AI: Benchmarking Across Industries for Transferability to FVL

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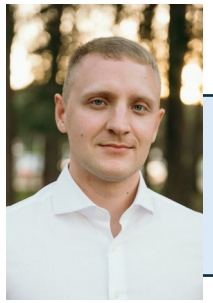

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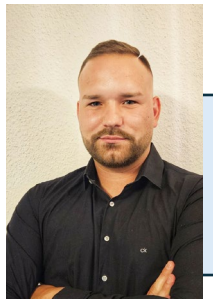

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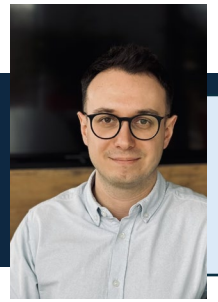

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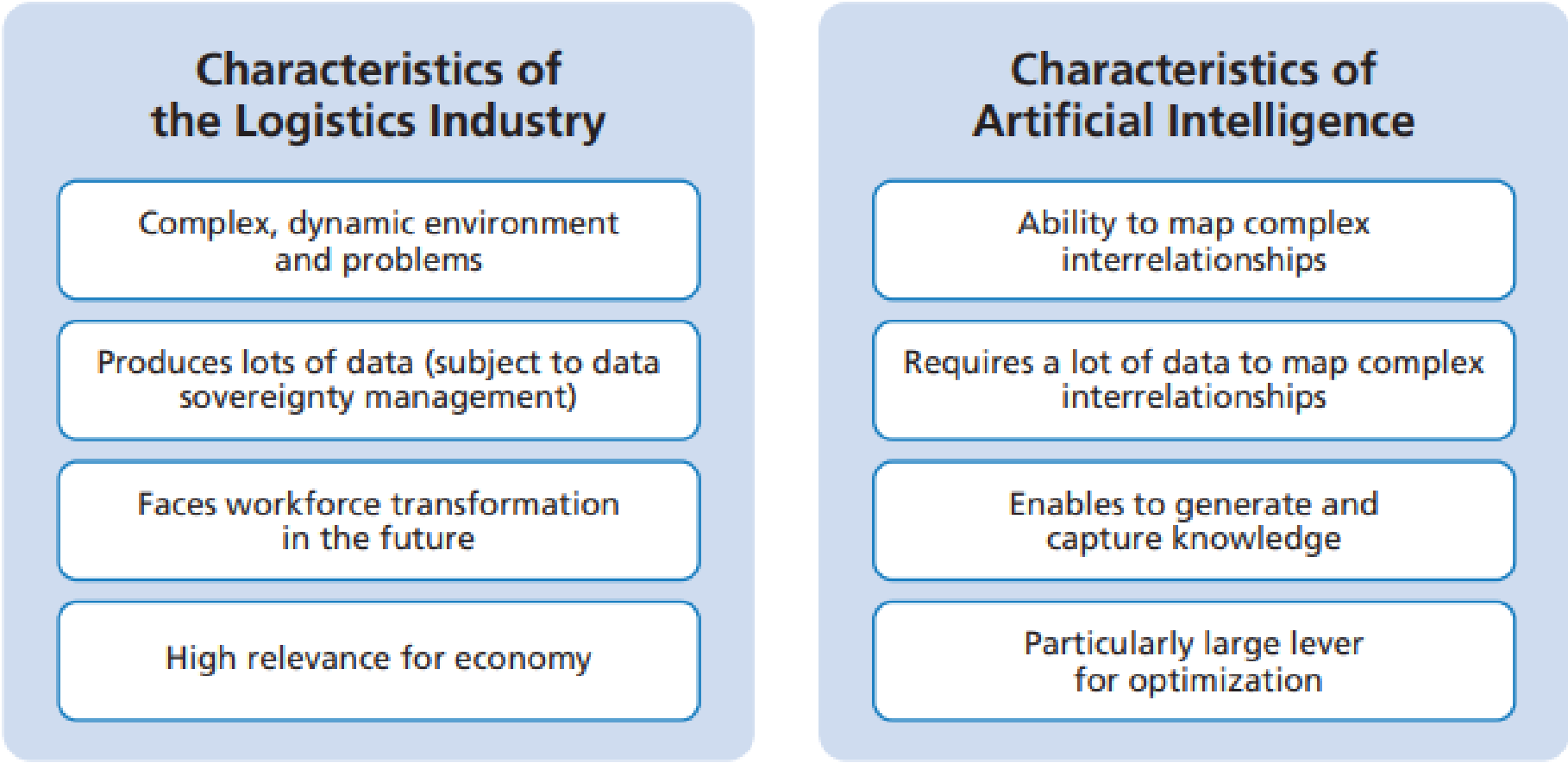
Why AI?



