AI for Port Applications

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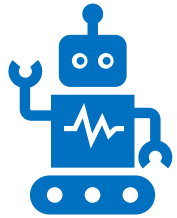
AI is a machine's capability to mimic the cognitive functions of a human

Learn, Reason, Make Decisions, Process Language

Human Intelligence

- **Evolved naturally over millions of years since the first human walked**
- **Human brain is the hardware – slowly changing**

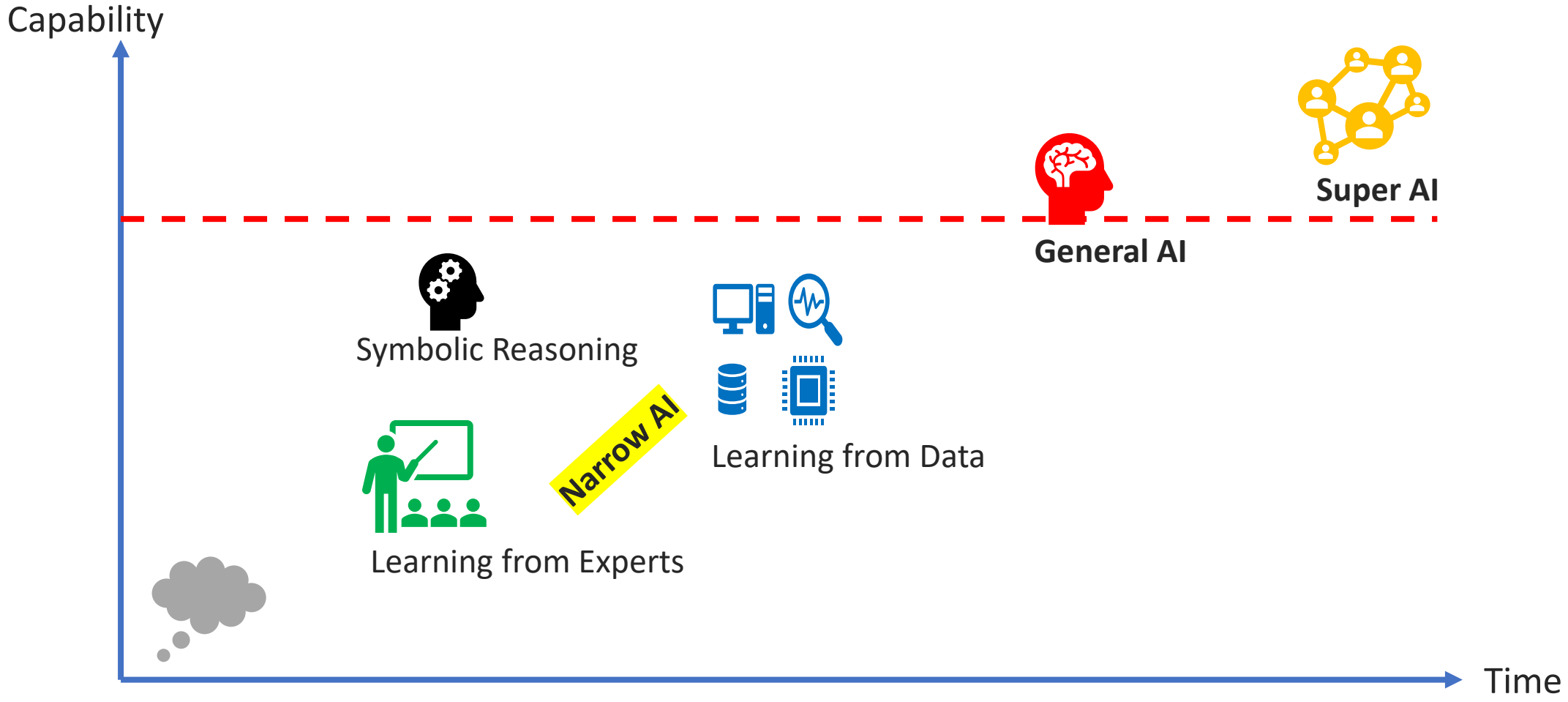
Artificial Intelligence



- **Human-created concept in 1950s with commercial applications ↑ in recent decades**
- **Electronic hardware – rapidly improving**

