

An aerial photograph of a large port facility. Several container ships are docked at the pier, with numerous colorful shipping containers (red, blue, green, yellow) stacked on their decks. Large white gantry cranes are positioned along the quay, lifting and moving containers. The port is situated on a body of water, with a city skyline visible in the background across the water.

Automation, Robotisation and the New Industrial Revolution

Peter McLean, Senior Vice President, Kalmar APAC

World of Artificial Intelligence



Smart cars



GPS



Autonomous ships



Virtual Reality (VR)
Video Games



Online shopping



Smart home devices

Why innovation matters

Shaping corporate life

- Eliminate barriers

Drive economic growth

Embark on success

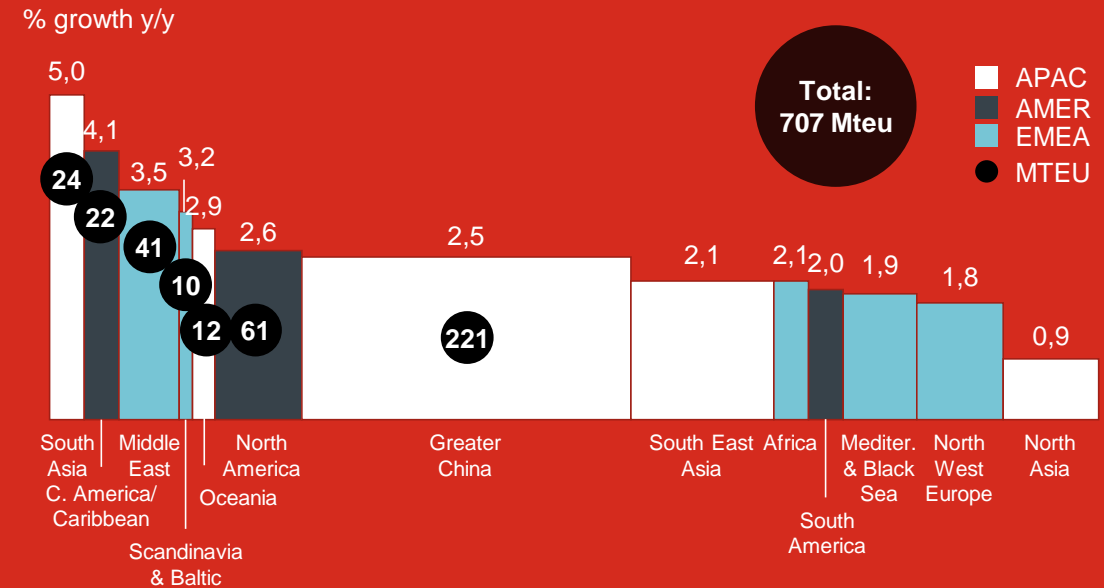
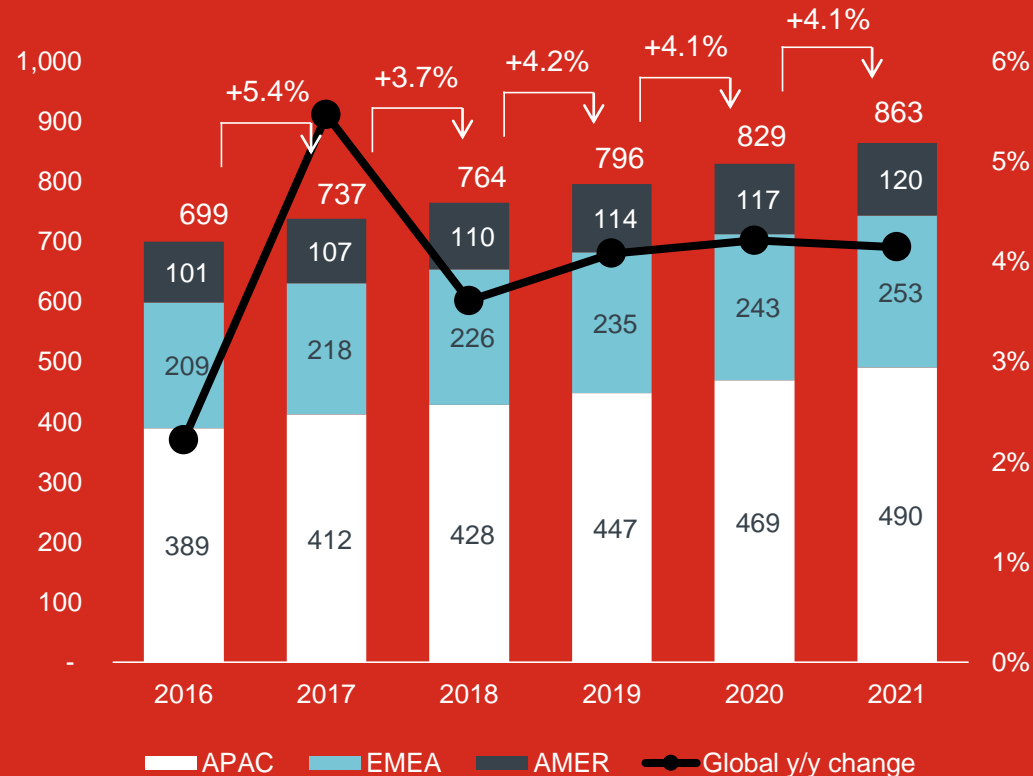
Lead the market

