Port of the Future Network

Docks the Future - Claudia Ribeiro, Docks the Future Dissemination Manager (Magellan – EU Affairs Consultancy)
COREALIS – Georgios Tsimiklis, Coordinating Partner (ICCS)
PortForward – Christos Papatheologos, Technology Innovation Consultant (Core Innovation)
PIXEL – Benjamín Molina, Deputy Coordinator (UPV Universitat Politècnica de València)
Port of the Future Network

The DocksTheFuture Project

Disclaimer: The views represented in this document only reflect the views of the authors and not the views of Innovation & Networks Executive Agency (INEA) and the European Commission. INEA and the European Commission are not liable for any use that may be made of the information contained in this document. Furthermore, the information are provided “as is” and no guarantee or warranty is given that the information fit for any particular purpose. The user of the information uses it as its sole risk and liability.
The Ports of the Future Network

- DOCKSTHEFUTURE
- COREALIS
- The Ports of The Future Projects
- PIXEL
- PortForward
What is DocksTheFuture?

Horizon 2020 Funded Coordination and Support Action (CSA)

Duration: January 2018 – June 2020 (30 months)

Goal: To define the Port of the Future, meant as a near future (2030) which should face challenges related to simplification and digitalization of processes, dredging, emission reduction, energy transition, electrification, smart grids, port-city interface and the use of renewable energy management.
What has been achieved so far?

- Desktop Analysis
- Stakeholder Consultation
- Maritime Traffic Analysis
- Analysis of Macro Trends
- Clustering methodology
- Selection for clustering of related Projects and Activities

1st Workshop with experts – Porto, October 2018
2nd Workshop with experts – Trieste, April 2019
The specific added value of DocksTheFuture

- New definition of the Port of the Future
- Decision Support System Tool
- Transferability Analysis
- PoF training package
- R&D and Policy Recommendations
- Port of the Future Road Map 2030
- PoF Network of Excellence
Workshop *What is next for green and sustainable Ports?*

Date: 17\textsuperscript{th} of May, 09:00 am

*Join us in Lisbon!*

*Registration:* [https://european-maritime-day.b2match.io/](https://european-maritime-day.b2match.io/)
Cláudia Ribeiro
Communication Manager of DocksTheFuture

web | www.docksthefuture.eu
@ | cpr@magellan-association.org
@ | info@docksthefuture.eu
updates | www.onthemosway.eu

@DocksTheFuture
Docks The Future
Corealis
Introduction to the COREALIS project-Webinar

Goals
✓ Call identifier: H2020-MG-7.3-2017
✓ Topic: “The Port of the future”
✓ Duration: 01.05.2018 - 30.04.2021 (36 months)
✓ 17 partners from 9 European and associated countries
✓ 4 Research Institutes, 5 Port operators/ Port Institute/ Port Authority, 4 Industries, 3 SMEs, 1 ITS Association
✓ Demonstrations in Five European Port-Cities
1. Valencia Port, Spain
2. Livorno Port, Italy
3. Antwerp Port, Belgium
4. Haminakotka Port, Finland
5. Piraeus Port, Greece
COREALIS Technologies

Port of the Future, 04th April 2019

RTPORT
(5G-enabled smart terminal operations, IoT)

PORTMOD
(optimization planning tool for CT operations)

Brokerage Platform
(cloud based marketplace for leasing intra-CT trucks)

Truck Appointment System
(reservation system including real-time traffic data)

Cargo Flow Optimiser
(optimization of cargo flows ocean/rail/inland-waterway)

Just-In-Time Rail Shuttle Service
(feasibility study for key port-hinterland corridors)

Predictor for Asset Management
(machine learning based Just in Time inventory)

Port of the Future Serious Game
(simulation tool for decision making)
Stakeholder driven approach

