Big Data and Data Analytics for Ports of the Future, COREALIS

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Introduction

COREALIS proposes a strategic, innovative framework, supported by disruptive technologies, including IoT, data analytics, next generation traffic management, for modern ports to handle future capacity, traffic, efficiency and environmental challenges. Through COREALIS, the port will minimize its environmental footprint to the city, it will decrease disturbance to local population through a reduction in the congestion around the port. COREALIS proposes a bunch of solutions for the ports based on big data analytics: i) a predictive model for maintenance for the port of Piraeus ii) a cargo flow optimizer based on historical and current data for hinterland connection applying at the Port of Antwerp iii) an optimized Truck Appointment System based on an Estimated Time of Arrival through real time data.

The solutions are contributing to the digitization and smart objects creation , the movement of containers and their interconnectivity and the creation of a multimodal transfer system , bringing one step closer the vision of Physical Internet for logistics .

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Objectives

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  connections and the surrounding urban environment for three major transport modes, road/truck, rail and inland waterways
- Embrace circular economy models and Improve operational efficiency without additional infrastructural investments
- Identify synergies between Physical Internet and synchro modality for the movement of freights by inducing a positive modal shift from roads to rails and inland waterways

Predictive maintenance

- **Predictive Maintenance (PdM)** relies on data about the equipment (e.g. status and past breakdowns), e.g. the trucks and cranes in a port, to predict when maintenance should be performed. Using the network infrastructure, this data is transmitted and
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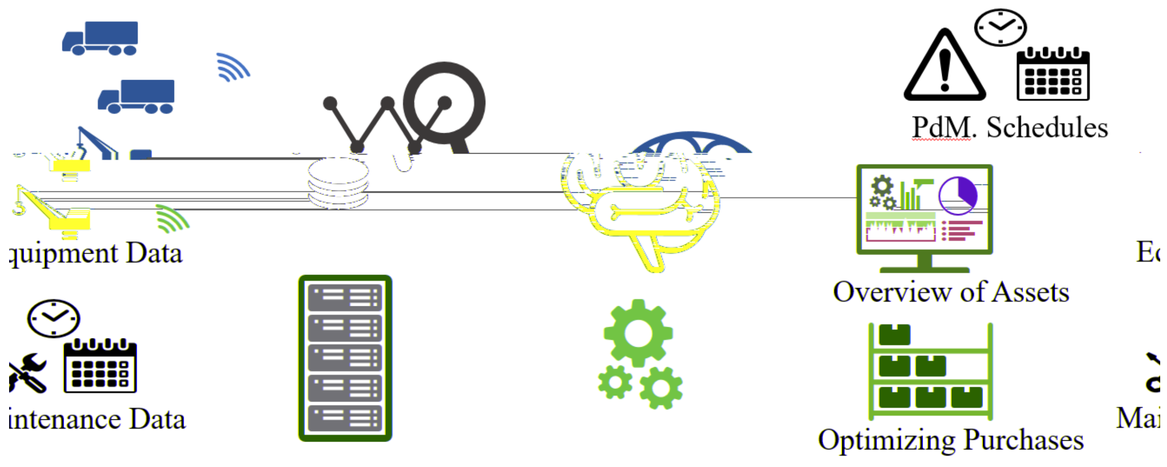
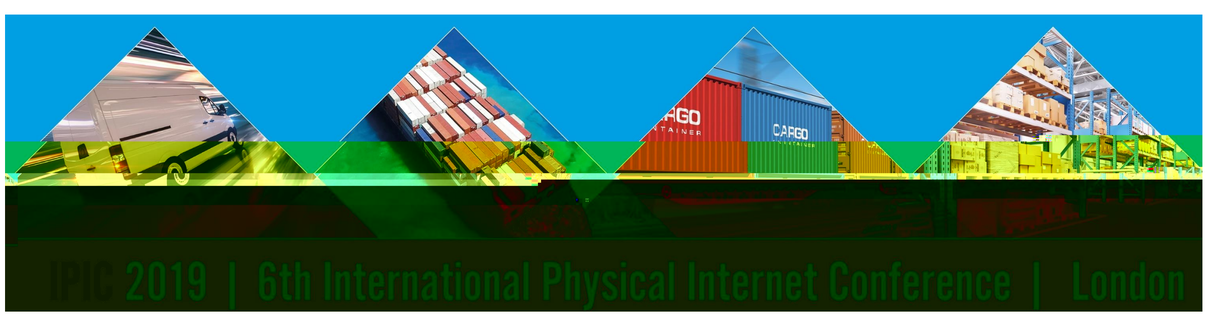
  assets.

