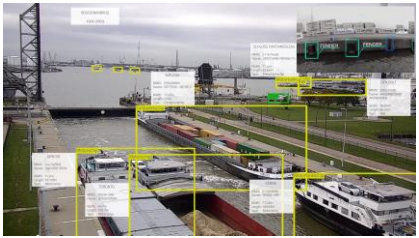
Three European leading ports have been studied: Rotterdam, Antwerp, Hamburg, and Algeciras.



Port of Antwerp

The vision of the port of the future for Antwerp is based on 4 pillars:

- **Energy and environment**: new solutions for a sustainable future (e.g. a steam network with residual heat; Onshore Power Supply,….)
- **Smart port** (e.g. *digital twin* concept; smart cameras,…)
- **Smart transport and industry 4.0** (e.g. autonomous depth-sounding boat-Echodrone,...)
- **Strong together**: community building (e.g. Chainport Hackaton; PortXL, the Beacon startup,….)



PORTXL
World's 1st Port & Maritime Accelerator

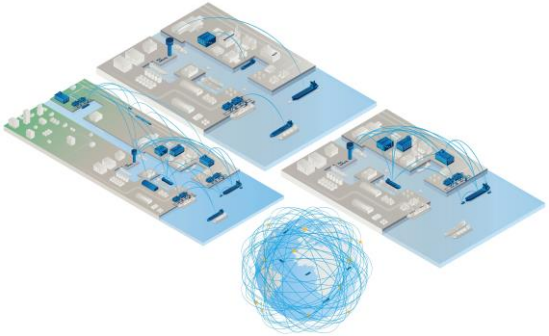
Source: Port of Antwerp

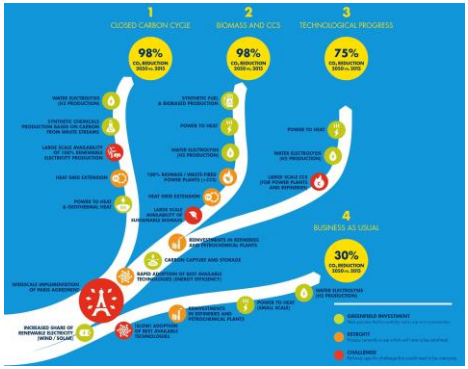
Port of Rotterdam

Port of Rotterdam relies on initiatives such as *Innovation Eco-System*, *Smartport*, Dutch universities and startups in a local level to create the ideal conditions in which innovation is most likely to appear, which implies to be in line with the market. But they also explore the whole world, as they do through *PortXL* (first accelerator that focuses on port start-ups on a global level).

The two most important innovation's trends for Rotterdam are:

- Digital Port (*digital twin* concept), that they explain through "four maturity levels" to gradually develop into smart ports:
  - Level 1: Digitisation of individuals parties in the port
  - Level 2: Integrated systems in a port community
  - Level 3: Logistics chain integrated with hinterland
  - Level 4: Connected ports in the global logistics chain
- Decarbonisation: to fulfill with *Paris Agreement* the Port of Rotterdam has proposed three possible decarbonisation pathways as well as one business as usual pathway:
  - Closed carbon cycle
  - Biomass and CCS
  - Technological progress





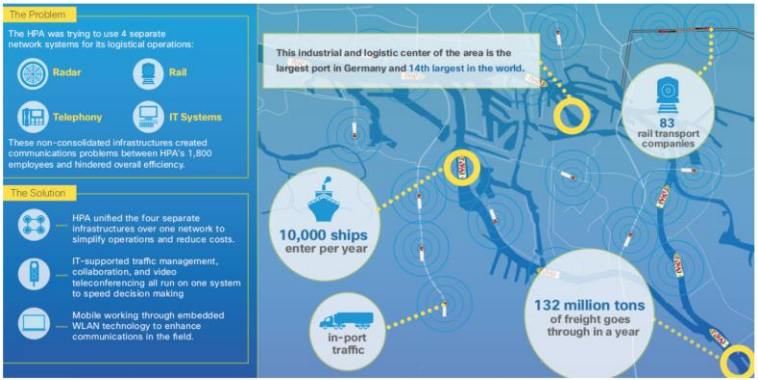
Source: Port of Rotterdam

Port of Hamburg

The Port of Hamburg (HPA) sets course for a sustainable future by relying on the IT optimization to ensure maximum efficiency, security and economy in all areas of the port and become a Port 4.0 or a smartPORT.