Create new customers

Global container throughput is estimated to grow at a healthy rate

APAC is the primary driver of growth

Throughput development, MTEU



- › APAC is expected stand for 60% of the global throughput growth.
- › Greater China and Southeast Asia are forecasted to account for 40% and 11,8% of the global throughput growth at 5.3% and 3.7% CAGR, respectively.

*y/y growth, Source: Drewry 2017 annual GTO report/ Drewry container forecaster Q3 2017

Our part of the world

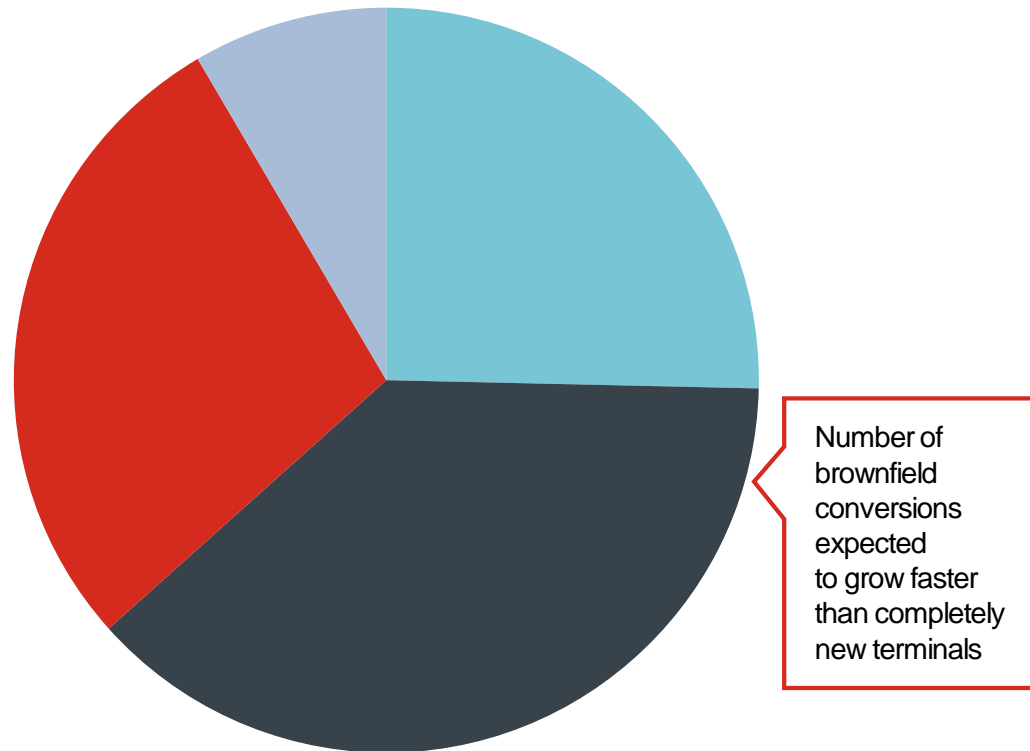
Cargo transportation:

