ABP2020 Phase II

Preliminary Market Consultation

PREDICTIVE AND PRESCRIPTIVE INTELLIGENCE FOR THE OPTIMIZATION OF PORT LOGISTIC OPERATIONS AT ALGECIRAS PORT

General approach and functional requirements

Algeciras, June 2019

Puerto de Algeciras

Collaboration and data exchange between stakeholders is essential to improve the coordination between partners, minimize idle times alongside value chain, and improve port logistics efficiency.

Creating value through data exchange requires **information to flow**...and a platform with universal applicability (**a platform of platforms**)

APBA has tested two additional **collaborative and shared-events digital platforms** based on the PortCDM concept ("Pit Stop" and "Container Value Chain" prototypes), which will be included in the **Algeciras Port Digital Ecosystem**...
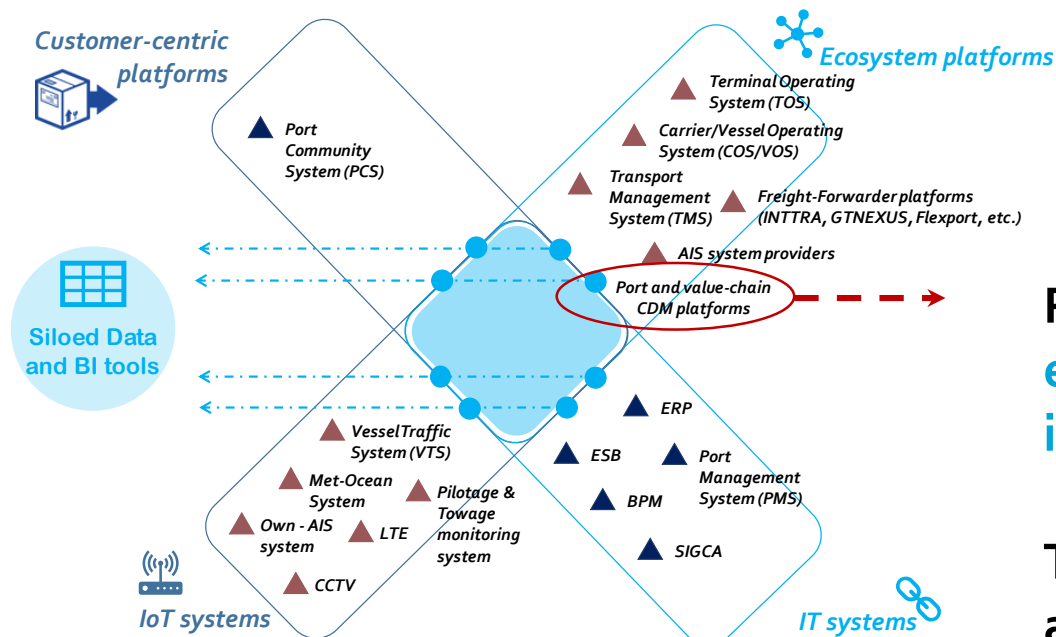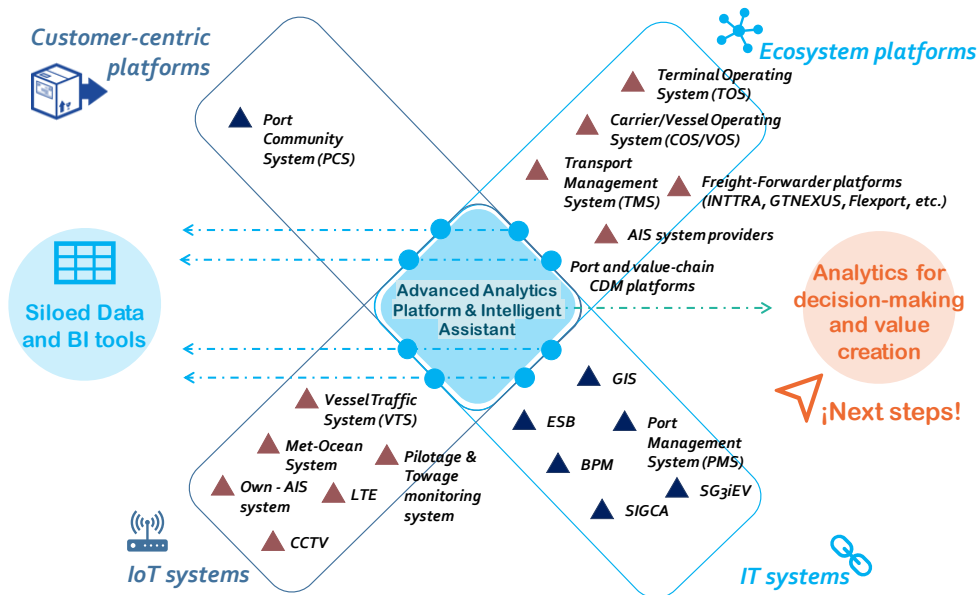

