Why to digitalize manual operated terminals

We automate,
you operate

Jan Bossens
2025-July-03

CAMCO
TECHNOLOGIES

About Camco

CAMCO Headquarters in Belgium

CAMCO Shanghai Office

CAMCO USA Office

CAMCO UAE Office

CAMCO Australia Office

26 Years
The longest history

CAMCO established in 1999, with 288 employees becomes the biggest company in terminal automation. CAMCO is the most stable technology company guarantee to provide long term services for her supplied systems.

Local M&S teams
The Efficient Service

With five M&S teams located in Belgium, Abu Dhabi, Shanghai, Los Angels and Australia, CAMCO provides the 24/7 full time efficient maintenance service globally.

300+
Biggest Project Reference

More than 300 container terminals worldwide installed Camco automation systems, it makes Camco the global leader in our industry with the richest experience and knowledge for all types of projects. And same time all the new technology developed by CAMCO are proved.

Innovation Focus

With a >30 engineers R&D team, CAMCO never stopped innovation, it guarantees the customers of CAMCO have always the most advanced technology in the industry.

Design and produce own hardware
In-house engineered Solutions

Camco designs, develops and implements its own technologies. Unlike sales organizations or system integrators, we keep total control over our hardware and software, and support a long-term product strategy.

What we do, our core business

RAIL AUTOMATION

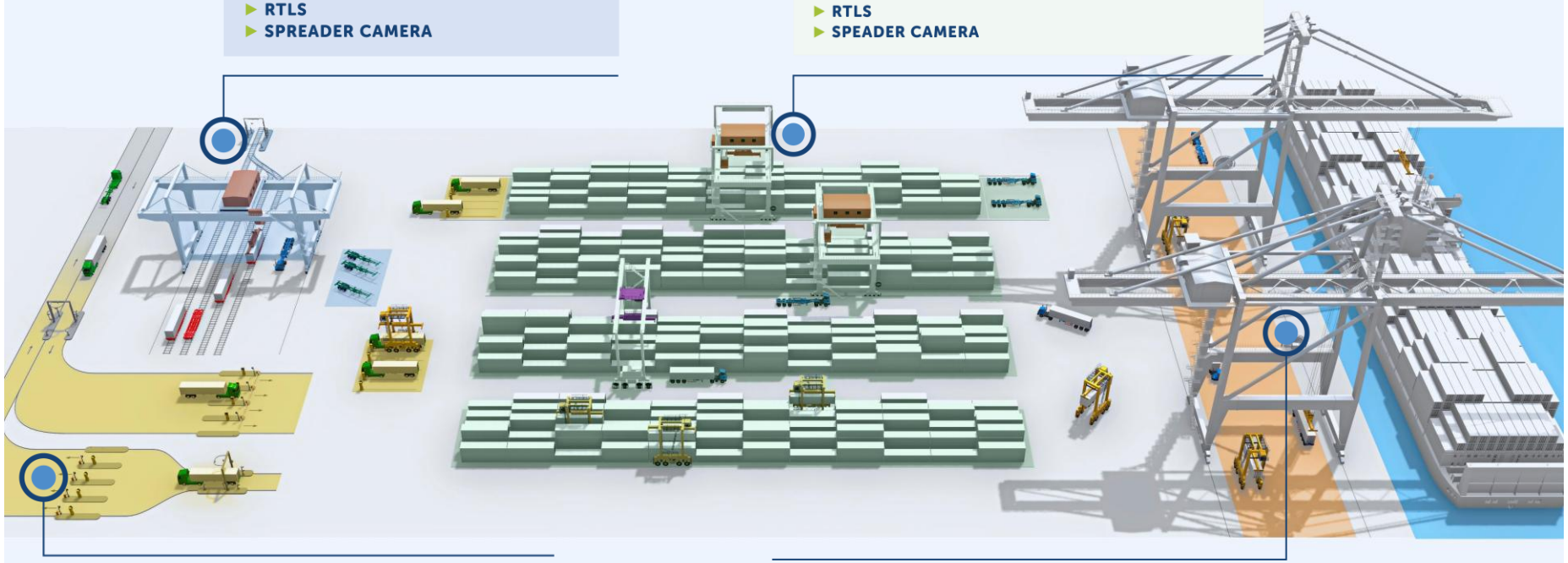
START PROCESSING TRAINS WITHOUT DELAY AND IMPROVE TRAIN TURNAROUND TIME

- OCR RAIL PORTAL
- RMG OCR CAMERAS
- RTLS
- SPREADER CAMERA

YARD AUTOMATION

FROM A STEP BY STEP INTEGRATION TO FULL INTEGRATION OF TERMINAL PROCESSES

- RFID RTG/RMG TRUCK HANDOVER
- VMT MANUAL / AUTO JOB STEPPING
- RTG/RMG OCR CAMERAS
- ASC KIOSKS
- RTLS
- SPEADER CAMERA