White Paper: AI in Logistics, ALICE (Alliance for Logistics Innovation through Collaboration in Europe)

Figure 1: **Relevance of AI for the logistics industry**

From Container Yard AI Management System

Why AI Container Yard Management

Case Study: Port of Rotterdam

Increased Efficiency:
15% increase container throughput

Sustainability Impact:
6% CO_2 emissions reduction

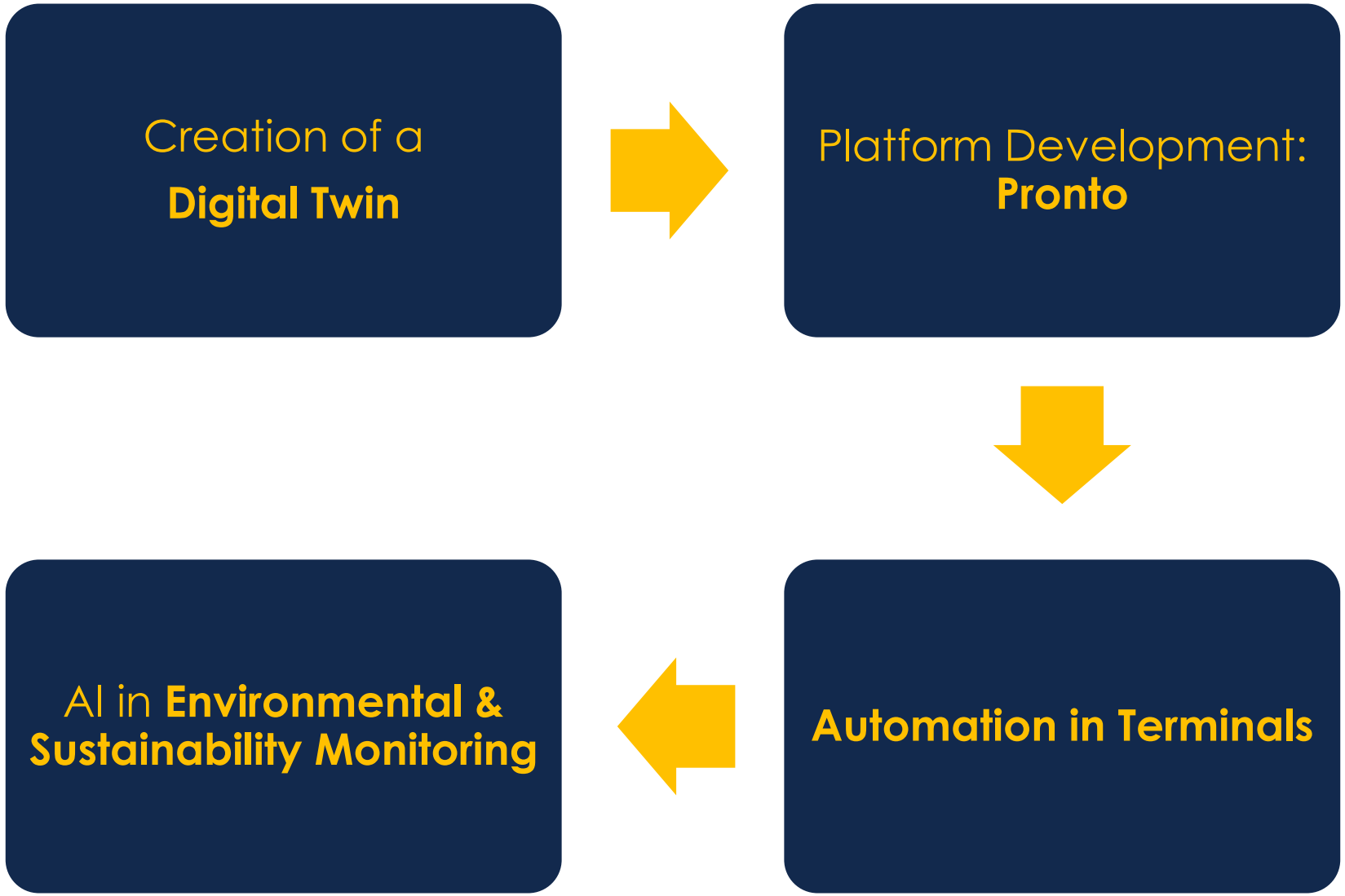
Vessel Turnaround time:
25% reduction in waiting times for ships