Real time or updated **data and information from ecosystem platforms and Algeciras Port IT/IoT systems is shared** between main stakeholders involved.

Those new digital platforms within the supply chain are able to **talk to each other.**

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3

However, tracking/monitoring fixed and mobile assets and having visibility at real-time is not enough. Currently, there is room to improve predictions to be able to react under operational/business disruptions scenarios.

Customer-centric platforms

Ecosystem platforms

Port Community System (PCS)

Terminal Operating System (TOS)

Carrier/Vessel Operating System (COS/VOS)

Transport Management System (TMS)

Freight-Forwarder platforms (INTTRA, GTNEXUS, Flexport, etc.)

AIS system providers

Port and value-chain CDM platforms

Siloed Data and BI tools

Advanced Analytics Platform & Intelligent Assistant

Analytics for decision-making and value creation

¡Next steps!

GIS

Vessel Traffic System (VTS)

ESB

Port Management System (PMS)

Met-Ocean System

BPM

Own - AIS system

LTE

Pilotage & Towage monitoring system
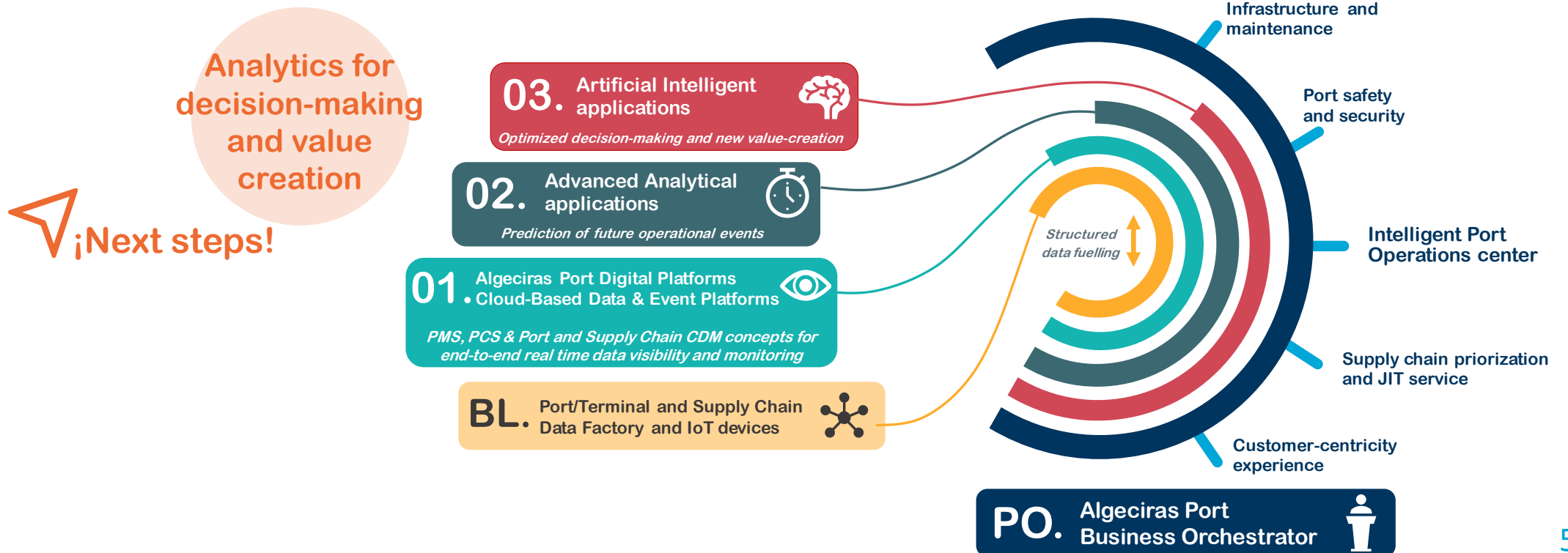
SG3iEV