GATE AUTOMATION

THE INDUSTRY REFERENCE IN VISION-BASED GATE AUTOMATION SOLUTIONS

- OCR PORTALS
- KIOSKS
- VBS + ITT VEHCILE BOOKING SYSTEM
- RFID
- WEIGHT IN MOTION (WIM)

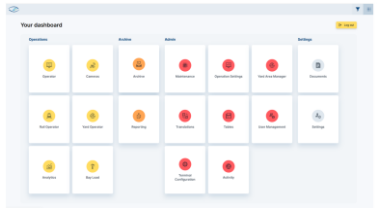
QUAY AUTOMATION

IMPROVING WATERSIDE OPERATIONS FOR A LEANER, GREENER INDUSTRY READY FOR INCREASING TRAFFIC

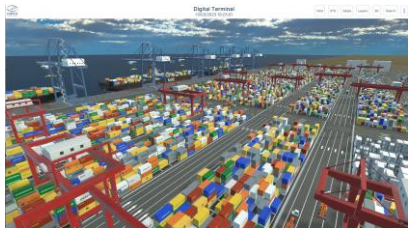
- OCR BOXCATCHER
- TT AND SC IDENTIFICATION AND ALIGNMENT
- BLV BAY LOAD VERIFICATION
- RTLS
- SPREADER CAMERA