- Represents 10% of the world's GDP*
- Is responsible for 22% of global energy consumption* and 25% of fossil fuel burning across the world*
- Produces 30% of global air pollution and greenhouse gases*
- Is getting more and more important as urbanization and globalization continue

* Source: Center for Environmental Excellence by AASHTO, http://environment.transportation.org/environmental_issues/sustainability/

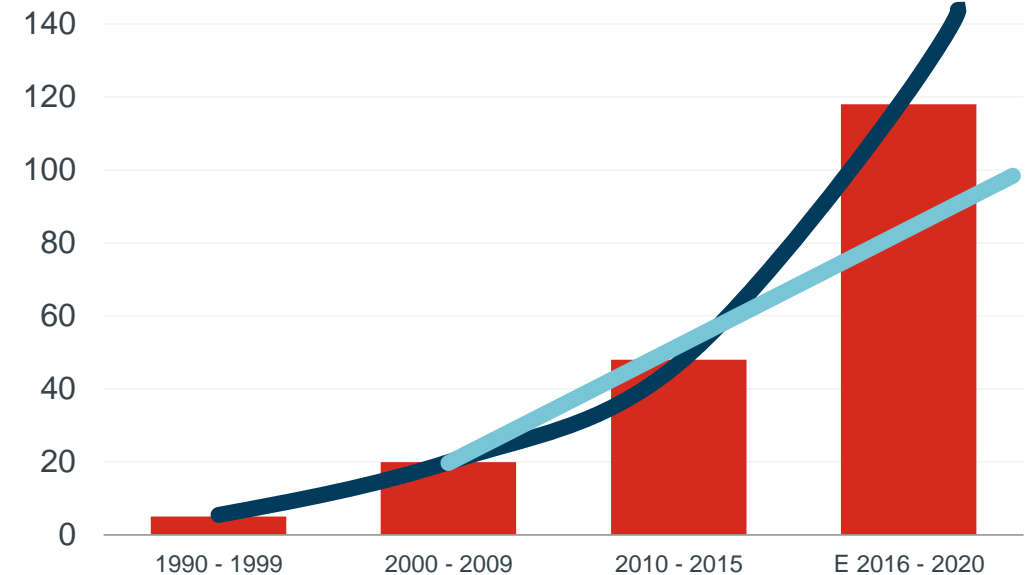
The Trend of Port Automation by 2020

Exponential growth would more than double the number of automated terminals by 2020



■ Greenfields ■ Brownfields ■ Extensions ■ Not known

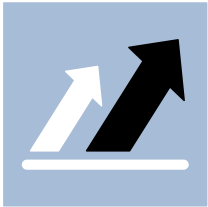
Numbers of terminals



Source: Kalmar Business Intelligence



Key drivers for automation



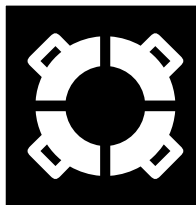
COMPETITIVE ADVANTAGE



COST OF UTILITIES



COST OF LABOUR



SAFETY



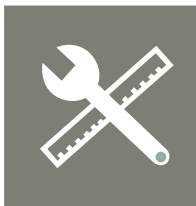
ENVIRONMENTAL BENEFITS



RENEW/ UPGRADE EXISTING



PERFORMANCE & SECURITY



MAINTENANCE AND DAMAGE

Myth behind automation

Higher productivity



Overall cost reduction



Faster performance



Start with a button



Truth behind automation



Kalmar automation investment



- Dedicated Automation team in Finland
- Highly qualified Robotics team in Australia
- Joint venture in China, RCI
- Project References in Asia, Europe and America
- Navis/ Xvela software capabilities

