



Capacity with a pOsitve enviRonmEntal and societAL footprint:  
portS in the future era



## Port of the Future (PoF) Input to the questionnaire ‘Needs and Requirements’

### Introduction to the COREALIS Project

Ports are essential for the European economy; 74% of goods exported or imported to the EU are transported via its seaports. At the same time, the challenges they face are only getting greater: Volumes of cargo increase while they also arrive in a shrinking number of vessels: Post-Panamax vessels have a capacity of more than 18k containers. Port operators need to comply with increasingly stricter environmental regulations and societal views for sustainability. A sustainable land use strategy in and around the port and a strategic transition to new, service-based, management models that improve capacity and efficiency are paramount. They are key enablers for ports that want to keep pace with the ocean carriers needs and establish themselves as trans-shipment hubs with a ‘societal license to operate’; for ports whose land strategy, hinterland accessibility and operations are underpinned by circular economy principles. COREALIS proposes a strategic, innovative framework, supported by disruptive technologies, including IoT, data analytics, next generation traffic management and 5G, for modern ports to handle future capacity, traffic, efficiency and environmental challenges. It respects their limitations regarding the port land, intermodal infrastructure and terminal operation. It proposes beyond state of the art innovations to increase efficiency and optimise land-use, while being financially viable, respecting circular economy and being of service to the city. Through COREALIS, the port will minimise its environmental footprint to the city, it will decrease disturbance to local population through a reduction in the congestion around the port. It will be a pillar of business innovation, promoting local start-ups in disruptive technologies of mutual interest. COREALIS innovations are key both for the major deep sea European ports in view of the new mega-vessel era, but also relevant for medium sized ports with limited investment funds for infrastructure and automation.

### List of PoF (Port of the Future) Innovations

#### 1. TAS: Truck Appointment System

An innovative TAS for external trucks that are calling into the port to deliver or pick-up containers. The system intends to minimise waiting time at the port gates, providing to the drivers an optimal time-window to enter the port based on preference, vessel schedules, the traffic expected from other trucks and real-time data from the urban TMC.

#### 2. Port Operations Process Modelling tool (COREALIS PORTMOD)

Process modelling of cargo and data flows in CTs can improve their competitiveness by more efficient operations and better compatibility with regulations. The focus of the PORTMOD modelling tool will be operational efficiency, safety for personnel, emission analysis. In practice, PORTMOD describes in detail the container placements in the container movement chain.

### 3. 5G-enabled Smart Terminal Operations (COREALIS RTPORT)

Model-Driven Real-Time Control module (RTPORT) will coordinate and support port operation, providing measurable feedback to the models of PORTMOD. It will perform real time control of operations collecting data via yard vehicles and implanted sensors (including cameras), taking operating decisions based on on-line analytical processing and PORTMOD models.

### 4. COREALIS Predictor – Asset Management tool

An efficient asset management requires an optimal use of port assets, e.g. yard vehicles (forklifts, cranes, trucks), tyres and spare parts. Storing and managing bulky assets takes up significant space of the port. The Predictor tool goes beyond classic ERP static preventive maintenance tools by realising a powerful predictive analytics module; this enables monitoring and dynamic prediction of the total life-cycle cost of port assets that improves over time

### 5. COREALIS Cargo Flow Optimisation tool

It is an innovative data-analytics based cargo flow optimisation component; AIS data for the vessel ETAs will be multiplexed with (big) data from the rail operators and barges ETAs so that cargo flows are streamlined; the aim is to minimise containers' waiting time at the port. This process will improve current land/infrastructure use and the overall supply chain connection to the port. Besides, through innovative machine learning, cargo flow prognoses for short-, mid- and long-term will be implemented so that the port managers and urban planners may be facilitated in their infrastructure investment planning.

### 6. Green Cookbook – Energy Assessment Framework

The Green cookbook helps ports to lower their environmental footprint and move to cleaner transport modes and cleaner energy sources.

### 7. Port of the Future Serious Game

The PoFSG is an innovative and interactive training and simulation tool that is used to assess the feasibility and sustainability of the socio-economic and environmental/physical development of a port within the surrounding coastal and urban area. The tool will visualise the anticipated impacts – positive and negative – related to social, economic, and environmental aspects