

## **Digital Twin and Artificial Intelligence transforming decision-making at Ports**

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Ports are leveraging the opportunity for optimizing operational efficiency and competitiveness with technology – empowering collaborative decision making and continuous improvement practices across the port eco-system, in order to provide real-time visibility and operational awareness.

- In same way, as capacities and facilities have to be developed to react upon the increasing pressure for competitiveness within Port communities and connected hinterlands, it is equally critical to ensure highest port planning focus to guarantee ecological friendly and sustainable port development.

The combination of Digital Twin and Artificial Intelligence technologies will enable new paradigms at Ports for decision-making, covering both Operational and Maintenance domains:

-Digital Twin enables a holistic and eco-system approach from Data:

- Monitoring the operations and behavior of actual deployed products, assets, and processes in real-time, by mirroring actual reality,
- Predicting the required performance, modes of failure from the operations via the analysis of data acquired and the model behaviors,
- Prescribing the corrective actions and application to future knowledge, standards, and rules to improve the subsequent products/assets/processes.

-Artificial Intelligence will realize re-engineer decision making:

- Making decision making more dynamic, closer to real time, and prescriptive – with advanced evaluation of multiple variables/parameters across many data,
- Connecting systems and decision domains to interoperate, catalyzing the synchronization between the different transportation modalities,
- Framing a connected Port eco-system for the benefit of Port's customers and the new logistic models driven by data and requesting end-to-end visibility;

In general, enabling two important capabilities for managing Port operations smarter, more efficient and more sustainable for all involved stakeholders through:

- A. Ability of the 'whole Planning system' to 'look ahead', creating feedback loops and being prescriptive to foreseen bottleneck/optimization opportunities.

B. Educated decision making to manage exceptions, for quicker and more robust contingency management, making Execution more adaptive and resilient.