Automation and Safety:
40% reduction in the risk of accidents

Cost Savings:
€100 million annually

Port of Rotterdam Authority, 2020
Van der Meer & Zunder, 2021
Khan & Pallis, 2022

Case Study: Port of Rotterdam



Case Study: Port of Rotterdam

Challenges with Traditional Systems

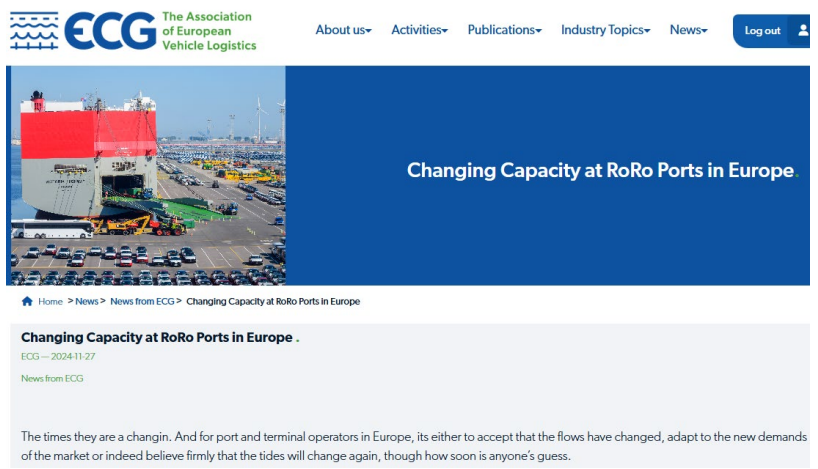
- Inefficient Scheduling & Resource Allocation
- Limited Predictive Capabilities
- Reactive Maintenance
- Data Silos

Advantages of AI Integration

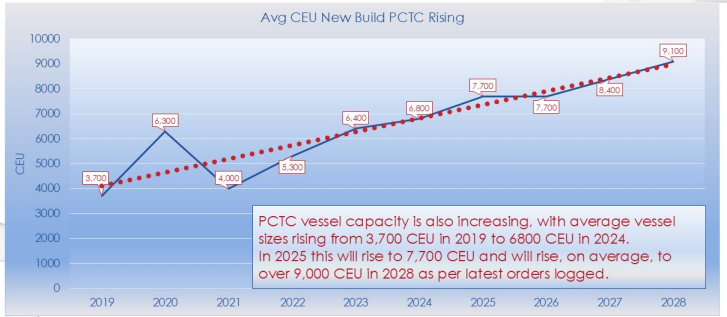
- Enhanced Predictive Analytics
- Optimized Resource Management
- Predictive Maintenance
- Integrated Data Ecosystem

To AI Compound Management System

Why AI Compound Management?



