IS FUTURE SMART PORT A FACTORY?

Opportunities for Replicating Industry 4.0 in Port / Terminal Operations

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Maritime industry is different, but not that much

**Factory of the Future 4.0**
- Fully digital, seamlessly networked value chain with no/minimal human intervention
- Machine before the human (Considers, Decides, Executes)
- Lean, leaner, leanest (machines find leaner ways of working by themselves)
- Continuous flow
- Single piece versus batch
- Systems thinking
- Automated optimisation of bottlenecks
- Systematic defect reduction

**Logistics of the Future 4.0**
- Fully digital, seamlessly networked value chain with minimal/no human intervention
- Machine before the human (Considers, Decides, Executes)
- Lean, leaner, leanest (machines find leaner ways of working by themselves)
- Continuous flow
- Every vessel call is custom-orchestrated
- Systems thinking (port + terminal + land)
- Automated optimisation of bottlenecks
- Systematic defect reduction
THE QUEST FOR

FUTURE PORT

Quo vadis?

WE MUST BECOME DIGITAL!

Virpi Oinonen. Image sighted at: www.businessillustrator.com
What are the Digital Ingredients of Logistics 4.0?

DIGITAL TWINS

MATHEMATICAL OPTIMIZATION

AI - MACHINE LEARNING

AI – DEEP LEARNING

COLLABORATION PLATFORMS & SHARED DATA HUBS

SENSORS

INTELLIGENT CONNECTED DEVICES

AUTONOMOUS MACHINES / ROBOTS

AI – Natural Language Processing

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Where to Apply 4.0 Concepts in the Port?

**Commerically Savvy (Optimizing Revenues)**

- **Accessible**
  - Engineered for easy & safe access
    - Port Waters
    - Quay
    - Hinterland
    - Side
    - Situational controls
    - Tactical planning (1-2w)
    - Strategic planning (1-2m)
  - Partners
    - Own

- **Informed**
  - Collecting & Transforming Data
    - Hinterland moves/events
    - Infrastructure (IoTs and sensors)
    - Vessel (ECDIS, AIS, VTS)
    - Equipment

- **Informing**
  - Coordinating
    - Port Community Systems
    - Single Window
    - Supply Chain Optimization including outside the port boundaries

- **Streamlined**
  - Benchmark Productivity
    - Not about newer/bigger/faster equipment, but seamless integration of processes and solutions
    - Custom-designed optimization & decision support systems added to operational systems

- **Sustainable**
  - Asset Sustainability
    - Structure (quaywalls, decks, etc.) usage & maintenance optimization
    - Equipment efficiency
    - Power generation
    - Yard lighting
    - Port structures optimization

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Carriers

Carriers, Shippers

Port

Port, Community

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Systems thinking! Think process, not activity!

- **COMPLEX SENSOR**
  - Automation

- **MACHINE LEARNING**
  - Software

- **REAL TIME DECISION**
  - Software

- **BERTH PLAN OPTIMIZATION**
  - Software

- **INTELLIGENT EQUIPMENT**
  - Automation

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**Datawell BV**

**ShoreTension BV**

**Cavotec**

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**WIND + WAVES**

Can I accept this ship?
When it’s safe to moor this ship?
Where it’s safe to moor this ship?

When to close / re-open the port to ships?
Business as usual
Tanjong Pagar

DIGITAL TWIN
Terminal transport changes -> 3m sea rise

• Master planning beyond civil engineering problem – poor value out of typical Port Master Plan deliverables when it comes to technology strategy and tactics

• Next generation of twins are here – connected to sensors in real time; classifying new data; running operational scenarios by themselves; autonomously assessing value of changes; capable of changing operational procedures and adjusting behavior of autonomous equipment
“Ex Port” *Digital Twin* Project – Port + Cruise Port + Airport
“In Port” Logistics 4.0 – Port + Terminals Ops Synchronization Platform

MACHINE LEARNING
Software

REAL TIME DECISION
Software

BERTH PLAN OPTIMIZATION
Software

AND

TOS INTEGRATION
Automation

Sighted at https://innovacion.apba.es/pit-stop-port-operations-algeciras-2/
New Frontier for Ports – Digital Platforms

International Land-Sea Trade Corridor

TWO PORT INTEGRATION FOR SMARTER E-COMMERCE

GSBN ?
CALISTA ?
Tradelens ?

CHINA

Chongqing

Barge

Ocean

Shanghai

TRANSHIPMENT

Singapore

6,400 KM
22 – 25 DAYS

Qinzhou

Rail

Ocean

Shanghai

TRANSHIPMENT

Singapore

3,800 KM
7 - 10 DAYS
Port Community System

https://connected-ports.org

Don’t be an “island”. Let’s build connected archipelago of ports
Logistics 4.0 in Port – 3 Smart Things to Remember

Virpi Oinonen. All images on this page sighted at: www.businessillustrator.com
Thank you

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