SIGCA

CCTV

IoT systems

IT systems

Exploiting data in order to help predicting actual and potential impacts over port-logistics operations such as transport demands, peaks, congestion, delays, etc.

Transforming data into useful information and assess decision-making process by implementing AI-based systems and simulation tools.

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The **next step** is developing a **predictive intelligence layer (tool)** on top of those digital platforms that provides real-time visibility and operational awareness in order to be able to **predict events/scenarios or impacts and suggest actions** oriented to optimize port-logistics operations at Algeciras Port and its supply chain.

Analytics for decision-making and value creation

¡Next steps!

03. **Artificial Intelligent applications**
Optimized decision-making and new value-creation

02. **Advanced Analytical applications**
Prediction of future operational events

01. **Algeciras Port Digital Platforms Cloud-Based Data & Event Platforms**
PMS, PCS & Port and Supply Chain CDM concepts for end-to-end real time data visibility and monitoring

BL. **Port/Terminal and Supply Chain Data Factory and IoT devices**

Structured data fuelling

Infrastructure and maintenance

Port safety and security

Intelligent Port Operations center

Supply chain priorization and JIT service

Customer-centricity experience

PO. **Algeciras Port Business Orchestrator**

3. Strategic and project goals

- **Main Project Objective**
  - ✓ **Optimize port-logistics operations** related to general cargo (containers and Ro-Ro/Ro-Pax) going through the Multi-Terminal **Hub of Algeciras Port by developing a AI-based decision-making tool with advanced analytics and simulation capabilities.**

- **Specific Project Objectives**
  - ✓ More efficient port operations (time/cost)
  - ✓ Better use of assets and resource allocation
  - ✓ Improve port operations sustainability
  - ✓ Better transparency
  - ✓ More efficient supply chain operations (value chain)

- **Expected impacts (KPI)**
  - Idle and waiting time for vessels, trucks and trains (5-10%) Port total turnaround time(5-10%)
  - Quality of service and better use of port assets
  - Energy consumption and gas emissions (10%)

- **Port Strategic Goals**
  - ✓ Improve service costs, efficiency, realiability and capacity (**attractiveness and efficiency of value chain** and **transshipment services**).
  - ✓ Better port's integration within the supply chain (**OPS visibility and predictability**)
  - ✓ Development of **import/export traffic**
  - ✓ **Operational excellence**

6

4. Scope and functional requirements

- **Project Scope**

  ✓ **To develop an AI-based decision-making tool** complemented by **predictive/prescriptive functionalities and simulation capabilities** with the aim of making more efficient cargo flow through Algeciras Port

- **Functional Needs**

1. **Algeciras Port Hub performance predictor**

Predict the global performance of the hub under what-if scenarios and assess strategic decision making-process as regards to design and performance at medium-term.

2. **Algeciras Port-Logistics operations' impact predictor**

Predict waiting and total turnaround time for vessels, trucks and trains in order to assess operational decision-making process as regards to supply chain planning at operational level.