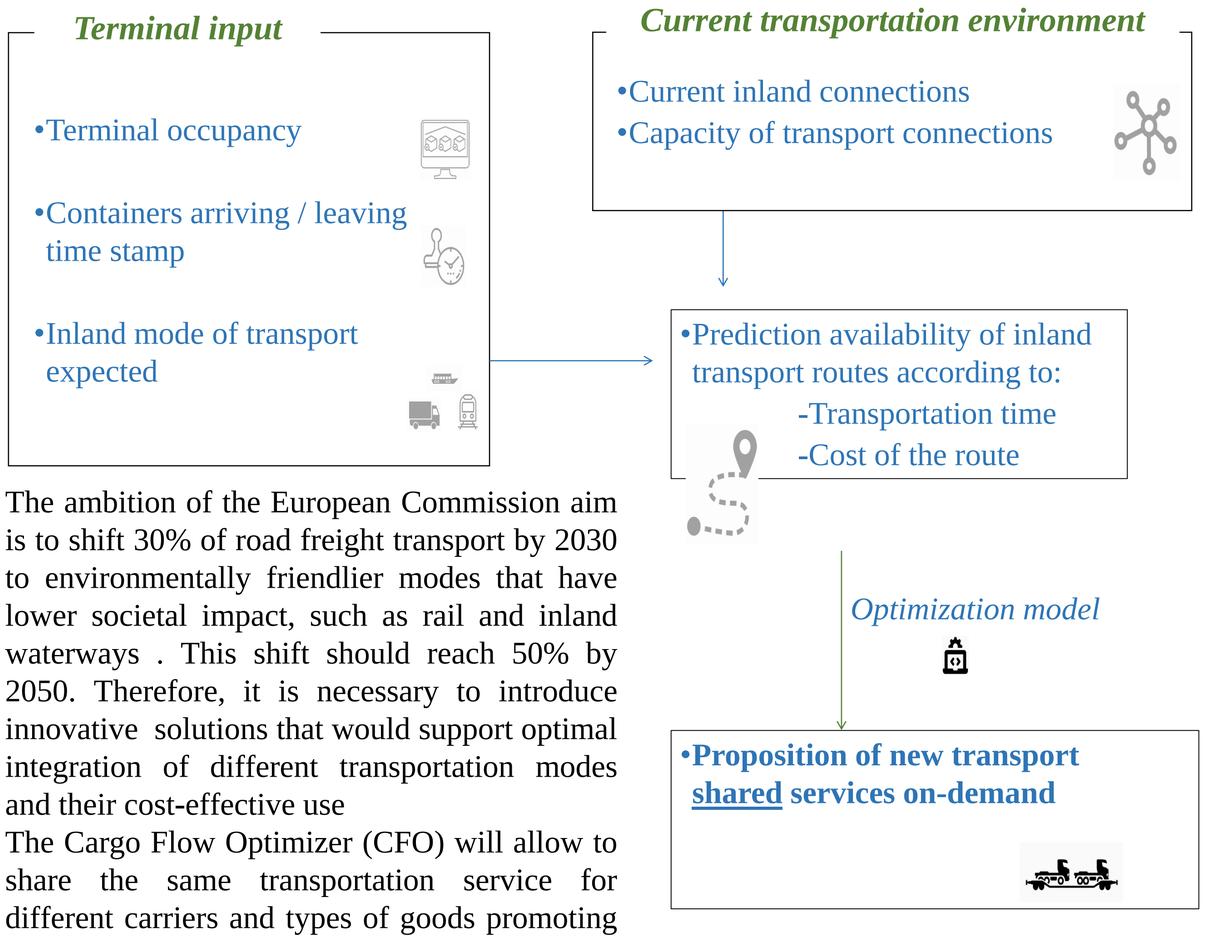


- Contrary to preventive/routine maintenance, predictive maintenance provides the *"right information at the right time"* which allows:
  - ❖ Cost reduction of routine maintenance
  - ❖ Reduction of loss of service and its cost, i.e. higher reliability
  - ❖ Productivity Improvement
  - ❖ Smarter Inventory Management

By better estimating the resources and the maintenance time it contributes to a fully interconnected system with better estimations between the relevant logistic entities , closer to the vision of Physical Internet.



Cargo Flow Optimiser



The ambition of the European Commission aim is to shift 30% of road freight transport by 2030 to environmentally friendlier modes that have lower societal impact, such as rail and inland waterways . This shift should reach 50% by 2050. Therefore, it is necessary to introduce innovative solutions that would support optimal integration of different transportation modes and their cost-effective use

The Cargo Flow Optimizer (CFO) will allow to share the same transportation service for different carriers and types of goods promoting the reduction of social economic, social & environmental costs.

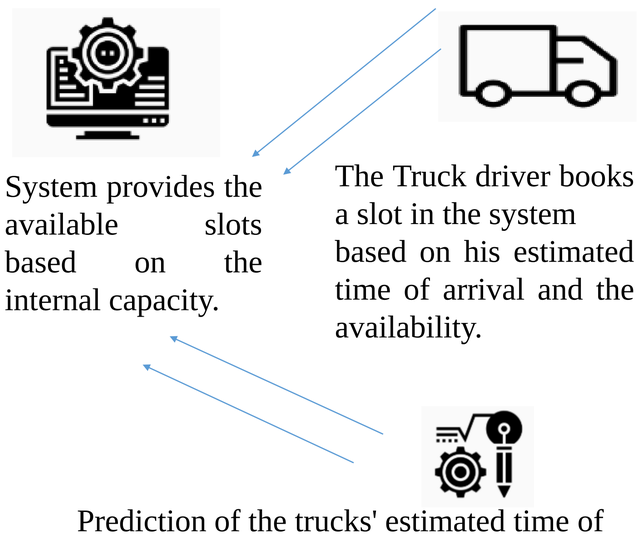
The Cargo Flow Optimizer is defined to promote different carriers to use the same mode of transport, issue that can be understood as one step further on the Physical Internet.

Enhanced TAS

An enhanced Truck Appointment system where the truck drivers can pre-book available slots at the ports . In addition the Estimated Time of Arrival of the trucks is computed dynamically offering a rescheduling capability to the system .

By sharing information about available capacity for the port in real time it can improve the load rate of the trucks , reduce the waiting time and contribute to an interconnected system .

The utilization of the system promotes multimodal solutions on one hand while on the other hand the efficiency of Operations is increased . The system brings one step closer the vision of Physical Internet for an interconnected system with information about the capacity at various steps of the transportation flow .



Conclusions

COREALIS innovations are aiming for increased economic, environmental and societal efficiency . The TAS can support hyperconnected logistics as all the trucks are identified and synergies among them are supported . The Cargo Flow optimizer is proposing a multimodal transport system which in parallel promotes the sharing of resources among the various providers by reducing the empty containers problem. Whereas all assets of the port will be continuously evaluated with a predictive maintenance system , aiming to better monitor the resources of the port . All in all the port will minimize its environmental footprint to the city and decrease disturbance to local population through a reduction in the congestion around the port.