SENSE . PROCESS . LEARN . RESPOND

Progress of AI



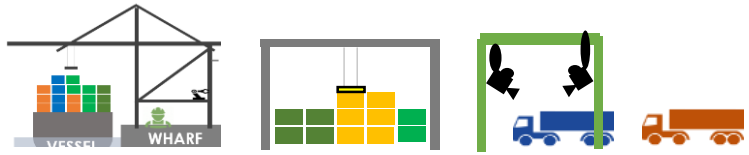
Expanding Scope of Port Operators' Interests

Until Now: Efficient, Safe and Secure

Emerging: Value Add to Cargo Owners (Cargo Solutions)
Supply Chain Efficiency (Platforms)
Automation & Digitalization (Smart)

Future: Environmentally Sustainable (Green)

Production of Port Services



Land: Berth, Yard, Roads, Gate

Operators
Workers

Equipment
Fleet

Energy: Fuel, Electricity

Office-based
Planners & Support Staff

ICT Systems
Algorithms

Customers

- Shipping Lines, Agents, Ship Supplies, Bunkers
- Pilotage & Tug Services
- Logistics Service Providers (Haulage, Depot)
- Container Fleet Owners
- Cargo Owners

Suppliers
Service Providers

Manifestation of AI --1

Video Analytics to ensure Lashing Safety
- Quay Crane mounted video cameras
- Spot unsafe behaviour and trigger alerts

Suppliers
Service Providers

Truck Telematics to ensure Driver Safety and Truck Reliability
- On-board sensors and camera
- Live tracking and sense making to spot anomalies and trigger alerts

Operators
Workers

Crane Operations Analytics to ensure Operator Safety and Good Equipment Condition
- Sensor IoT Data
- Big Data Technologies
- Pick up signs of abnormal equipment handling

Equipment
Fleet

Manifestation of AI --2

Predictive Crane Maintenance for cost-effective Equipment Availability

- Sensor IoT Data
- Big Data Technologies
- Correlating failure with anomalous behaviour
- Plan ahead for spare parts and maintenance resources

Equipment Fleet

Video Analytics for Automated and Remote Crane and Gate Operations

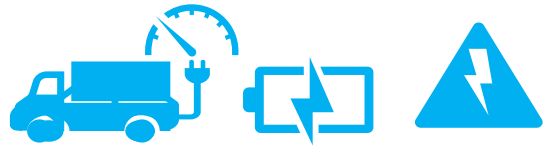
- Container Number Recognition
- License Plate Recognition
- Chassis Alignment
- Container Weight Verification
- Driver Identification

Gate

Manifestation of AI --3

Smart Grid for energy efficiency and cost effective power management

- Sensor IoT Data
- Big Data Technologies
- Forecast power demand and energy consumption
- Optimize energy storage and procurement to reduce costs

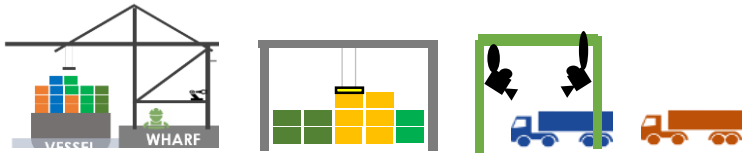


Energy

Manifestation of AI --4

Next Generation Terminal Planning System

- Data driven – TOS, Portnet, Cargo Solutions, CALISTA, Data Exchanges
- Embedded Analytics – ML, DL, RL
- Collaboration Platform for sharing information and plans: node to network
- Predict Container Dwell and Connectivity and Yard Activity
- Optimize land usage by stacking efficiently
- Optimize resource productivity by spreading container traffic



Land: Berth, Yard, Roads, Gate

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Intelligent Resource Planning & Deployment

- Predict Vessel Arrival, Throughput and Connectivity – Customer behaviour
- Forecast manpower demand and supply – Supplier behaviour
- Match resource deployment to terminal conditions and vessel requirements
- Maximize resource productivity while maintaining service levels

Customers

Suppliers
Service Providers

In Summary, the Business Objective of AI is to better predict the behaviour of various players and systems and undertake focussed intervention

Operators
Workers

Equipment
Fleet

ICT Systems
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Customers

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- Pilotage & Tug Services
- Logistics Service Providers (Haulage, Depot)
- Container Fleet Owners
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Thank You

The End