Trends in Modular Crane Automation

It is all about sensors and data

Ports and Shipping 2023

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Why automation?

The main driver is cost savings through reducing manual intervention.

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Mega-trends container crane business

Artificial Intelligence

Energy-Efficient

Clean energy

Sustainable automation

Big Data & Analytics

Intermodal Shipping

Autonomous Cranes

Larger STS cranes

Virtual reality

Digital twin

IoT

5G

Cyber-security

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Typical routing of an container

Container on latching platform

Straddle Carrier
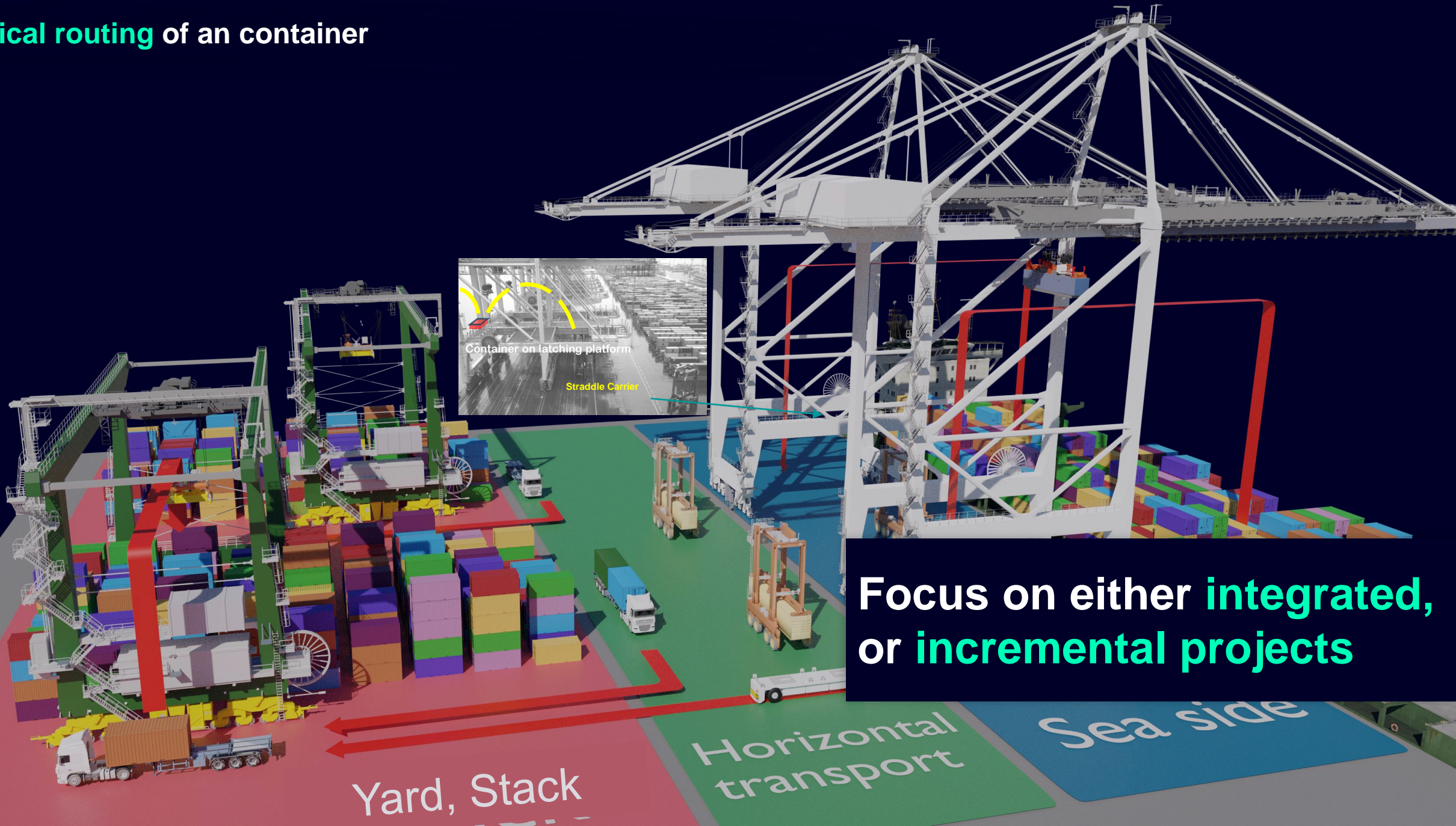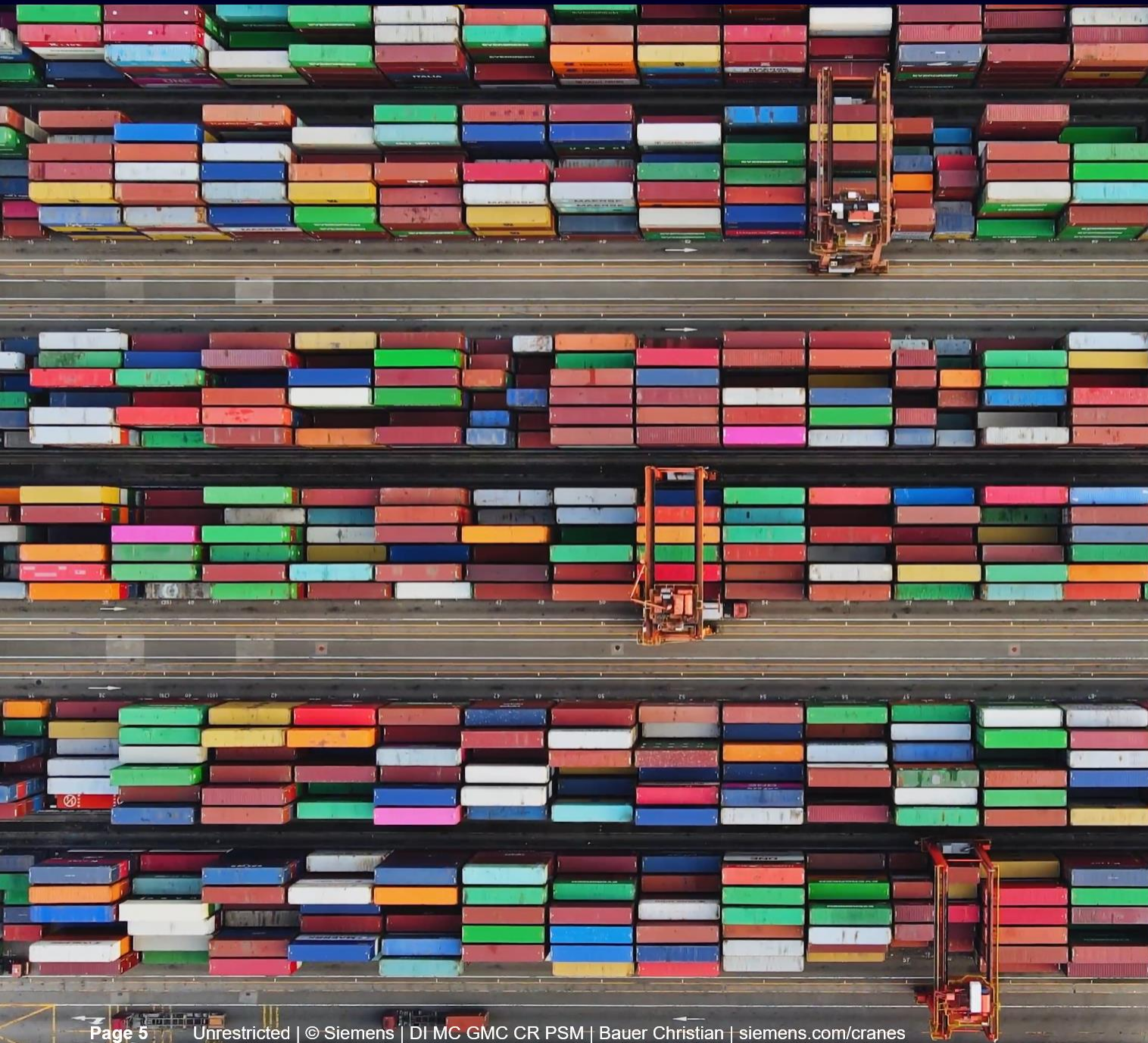
Focus on either integrated, or incremental projects

Yard, Stack

Horizontal transport

Sea side

Quay Cranes

Horizontal Transport

Yard Cranes

Yard Management

Automation Level

Time

Source: https://porteconomicsmanagement.org/pemp/contents/part3/terminal-automation/diffusion-port-terminal-automation-technologies/ checked: 02/06/2023

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Modular Automation
Customer feedbacks

- "Automation make it scalable. Create smart solution for OT and IT together "

- "Automation shall support humans and machines"

- "Exception handling is key for automation."