Collaborating with large communication companies, they are testing ground for the creation of a new 5G mobile standard or had create a unified communications system (HPA_{Net}), without losing sight of the physical and cybersecurity threats.

The HPA promotes environmentally-friendly mobility and advocates reduced energy consumption focusing on three core areas: renewable energies, energy efficiency and mobility.



Source: Port of Hamburg

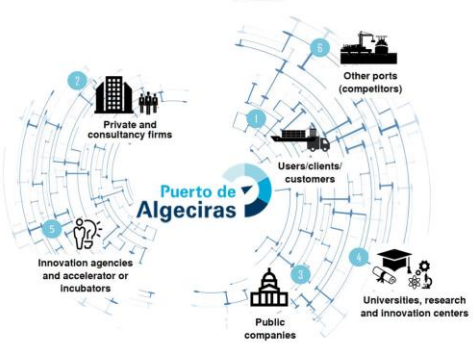
Port of Algeciras

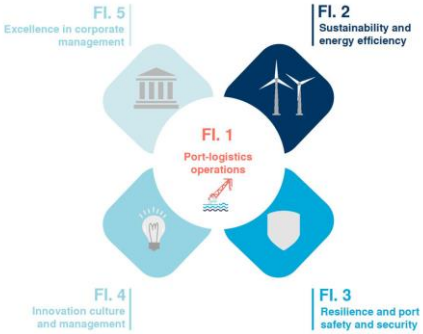
Algeciras Port Authority (APBA) has created the *Algeciras Innovation Portal* to boost an innovative culture and promote the development of an Innovation ecosystem, in order to guarantee the future competitiveness of the Algeciras Bay Port.

Through this portal, the APBA's innovation strategy has been outlined considering the following five strategic points of innovation:

- Port-logistics operations
- Sustainability and energy efficiency
- Resilience and port safety and security
- Innovation culture and management
- Excellence in corporate management

It is important to highlight the programme *Algeciras BrainPort 2020* (ABP2020) which is conceived as the vehicular axis for the strategy for digitization and innovation at APBA, which covers the portfolio of innovation and technological projects.





Source: Algeciras Port Authority

ACTION PLAN

DIGITALISATION AND AUTOMATION

Implementation period (1-5 years)

Relevance (High/ Medium/ Low)

Sensorization of port physical environment

Predictive model and data analytics

IoT information broker (Industrial DATA Spaces)

1. Preventive maintenance of facilities and infrastructures
2. Control of empty containers and other services
3. Smart parking
4. Real-time traffic status

Planning & optimisation of maritime operations

1. Prediction and management of maritime access
2. Calculation of the ETA
3. Improvements to elaborate the Bayplan

Predictive systems for Vessels' ETA to the port (JIT application)

1. Collaboration in the definition of European maritime traffic management systems
2. Vessel monitoring
3. Evolution of mooring area management systems

Prediction and management of road access

1. Preventive air quality control systems
2. Prediction and management of accesses
3. Management of equipment and machinery

Management of massive data acquisition systems

1. Start-up of advanced high quality video surveillance systems (4K images).
2. Advanced management of electricity meters
3. Identification and tracking of terminal equipment

Vehicle – Infrastructure communication systems

1. Geolocation of the vehicle
2. Prevention and management of risks and accidents
3. Communication of the availability of a container