4.1. Assessment tool for strategic/tactical decisions (Port planning Optimization)

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📍 Current situation and opportunity

- ✓ **Strong competition** for transshipment containers by major ports in West-Med and Ro-Ro/Ro-Pax at Gibraltar Strait.
- ✓ **Digital transformation** within Algeciras Port's ecosystem
- ✓ Growing availability of **port logistics data**
- ✓ Develop new strategies to address the **changing customer requirements** and meet quality of service expectations.
- ✓ Today's optimization challenge: Companies need to provide more **future-looking answers** and **recommendations** to execution decisions that cannot be only addressed by historical analysis

🚩 Scope

To develop a tool with predictive/prescriptive intelligence in order to predict the global performance of the Algeciras Port hub and assess strategic/tactical decision making-process as regards to design, layout and performance at medium-term.

🧭 Final user and main application

- ✓ Port Operations Management Department from **Algeciras Bay Port Authority** for **Port Planning**

🖼 Use cases/Business questions

- ✓ Which will be the most restricting bottleneck under different scenarios?
- ✓ What will be the average port waiting/turnaround time?
- ✓ What will be the average occupation/utilization level of port assets?
- ✓ What will be the performance level of the hub?
- ✓ What would be the consequences if we change operational rules of anchorage áreas or truck appointment system?
- ✓ If import/export traffic increase about x%, what will be the optimum port set-up?

4.2. Assessment tool for operational decisions (Port-Logistic Operations Optimization)

📍 Current situation and opportunity

- ✓ **Digital transformation** within Algeciras Port's ecosystem
- ✓ Growing availability of **port logistics and supply chain real time data**
- ✓ Increasing evolution of **modeling and analytical tools** (from descriptive analytics to **analytical optimization with prescriptive/predictive intelligence**)
- ✓ Today's optimization challenge: Companies need to provide more **future-looking answers** and **recommendations** to execution decisions that cannot be only addressed by historical analysis
- ✓ **Creating added value** for our users/clients by analyzing data

🚏 Scope

To develop a tool with **prescriptive/predictive intelligence** in order to predict events, scenarios and impact as regards to port-logistics operations at short-term (from 2h to 48h in advance) for main supply chain stakeholders