- **Phase 1**: Scenarios & Requirements Phase (M1-M7)
- **Phase 2**: Technical Design and Development Phase (M8-M24)
- **Phase 3**: LL full-scale implementation and Impact Assessment phase (M25 - M32)
1) **PORTMOD** a modelling tool that improves Container Terminal (CT) operations by simulation;
   i. Optimize stacking height and location
   ii. Evaluate new equipment solutions
   iii. Evaluate CT yard area layout changes

2) **Port of the Future Serious Game (PoFSG):**
   i. Assist in the development of the energy transition scenario of the game: estimate the impact of new technologies and environmental issues.
COREALIS Initial Results – Port of Antwerp

Cargo Flow Optimizer:

• Main goal:
  • Aim is to minimize containers’ waiting time at the port
  • Cargo flow prognoses for short, mid and long-term will be implemented to optimise the port infrastructure and promote modal share in inland connections

• Expected benefits:
  • Improve modal split towards rail and barge
  • Reduce the dwell time of containers in the port

Brokerage platform:

• Main goal:
  • Efficient flow of containers and more free space at terminals
  • Low demurrage due to equipment unavailability

• Expected benefits:
  • Proper use of port equipment – low idle time
  • Booking of equipment between terminals – no unnecessary investments
Designing and setting up a pervasive 5G network in a CT.

General Cargo & Yard Vehicles Management System
Predictor Asset Management:  

Objective: extend yard equipment lifecycle, improve yard equipment availability, reduce spare parts inventory cost & size

Predictor Asset Management in two steps:  
1. Predictive Maintenance:  
   • Predictive Maintenance Equipment List  
   • Predictive Maintenance Schedule  
   • Learning Algorithm  
2. Spare Parts Inventory:  
   • Spare parts requirements based on Predictive Maintenance Schedule  
   • JIT inventory
Energy Assessment

Objective: Reduce energy consumption in the Port of Piraeus and investigate feasibility of use of renewable energy sources

- Isolate power fault sources and restore power to unaffected parts of the grid
- Long term planning of grid infrastructure
- Research and evaluate integration with renewable power sources
- Evaluate power storage feasibility at port premises
Objective: demonstrating advantages of an innovative TAS to minimize road transport impacts

TAS in two steps:
1. Simple TAS:
   - Appointment Management
   - Capacity Management
   - Dashboards
   - Simple ETA based on static position
2. Advanced TAS: (possible functionalities)
   - Full Integration with the PCS
   - Pre-Booking
   - Virtual queue
   - Accurate ETA
   - Integration with external sources
1. Embrace circular economy models in the port strategy and operations

2. Improve operational efficiency, optimise yard capacity and streamline cargo flows without additional infrastructural investments

3. Reduce the port’s environmental footprint associated with intermodal connections and the surrounding urban environment for three major transport modes, road/truck, rail and inland waterways

4. Enable the port to take informed medium-term and long-term strategic decisions and become an innovation hub of the local urban space
THANK YOU FOR YOUR ATTENTION

Georgios Tsimiklis
ICCS

COREALIS Coordinating Team
Angelos Amditis: a.amditis@iccs.gr
Amalia Nikolopoulou: anikolop@iccs.gr
Georgios Tsimiklis: georgios.tsimiklis@iccs.gr
Athenasia Tsierou: a.tsierou@iccs.gr
Towards a green and sustainable ecosystem for the EU Port of the Future

Christos Papatheologos, Technology Innovation Consultant

This project receives funding in the European Commission's Horizon 2020 Research Program under Grant Agreement Number 769267
To give organizations the opportunity and ability to reach their full potential and together change the course of industries.
How we do it
Machine Learning
Machine Learning

Innovation Management
Effective Communication
Machine Learning

Innovation Management
Effective Communication

Concept and Business Model Engineering
The PortForward project
PortForward: The Port of the future

July 2018 – December 2021
Investment: €4,994,311
Funding: H2020
Our Vision
PortForward:
The Port of the future