Predictive maintenance systems

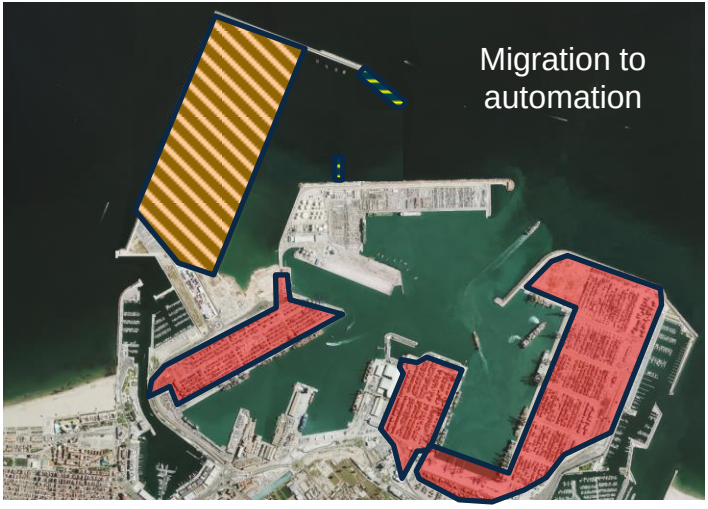
1. Monitoring and control of equipment, infrastructure and facilities
2. Container monitoring and alert management

NORTH ENLARGEMENT CASE

DIGITALISATION AND AUTOMATION

Main technical characteristics:

- ✓ **Dock length:** 1,970 m
- ✓ **Quay draught:** 19.2 m
- ✓ **Dock draught:** 20.0 m
- ✓ **Draft of entrance channel:** 22.5 m
- ✓ **Width of the terminal:** 700 m. approx
- ✓ **Terminal area:** 140 Ha. approx
- ✓ **Maximum capacity:** 5 Million TEU approx
- ✓ **Railway terminal:** for trains of at least 750 m.
- ✓ **Phased development:** according to the tenderer's offer
- ✓ **Concession term:**
  - 35 years, with the possibility of a 50 year extension for partial development
  - 50 years for full development



DIGITALISATION AND AUTOMATION

Implementation period (1-5 years)

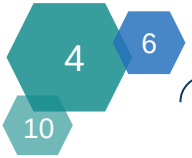
Relevance (High/ Medium/ Low)