◁ Final user and main application

- ✓ Transport and shipping companies, logistic operators, cargo owners and terminal operators within the Port of Algeciras.
- ✓ Port Services' providers/operators
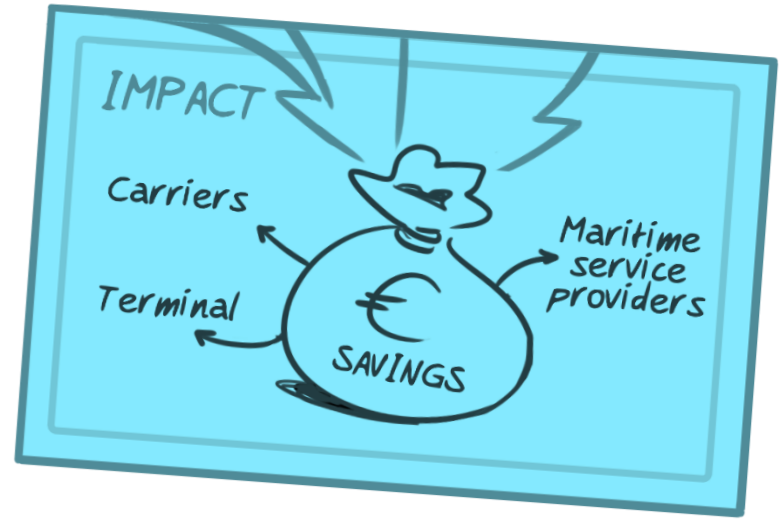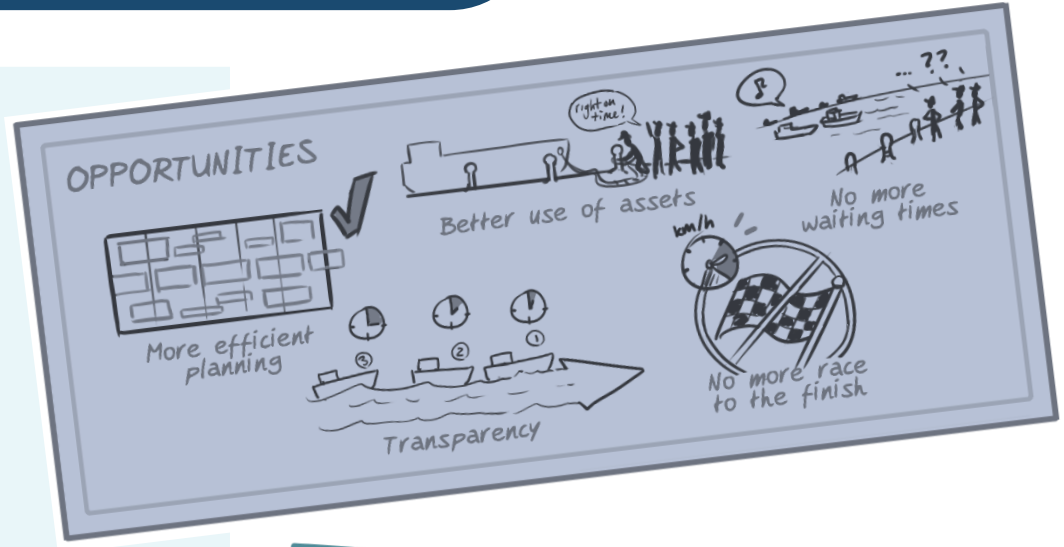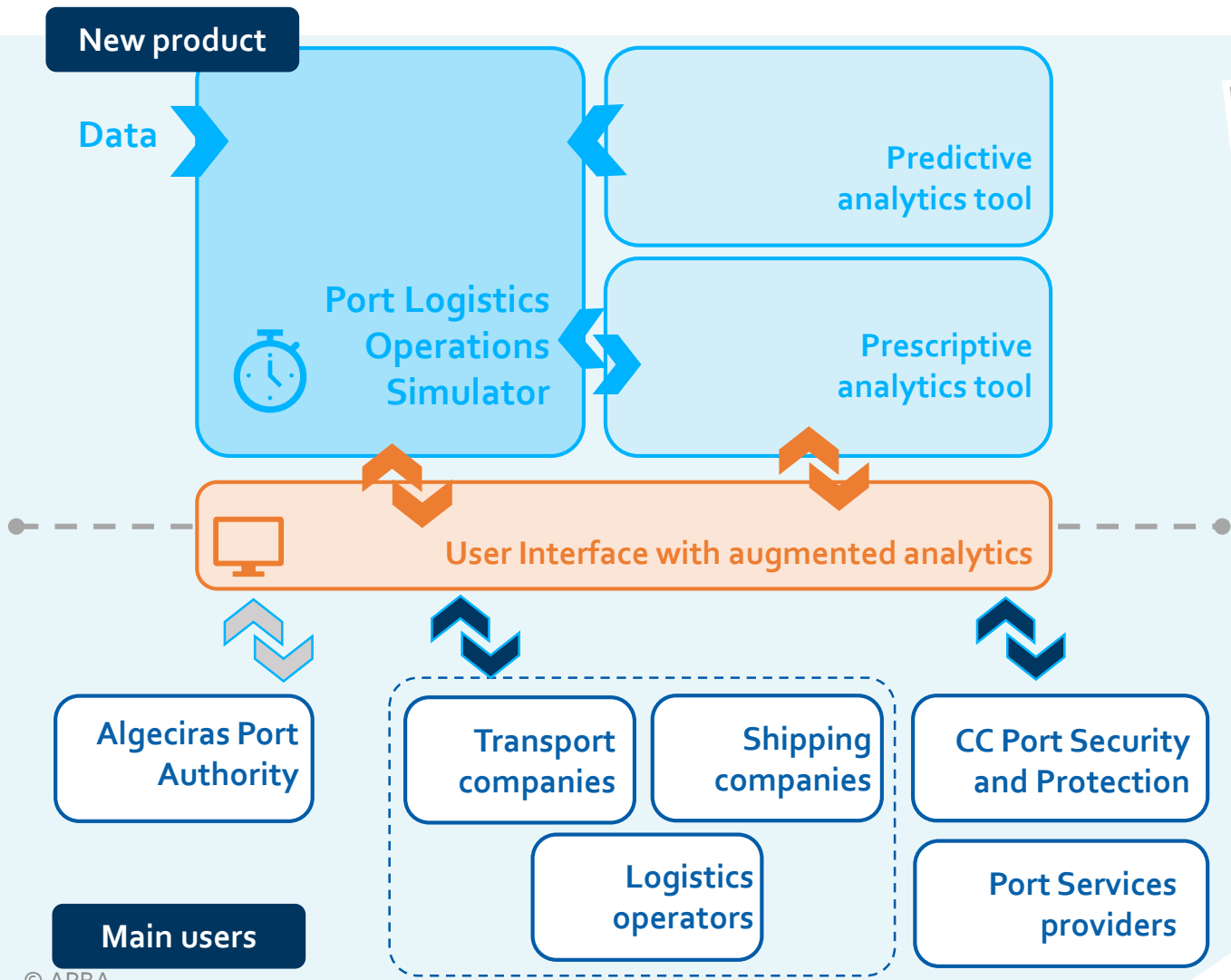- ✓ CC Port Security and Protection