In 2017, Cargotec's software sales were EUR 159 million

Kalmar automated terminal references



Automated terminals

T1

Automated straddle carrier terminal

- Highly flexible concept
- Stacking and transportation by one type of equipment
- Relatively low initial investment
- Short time to realisation

T2

Automated RTG terminal

- Various degrees of automation possible
- High capacity stack and manoeuvrability
- Works with terminal tractors or automated shuttle carriers
- Both for medium-size and large terminals

T3

Automated stacking crane terminal

- Works with automated shuffle carriers to decouple processes and minimise apron size
- Alternatively works with automated guided vehicles
- Supports high stack volume and density
- Optimised throughput

T4

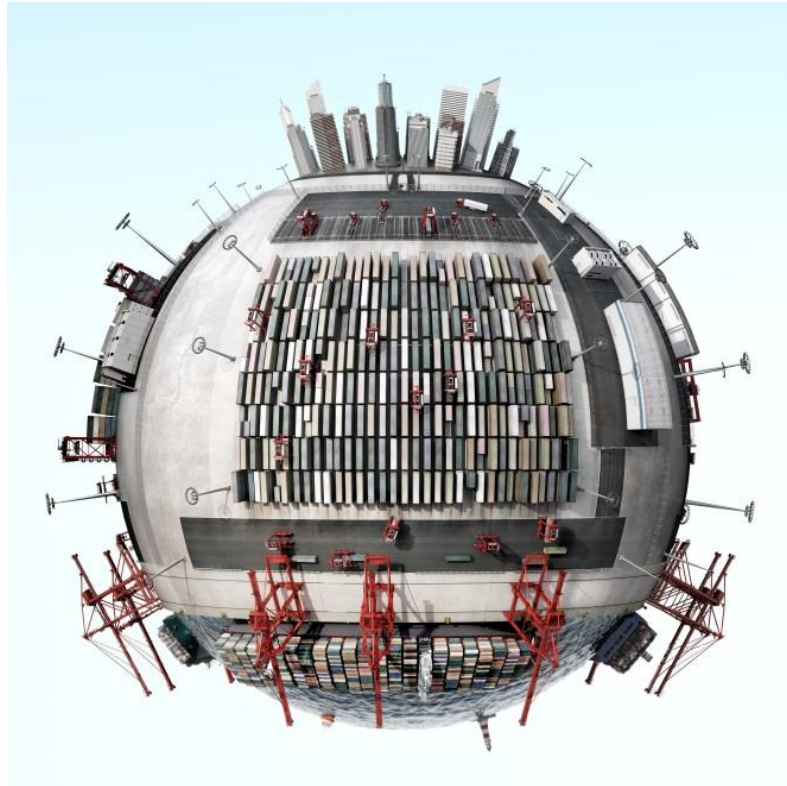
Hybrid terminal

Several automation concepts can be combined in the same terminal, depending on the unique characteristics and requirements of the site. For example, the new TraPac extension to the Port of Los Angeles features a diagonal AutoStrad stack in a corner of the port that would be impossible to utilise for an ASC stack.