Optimisation of operations

Information security and visibility

Automation of terminals and vehicles

1. Installation of 5G networks in port area
2. Electrification of terminals
3. Interoperability between IoT platforms



Traceability services in Blockchain networks

1. Creation of new advanced container traceability services for final clients

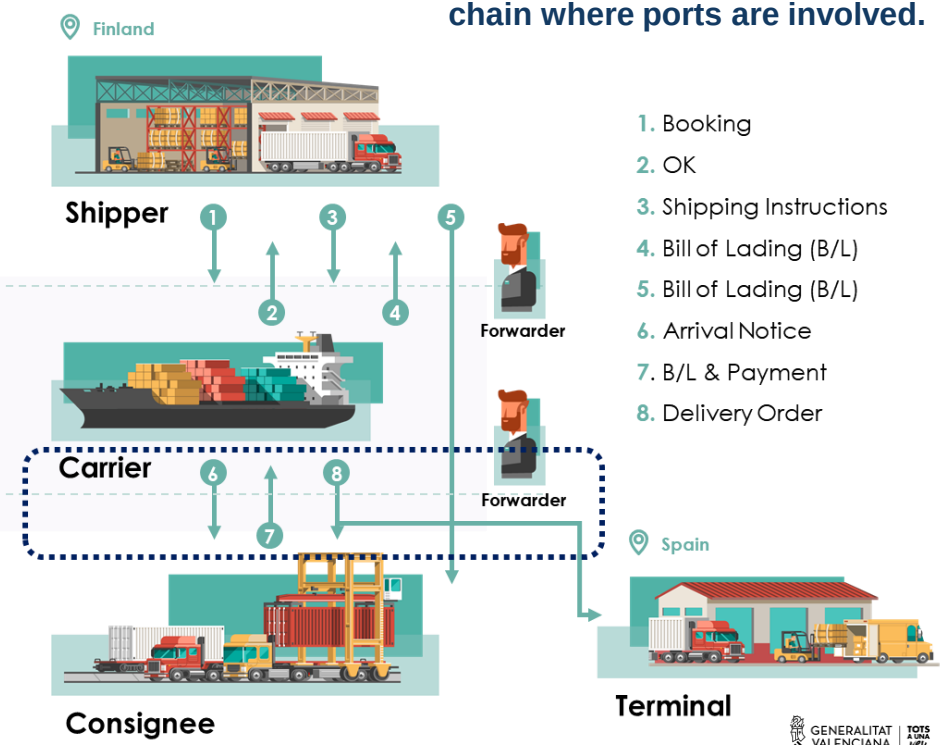
Maritime traffic management systems

1. Implementation of collaborative scale management systems
2. Development of mobile applications for towage, mooring and pilotage.
3. Design of data processing tools and management of productivity indicators.

PORT MANAGEMENT OF CONTAINER 4.0 BLOCKCHAIN

DIGITALISATION AND AUTOMATION

Secure and efficient container management at the port providing greater process integrity, transparency and auditability in certain parts of the supply chain where ports are involved.



1. Booking
2. OK
3. Shipping Instructions
4. Bill of Lading (B/L)
5. Bill of Lading (B/L)
6. Arrival Notice
7. B/L & Payment
8. Delivery Order

Blockchain

Integration with IoT

PCS

GENERALITAT VALENCIANA | TOTS A UNA VEU

AVI AGÈNCIA VALENCIANA DE LA INNOVACIÓ

HERIT-DATA Sustainable Heritage Management towards Mass Tourism Impact thanks to a holistic use of Big and Open Data

HERIT-DATA aims to **reduce the impact of human activities** (tourism-related ones) on cultural heritage, with a special focus on 2 kind of cultural destinations that can benefit from and be affected by mass tourism: Old towns & Sites of particular cultural heritage or archaeological interest for visitors, including UNESCO World Heritage Sites, so present in the MED territories.

In that framework, HERIT-DATA plans **to develop of a sustainable and responsible tourism management** towards cultural heritage in MED regions, in particular by taking advantage of **technology and innovation in management tools (Smart Cities),** as well as other policy and social measures.

11 Partners

7 Countries

ENERGY & ENVIRONMENT

Implementation period (1-5 years)

Relevance (High/ Medium/ Low)

Decarbonisation of the Logistic Port Cluster

Monitoring and communicating of environmental impact of products and services

1 Evolution towards a zero emissions operations model

1. Electrify port machinery that currently uses fossil fuels.
2. Introduction of alternative fuels in those machinery and equipment
3. Introduction of environmental and commercial bonuses

2 Carbon Footprint: monitoring and communicating (for products and services offered by the Port-Logistics Cluster)

1. Define a certification procedure for measuring the environmental footprint generated by passengers and goods.
2. Communication of environmental impact to society.
3. Ecolabelling.

3 Environmental and commercial bonus

1. Promote good practice guides to raise the cluster's environmental awareness.
2. Link continuous improvement in operational efficiency in the port area to obtaining environmental bonuses.

4 Smart Energy Grids development

1. Implementation of Monitoring and Energy Management Systems
2. Incorporation of renewable energies into the electricity generation system.
3. New energy accumulation or storage systems for electricity surpluses.

5 Energy transition and self-supply taking into account renewables sources

1. Use of wind, wave, photovoltaic energy and others in the port.
2. Investigate new energy accumulation or storage systems.
3. Study the conversion of surplus renewable energy to hydrogen production.