- "Lack of standards in ports makes every new terminal a new project"

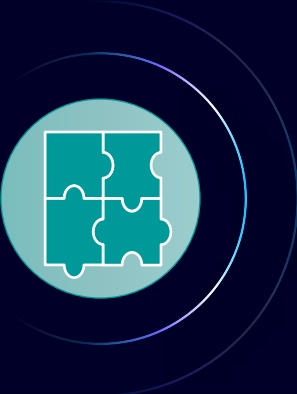- "Highly skilled employees hard to get but are necessary for the success of automation."

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SIMOCRANE – Sensor Modules
Modular solution approach Objectives
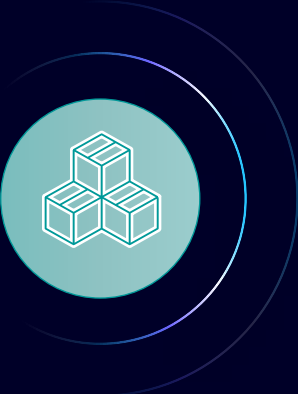
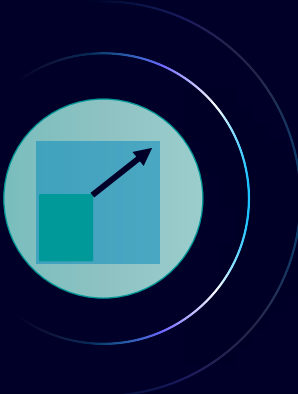| Flexibility	Customization	Scalability	Interoperability	Time Saving
Easy adaptation to internal and external changes.	Customer tailor Made Solutions , with the possibility to select functions needed by specific projects	Possibility to deploy multiple instances simultaneously.	Communication and data exchange with different systems	Easy Deployment and Maintenance of the Solution ,Minimize down time for Maintenance or Patch deployment

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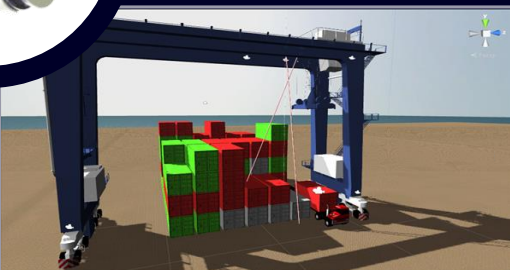# Modular Automation SIMOCRANE Sensor modules
Portfolio

Laser based

Detection & tracking

Collision detection

Final Landing

Profiling

Trend:
Accuracy & Performance

Camera based

Final landing
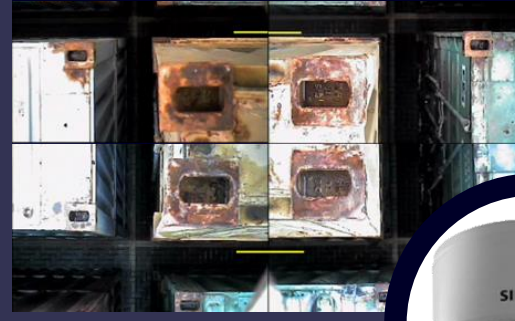
Identification

Tracking

Classification

Sway Control

Trend:
Track & Monitor

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Data

.. is not created equal

Structured data is highly organized and formatted so that it's easily searchable in relational databases.

- Numbers, dates and strings
- Can be displayed in rows, columns and relational databases
- Easy to manage

Sensor data has no predefined format or organization, making it much more difficult to collect, process, and analyze.

- Images, audio, video, word processing files
- Requires more storage
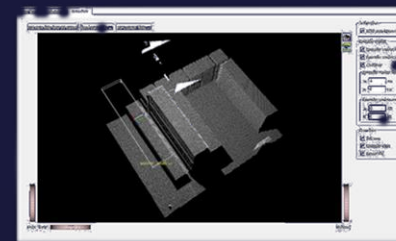- More difficult to manage

Data Example

Excel files

Databases

Data Example

3D Dot-Cloud

Video sequences

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STS & Yard Cranes – Typical KPI