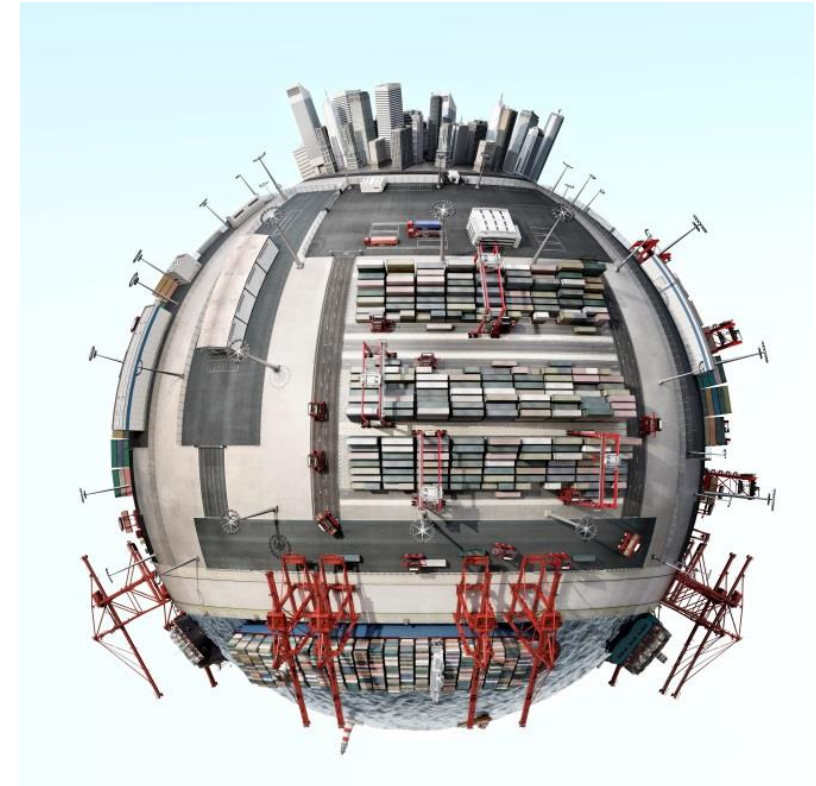
Three preferred concepts for automation



ASC & AutoShuttle or AGV



Straddle Carrier



RTG

Case example: Greenfield automation terminal VICT, Melbourne, Australia



AHTS with Autoshauffles

Fully decoupled container handoffs under STS and ASC ensures best STS productivity with highest utilization of the equipment

TLS

Integrated fleet management solution for ASC and Autoshauffles

Data Centre for IT Systems

N4 TOS

- Holistic optimization functions
- Automatic yard planning
- Automatic vessel/berth planning

Ship to shore cranes

SmartQuay

Autoshauffles

Auto LashingPlatform

STS operation

- Remote controlled STS with semi-automated functions
- Automated twistlock handling using ALP
- OCR for container ID recognition
- Exclusion between STS and Autoshauffles

ASC stacks

- 2 crane ASC blocks
- Access Control System that ensures safety of the personnel
- Own inventory database