H2PORTS

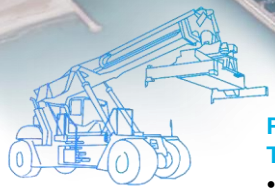
FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

ENERGY & ENVIRONMENT

Implementing Fuel Cells and Hydrogen Technologies in Ports

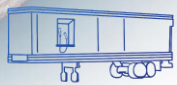
H2PORTS

Port of Valencia



Reach Stacker in MSC Terminal

- FC: 90-120 kW
- 2 years / 5,000 h of operation



Mobile HRS

- Hydrogen supply logistics at ports
- Port regulatory framework
- Safety procedures

Yard Tractor in Valencia Terminal Europa

- FC: 85 kW
- 2 years / 5,000 h of operation

General features

- Total Budget: 4,117,197.5 EUR
- Duration (4 years): 2019-2023

First application of hydrogen technologies in port handling equipment in Europe

SAFETY & SECURITY

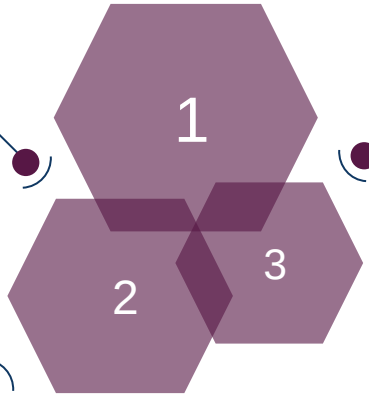
Implementation period (1-5 years)

Relevance (High/ Medium/ Low)

New physical/cyber security and safety schemes

Security, safety and emergencies integral management based on industry 4.0 technologies

1. Sensorize and monitor all physical assets of the port.
2. Biometric controls for personnel access to restricted areas
3. Transport orders that integrate the use of the driver's digital identity.



Cybersecurity models

1. Integration in a system of all the physical sensors and cyber of the port.
2. Identification of innovative surveillance and control technologies.
3. Implementation of Early Warning System against cyberthreats.

Drones based applications

1. Applications of submarine or surface drones for surveillance in port areas.
2. Use of drones for inspection and maintenance of port machinery or infrastructure.
3. Use of aerial drones for the delivery of documentation or container seals.
4. Exploration of the use of aerial drones to deliver supplies to ship crews.

Sauron

SCALABLE MULTIDIMENSIONAL SITUATION AWARENESS SOLUTION FOR PROTECTING EUROPEAN PORTS

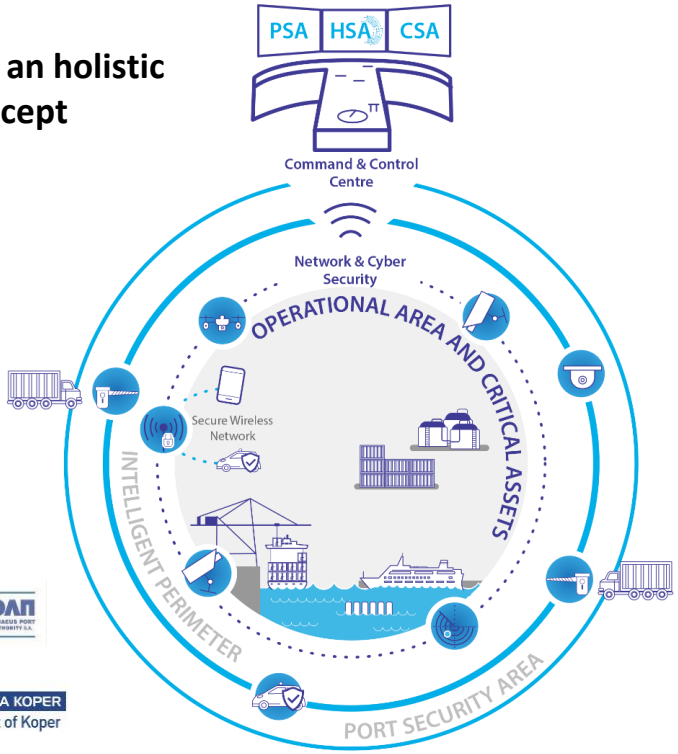
The **SAURON project proposes an holistic situation awareness concept**

PSA: Prevent/detect/mitigate physical threats

HSA: Detect/prevent/mitigate cascading effects detected through PSA and CSA

CSA: Prevent/detect/mitigate cyber threats

EPWS: Communication/coordination of warnings between security teams and population