Interconnected Port

Smart Port

Green Port
Combining different modes of transport

Integrating different technologies

to better monitor and control freight flows
Employing ICT solutions to improve information flows between ports and port communities
Adopting green technologies to reduce the environmental impacts of port operations and save resources
Our Partner Network
Partners
Our Innovations in action
Optimization of people and Ro-Ro cargo flows
Optimal and centralized port systems management
Green scheduling and sustainability of operations
Remote Pilot assistance and goods control with AR
Virtual Twin for Dynamic storage monitoring
Port ecosystem performance monitoring
Thank you!

www.portforward-project.eu

@portforward-project

@portforward_eu
MidTerm Conference: Envisioning the Port of the Future: the 2030 horizon

4th of April 2019 – Port of Trieste

PIXEL project presentation – Benjamin Molina (UPV), benmomo@upvnet.upv.es
PIXEL – Port IoT for Environmental Leverage

Mission. To bring the sustainable PoF paradigm to the complete spectrum of European ports

✓ Establish a single metric index (PEI, Port Environmental Index) to quantitatively assess the environmental impact
✓ Interoperable IoT infrastructure
✓ Automatic aggregation and integration of heterogeneous data
✓ Models and algorithms to predict/simulate future (environmental) impacts and propose optimization strategies
✓ Real applicability in small, medium and large European pilot ports

✓ More on integration of operational information exchange than on regulatory compliance
✓ More on port-city general area interactions than on specific events in ports
✓ More on small and medium ports (limited resources) than on large ports
✓ More on multipurpose port operations (containers, general cargo, passengers) than on dedicated ones
PIXEL – Port IoT for Environmental Leverage

- Coverage: 15 partners from 7 different countries (May 2018- April 2021)
- Pilot Ports: Monfalcone, Bourdeaux, Pireaus, Thessaloniki
- Duration: Coordinator: UPV / Innovation: XLAB

<table>
<thead>
<tr>
<th></th>
<th>Energy Management use case</th>
<th>Intermodal Transport use case</th>
<th>Port-City Integration use case</th>
<th>Port Environmental Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grand Port Maritime of Bordeaux</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Port of Monfalcone/SDAG</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Port of Pireaus</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Port of Thessaloniki</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
PIXEL – Port IoT for Environmental Leverage

- Initial results so far are already available in the website (http://pixel-ports.eu/)
- D3.3/D3.4 Use cases and scenarios manual v1/v2

**ENERGY - Bordeaux**
- IoT platform
- Integration with VIGIESip
- Assessment for supplying local renewable energy
- PEI (Port Environmental Index)
- 8 scenarios

**INTERMODAL TRANSPORT – Monfalcone, SDAG**
- Data sharing between ports to reduce congestion
- Reinforce safety related to ADR transport
- Collect, analyse and share data with public entities (REHO and Reg. Gov.)
- PEI (Port Environmental Index)
- 6 scenarios

**PORT-CITY INTEGRATION - Piraeus, Thessaloniki**
- Air quality monitoring (IoT)
- Noise level monitoring (IoT)
- Optimize traffic between city and port
- PEI (Port Environmental Index)
- 5 scenarios
PIXEL – Port IoT for Environmental Leverage

- Initial results so far are already available in the website (http://pixel-ports.eu/)
- D4.1 PIXEL models v1 (energy, transportation, environmental pollution). Final version ongoing

**Energy model**
- Energy consumption module
- Electricity production module
- Energy balance module
- Usage and interoperability

**Hinterland multimodal transport model**
- Context and data available
- Existing tools (SOTA)
- Hypothesis
- Usage and interoperability

**Environmental pollution model**
- Context and data available
- Existing tools (SOTA)
- AEROMOD, CALPUFF

+ Predictive algorithms: inbound traffic, outbound traffic (road and maritime), energy consumption
PIXEL – Port IoT for Environmental Leverage

**IoT**
- Multi-source sensors
- Virtual sensors
- Data Acquisition Layer
- Information Hub

**DATA ANALYTICS**
- Models
- Predictive algorithms
- Operational Tools
- Dashboard

**ENVIRONMENT**
- Environmental-dependent decision policies
- Integration with neighbourhood (city) environmental plans
- PEI + Guideliness

**Security**