Gate operation

- OCR for container ID recognition
- RFID identification and/or LPR

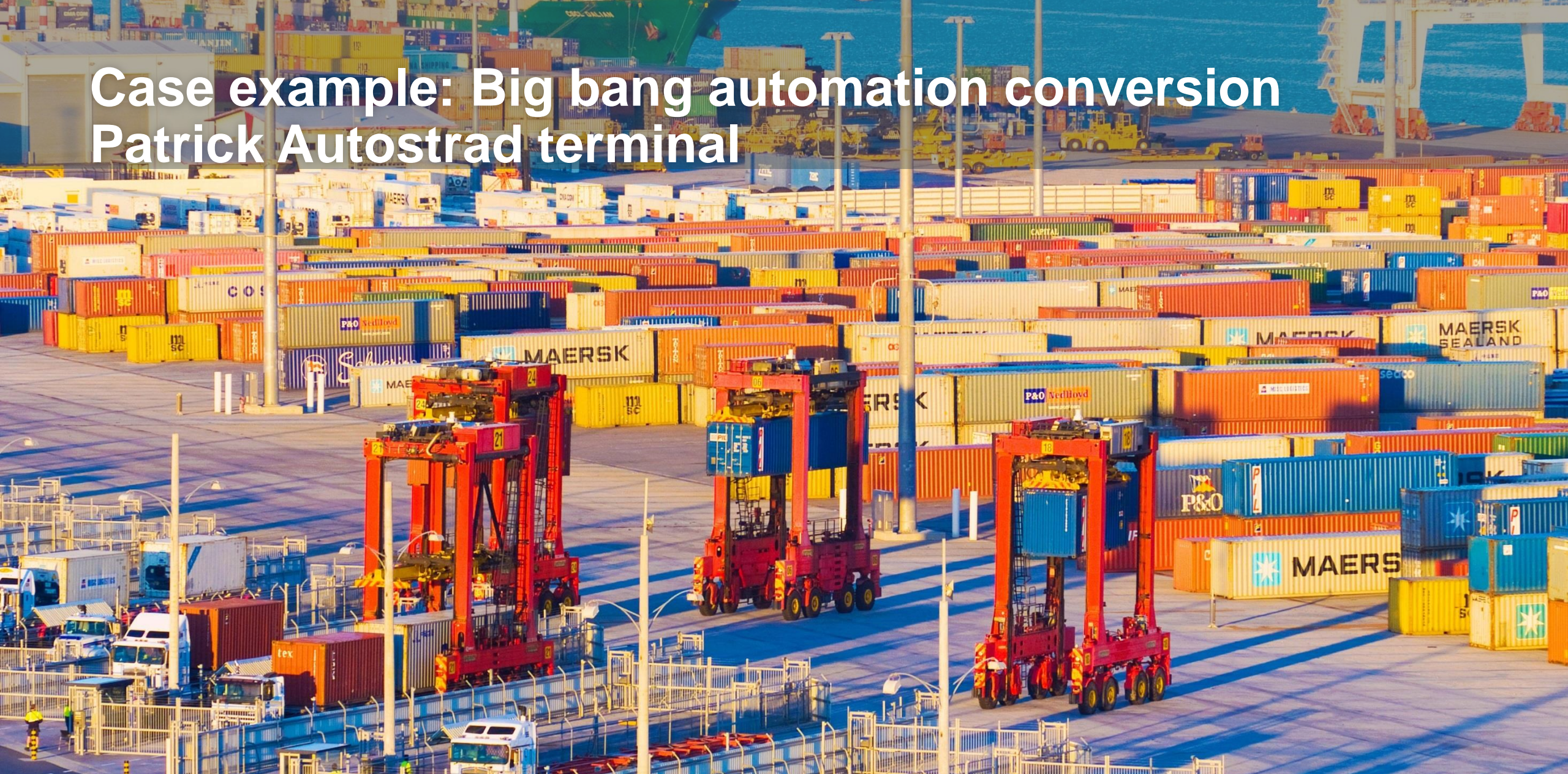
Automated Stacking Cranes

SmartLanes

Landside operation

- Automated truck handling using Kalmar ATH
- Remote control needed only for exception handling

Case example: Big bang automation conversion Patrick Autostrad terminal



Patricks Brisbane, Australia

Terminal setup:

- Capacity 800 000 TEU
- AutoStrad terminal



Equipment & software

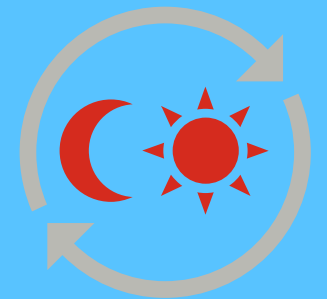
- 27 Kalmar AutoStrads™ – 3-high
- Inhouse TOS
- Kalmar RTCS



The unmanned Kalmar AutoStrads™ can operate 24/7 in almost any weather conditions, ensuring smooth flow of cargo and significant cost savings.