🖼 Use cases/Business questions

- ✓ What is the estimated waiting/turnaround time predicted for tomorrow morning?
- ✓ What is the best tugs/pilots allocation?
- ✓ Is it expected that port gates/inner roads will be congested?
- ✓ According to current predictions, when truck/train arrivals would be suggested?
- ✓ How can we optimize truck/train arrivals according to expected vessels' calls?

4.3. Specific requirements to satisfy previous functionalities

1. **Simulation engine** for port-logistics operations at Algeciras Port Hub for cargo (mainly containers and Ro-Ro/Ro-Pax).

2. **Predictive models** (ML/Deep Learning) to predict events, scenarios and impact over operations.

3. **Prescriptive models** to define alternative actions according to their impact over operations (linked to the simulation engine).

4. **Augmented analytic** capabilities to improve UX and support data exploration activities.

5. Expected outcomes (product/service)

New product

Data

Port Logistics Operations Simulator

Predictive analytics tool

Prescriptive analytics tool

User Interface with augmented analytics

Algeciras Port Authority

Transport companies

Shipping companies

CC Port Security and Protection

Logistics operators

Port Services providers

Main users

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OPPORTUNITIES

More efficient planning

Better use of assets

No more waiting times

Transparency

No more race to the finish

IMPACT

Carriers

Terminal

SAVINGS

Maritime service providers

Source: http://smart-port.nl/en/project/eta-predictor-zeeschepen/

6. Expected impacts and savings*

Direct Benefit

- ✓ Reduction of **idle/waiting cost** for vessels and trucks
- ✓ Reduction of **fuel costs** due to slow steaming
- ✓ Reduction of **operating costs** for terminal operators and port services providers due to an improved resource planning (lower service level)
- ✓ Reduction of **gas emissions** in the port area (carbon footprint) due to non-traffic congestion

1h vessel and truck delay

- ✓ We estimate the **total value** to be captured from better information, predictions and coordination to **87.500€/day and over 32 M€/year** (according to current container traffic at Algeciras Port and non-considering social cost due to environmental damages).
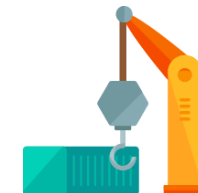
9 CS/day
6.000€/h (18.000 TEU)

700 trucks/day
25€/h (tráiler)

2.500€/h/CS (labor gangs)

12

7. How to submit an application for the market consultation?

1. Get access to the Tenders' Section within the Algeciras Port Authority Website (https://www.apba.es/anuncio/413).

2. Download and read the report "*Memoria Descriptiva"* that includes all specific requirements and needs of the innovative solution.

3. Submit your application by filling the form "*Ficha de propuesta"* before 23th September, 2019 and sending to cpi@apba.es.

4. Afterwards, Algeciras Port Authority (contracting authority) will develop a more accurate tender specifications and a suitable procedure. In addition, it may also gauge whether the proposed contract, or a similar one, has been delivered on the market before.