STS

**Productivity
40 mph**

MMBF > 2000

**Remote control
with 1:1 (1:2)**

**Positioning
accuracy 50 mm**
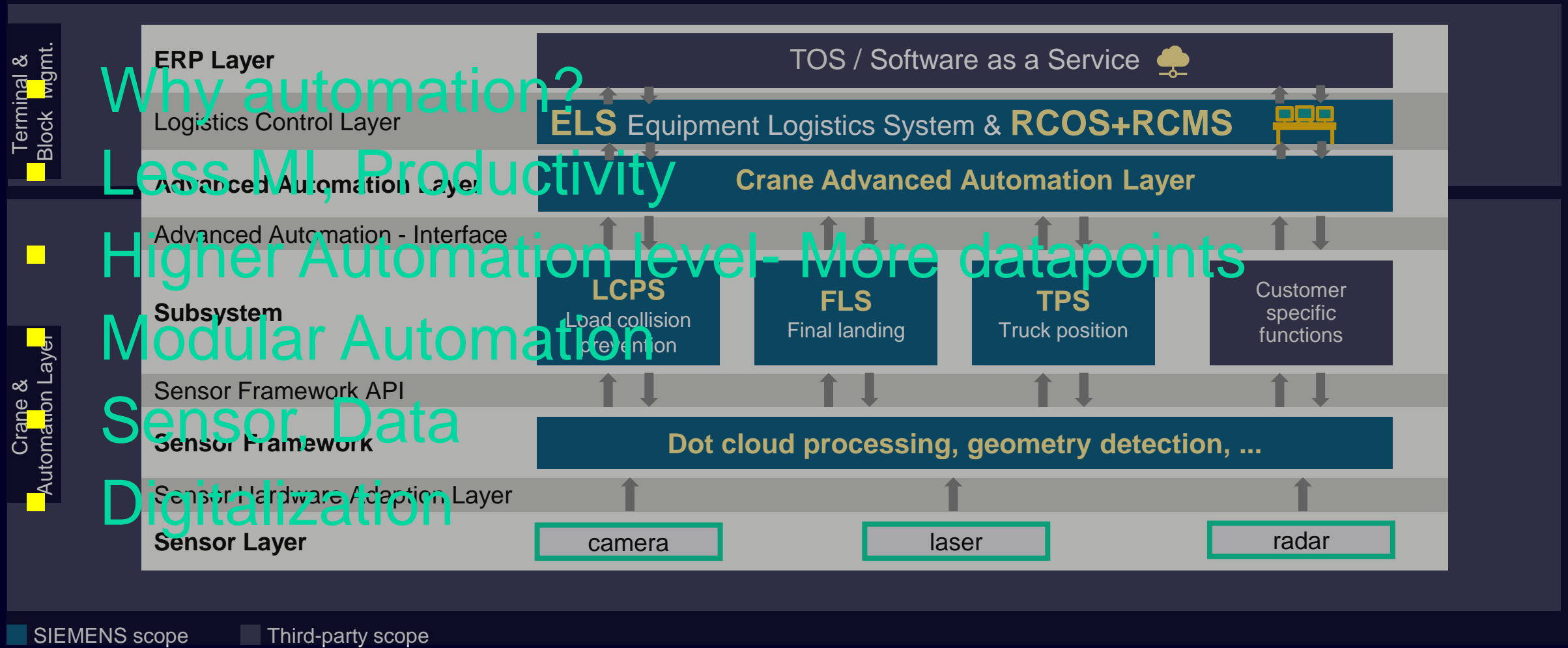
Yard Crane

**Productivity
30 mph (WS)
20 mph (LS)**

MMBF > 3000

**Remote control
with 1:5 .. 1:20**

**Stacking
accuracy 50 mm**

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Key take away

Topology of a fully automated Terminal

ERP Layer — TOS / Software as a Service

Logistics Control Layer — **ELS** Equipment Logistics System & **RCOS+RCMS**

Advanced Automation Layer — **Crane Advanced Automation Layer**

Advanced Automation - Interface

Subsystem — **LCPS** Load collision prevention · **FLS** Final landing · **TPS** Truck position · Customer specific functions

Sensor Framework API

Sensor Framework — **Dot cloud processing, geometry detection, ...**

Sensor Hardware Adaption Layer

Sensor Layer — camera · laser · radar

Terminal & Block Mgmt.

Crane & Automation Layer

Why automation?
Less MI, Productivity
Higher Automation level- More datapoints
Modular Automation
Sensor, Data
Digitalization

■ SIEMENS scope   ■ Third-party scope

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Thank you

for your attention

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