Patrick's work force has decreased drastically, as today a crane gang of only 4 people is needed to operate a ship-to-shore crane and the yard and stacking area

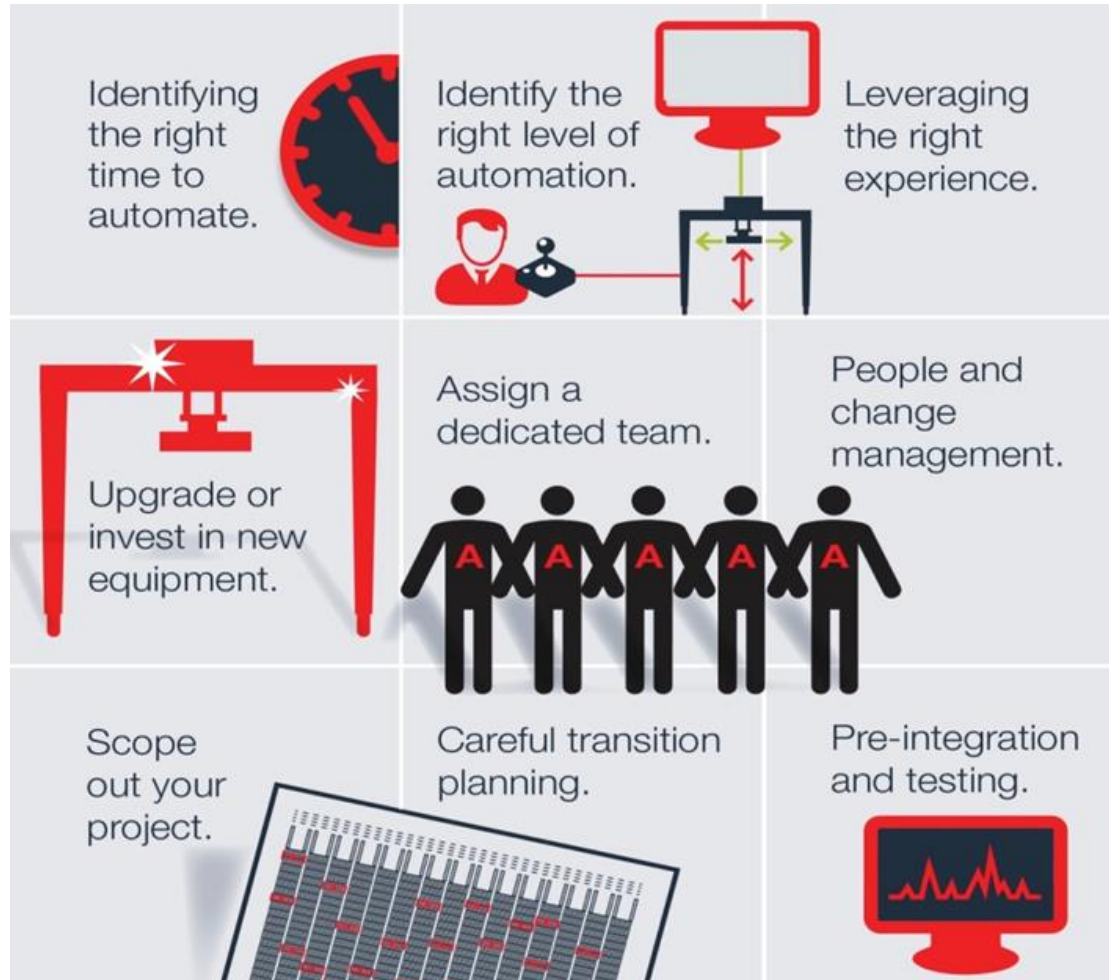
The transition to automation can be done quickly and at low cost.



**“We went 12 months
without a single lost
time injury among our
160 employees.”**

Matt Hollamby
Brisbane manager, terminals division
Patrick

Driving to the Future





The future

Port 2060 by Kalmar

An aerial view of a busy container yard. Numerous shipping containers are stacked in rows, with brands like COSCO, K LINE, and Safmarine visible. Three red Kalmar cranes are positioned among the stacks, with their yellow lifting mechanisms visible. The scene is captured from a high angle, showing the organized layout of the yard.

MAKING YOUR EVERY MOVE COUNT



KALMAR