Fundación Valenciaport · Universitat Politècnica de València · Grupo SZ · Urania Port Authority · SAFRAN Morpho · InnovaSec · AIT Austrian Institute of Technology · OAP Piraeus Port Authority S.A. · etra · Πανεπιστήμιο Πειραιώς University of Piraeus · Katholieke Universiteit Leuven · Luka Koper Port of Koper

High-Resolution Copernicus-Based Information Services at Sea for Ports and Aquaculture

HiSea is an EU-funded project that aims to develop, test and demonstrate information services that provides high resolution data of water quality at sea. The services offered by HiSea will incorporate and process data that are being obtained through the marine, land and climate services COPERNICUS (the EU Earth Observation and Monitoring service), local monitoring data and advanced modelling. The platform will improve operation, planning and management of different marine activities, with a focus on the usage in the port and aquaculture sectors.

New Business Models

Implementation period (1-5 years)

Relevance (High/ Medium/ Low)

Sharing Data

Sharing Resources

New modern Customers relationships models based on global digital platforms

1. Study on the redefinition of roles among the current actors of the logistics chain with the increase of market concentration and level of digitalization foreseen.
2. Pilot test to demonstrate efficiency changes in the container supply chain with the new business model.

Full cargo load & container traceability

1. Development and pilot testing of new technological solutions that improve traceability, real-time tracking and forecasting of the movement of goods along the logistics chain.
2. Pilot test of a decentralised Blockchain platform to support transport and logistics processes

Provision of value-added information services by Port Authorities

1. Design and development of solutions that allow information and data to be integrated and available to third parties.
2. To articulate initiatives that allow to optimize the arrival of trucks and ships to the port, reducing the times of stay.
3. Improve the visibility of the trucks that arrive at the port by means of sensorization and constant data transmission.

Foster innovation with Start-Ups – logistics accelerators

1. Creation of an incubator/startup accelerator in which the companies of the cluster participate.
2. Creation of a living lab of the cluster companies to support the research activity and startups, providing a testing field and promoting co-creation,

Smart aggregation of logistics demands to remove inefficiencies

1. Research study presenting the technologies and the approach of a system that intelligently aggregates logistics demand, shares and optimizes resources.
2. Pilot test on the organization of resources and the distribution of the load to be transported in a more efficient way using an intelligent aggregation system of logistic demand.

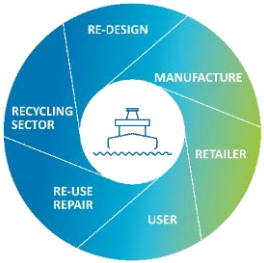
Development of new logistics circular economy models

1. Promote the implementation of the Environmental Management System in port operators.
2. Promotion of the development of commercial waste collection services in ports.
3. Promotion of the implementation of the EMAS

LOOP-Ports project

New Business Models

The LOOP-Ports project is funded by the EIT Climate-KIC initiative in the framework of the "SUSTAINABLE PRODUCTION SYSTEMS"



LOOP-Ports aims to **facilitate the transition to a more circular economy in ports** through the creation of a Circular Economy Network in Ports that will provide an innovation ecosystem around the port activity and stimulate circular economy initiatives in ports.