CEU Capacity in New Build PCTCs Rises



Source: ECG Business Intelligence, Esgian data, Vessels Value data

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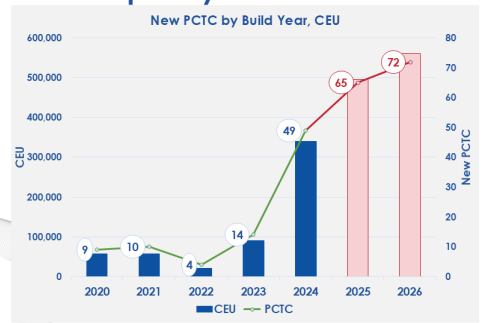
New PCTC surge results in CEU jump, as average PCTC capacity rises



Year	PCTC	CEU
2020	9	57,300
2021	10	57,520
2022	44	21,218
2023	14	90,489
2024	49	340,364
2025 estimate	55-65	495,400
2026 estimate	70-72	561,000

2020 to 2024, capacity increased by 567,000 CEU

2025 & 2026, capacity forecast to increase by 1,056,400 CEU

Source: ECG Business Intelligence, Esgian data, VesselsValue data

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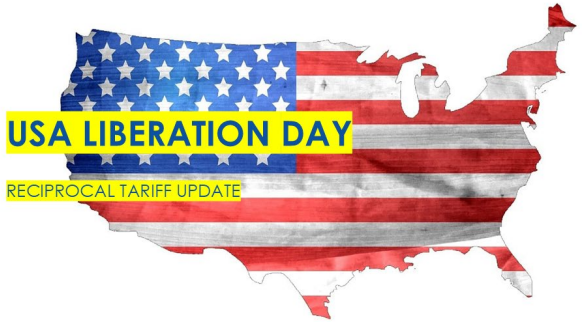

From containers to cars: Adaptation process

1

Input

- Adapt data in from container to compound
- Identify vehicle specific data in

2

Adaptation Steps

- Adapt unit and yard measures
- Movement Scheduling
- Loading/Unloading process
- Vehicle Specific Data
- FVL Specific Systems
- AI Sustainability Metrics
- Environmental Factors

3

Customisation

- Space allocation to vehicles types and activities
- Equipment Utilisation and Predictive Maintenance
- Loading/Unloading schedule

Containers are NOT cars and cars are NOT containers →
a part of the adaptation process, focuses on vehicle specific data

AI Container Yard Management Data In

Container Data	•Size, weight, type (e.g. refrigerated, hazardous), destination
Vessel Schedule	•Arrival and departure times, loading/unloading sequence
Yard Layout	•Current container locations, available space
Truck/Crane Data	•Equipment availability, capacity, status, and routes.
Traffic Data	•Congestion levels, truck, train entry/exit, gate information
External Data	•Weather conditions, maintenance schedules, labor shifts

Adapt to FVL

AI Compound Management Data In

Vehicle Data	•VIN, dimensions, destination, condition (e.g., damage, cleanliness)*
Transport Schedule	•Arrival and departure times for trucks, vessels, or railcars
Yard Layout	•Current vehicle parking locations, available space, and priority zones
Equipment Data	•Status and availability of jump start device and charging stations
Traffic Data	•Gate congestion, truck, rail entry/exit times, and compound traffic flow
External Data	•Weather conditions, labour availability, and maintenance schedules

Further Vehicle Specific Data In

Damage Detection:

- Use AI-powered cameras for automated visual inspections of vehicles to detect scratches, dents, or other damages.

  → Automatically log and tag vehicles with detected issues for repair or additional handling

Statement of Charge SOC (for EVs):

- Integrate IoT sensors to monitor electric vehicle (EV) battery levels.

  → Automatically allocate charging stations for EVs requiring a recharge before transhipment.

Processing Needs:

- Identify vehicles needing additional steps, such as cleaning, refuelling, or installation of accessories.

  → Generate work orders for staff and schedule tasks to ensure readiness.

AI Compound Management

OEM Data

Forwarders Data

Inspection Data

Shipping Line Data

AI Processing

- Processes & Analyses data
- Predicts missing data
- Combine data

AI Outputs

- ✓ Smarter Space Utilisation
- ✓ Predictive Planning
- ✓ Real-Time Decision-Making
- ✓ Resource Optimization
- ✓ Damage & Risk Reduction
- ✓ Improved Visibility and Reporting
- ✓ Sustainability Gains

AI in Compound Management brings:

- ✓ **Efficiency** through automation and optimization
- ✓ **Predictability** through forecasting and pattern recognition
- ✓ **Agility** through real-time responsiveness
- ✓ **Sustainability** through smarter resource use

AI in Compound Management

Breaks the limitations of any existing system.

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Thank you