Metals Plastics Cements Biomaterial

13 partners

6 European Countries

France
Italy
Germany
Netherlands
Denmark
Spain

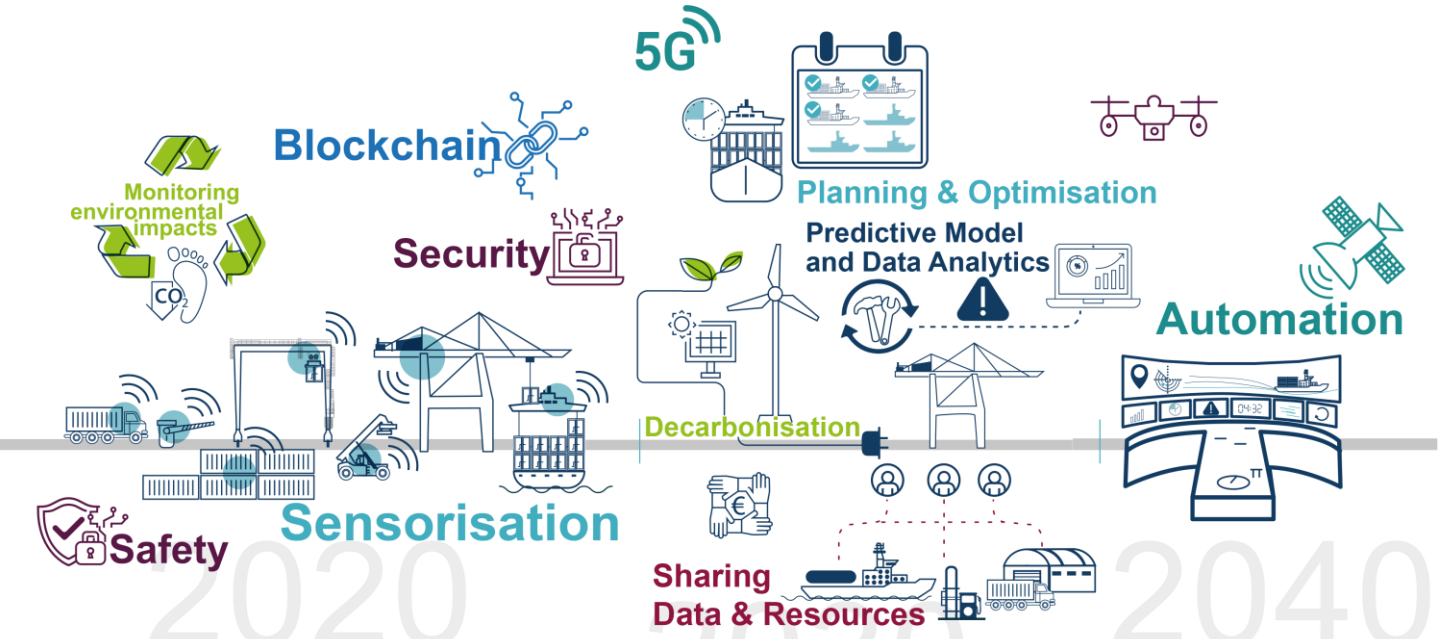
+450 ports analysed
7 business models
3 training pilots
1 web tool 30 workshops

(All the port stakeholders are invited to participate in the network)

Join now the Circular Economy Network of Ports! You will gain access to valuable information! More information: www.loop-ports.eu

LOOP·Ports
Circular Economy Network of Ports

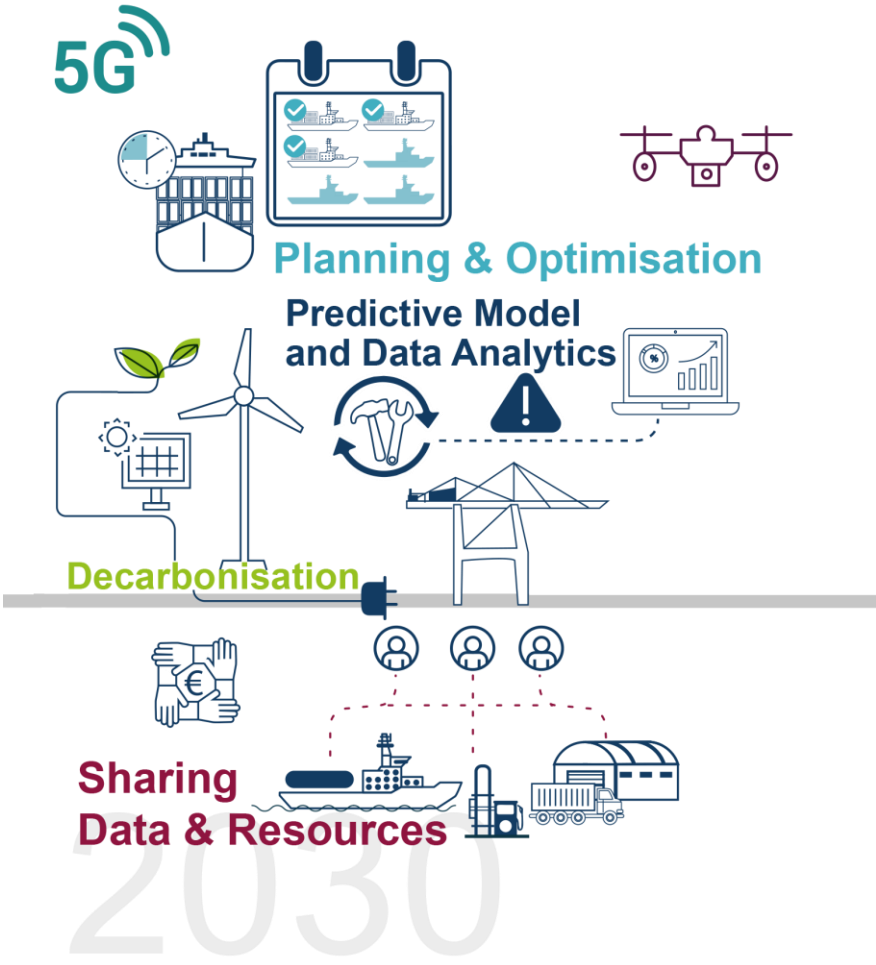
ROADMAP


5G
Blockchain
Monitoring environmental impacts
Security
Planning & Optimisation
Predictive Model and Data Analytics
Automation
Decarbonisation
Safety
Sensorisation
Sharing Data & Resources
2020
2030
2040

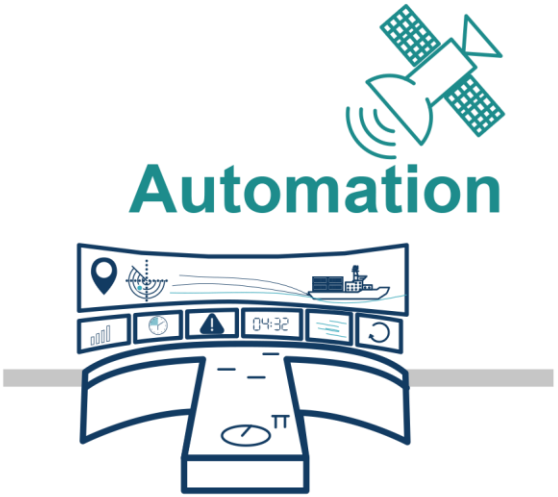
ROADMAP


Blockchain
Monitoring environmental impacts
CO2
Security
Safety
Sensorisation
2020

ROADMAP


5G
Planning & Optimisation
Predictive Model
and Data Analytics
Decarbonisation
Sharing
Data & Resources
2030

ROADMAP



2040

INNOVATION COMMITEE

The governing body of the Innovation Plan that establishes priorities and areas of interest.

Shared forum for debate where the agenda and Innovation actions of the Valenciaport Cluster are debated.

Brings together the knowledge, resources, experience and structures necessary to stimulate and promote the Cluster's strategic projects.

FUNDACIÓN Valenciaport

valenciaport Autoridad Portuaria de Valencia

Lifting Global Trade. APM TERMINALS

msc

msc TERMINAL VALENCIA S.A.

COSCO SHIPPING

VALENCIA TERMINAL EUROPA

noatum

GRUPO RAMINATRANS INTERNATIONAL FORWARDERS

TIBA

TransBase SOLER

logitren

SYRGROUP Operador Logístico

LOGÍSTICA Chema Ballester

INSTITUTO DE ECONOMÍA INTERNACIONAL VNIVERSITAT DE VALÈNCIA

ASIX

The International Maritime Transport and logistics Conference

Towards Global Competitiveness in Maritime Industry

"INVESTING IN PORTS"

The Trends, The Future

8 2019 Marlog

FUNDACIÓN valenciaport

Antonio Torregrosa Maicas
General Manager

atorregrosa@fundación.valenciaport.com