CAMCO TECHNOLOGIES

THE BRIDGE
Management by Intelligence



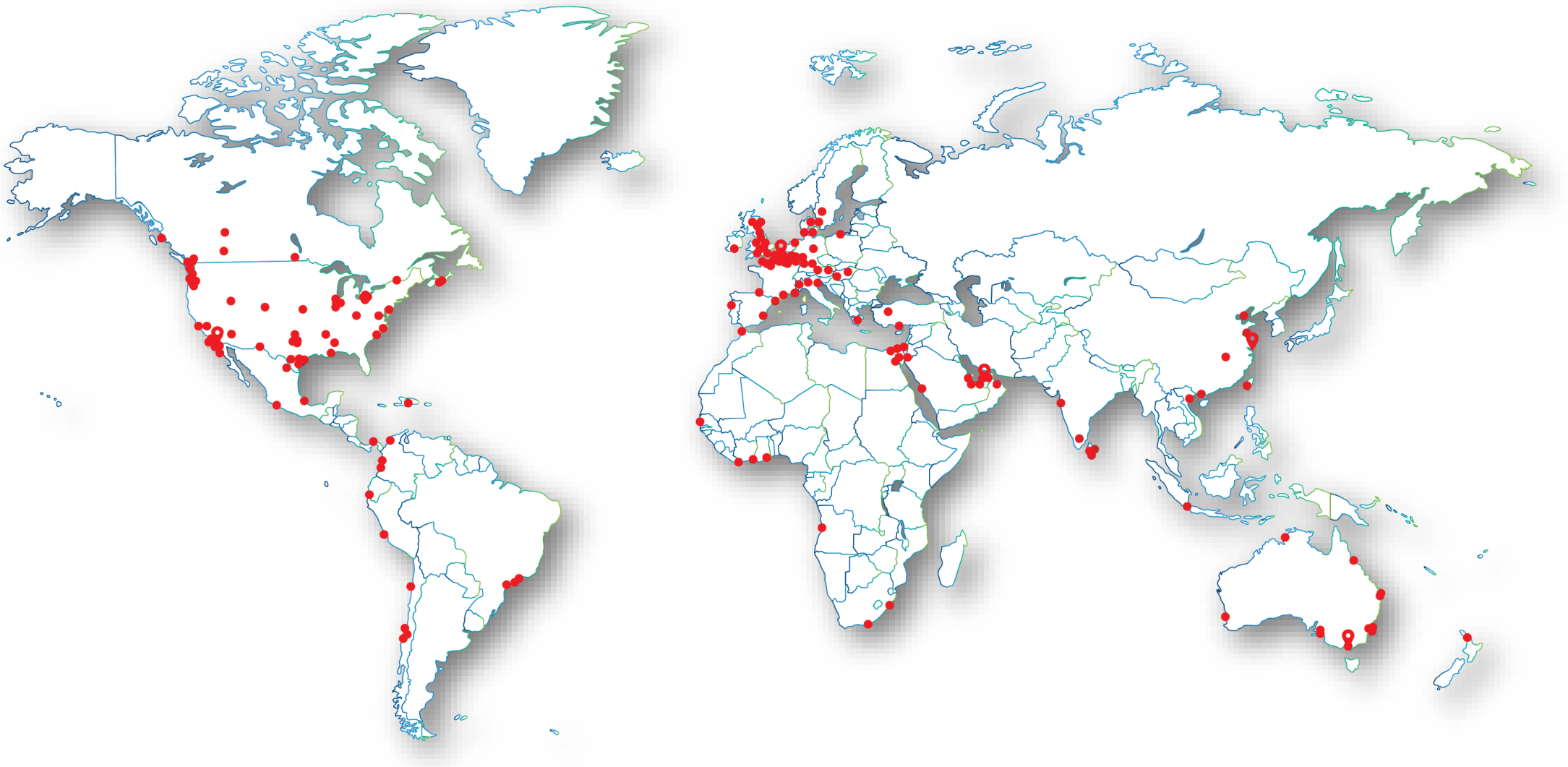
RT DIGITAL TWIN



About Camco

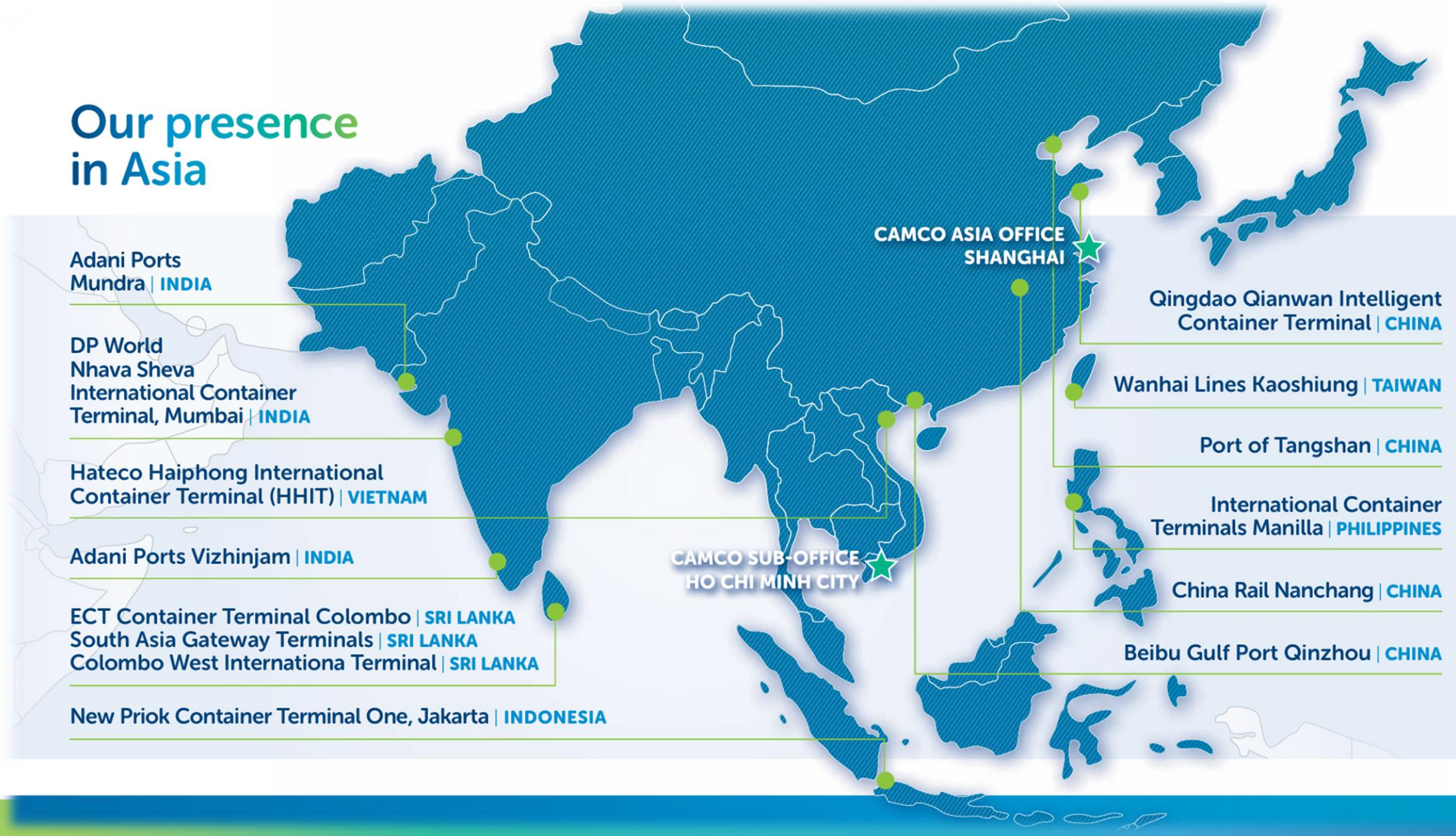
60 Countries

300+ Project Reference



Camco Presence in Asia

Our presence in Asia



Adani Ports
Mundra | INDIA

DP World
Nhava Sheva
International Container
Terminal, Mumbai | INDIA

Hateco Haiphong International
Container Terminal (HHIT) | VIETNAM

Adani Ports Vizhinjam | INDIA

ECT Container Terminal Colombo | SRI LANKA
South Asia Gateway Terminals | SRI LANKA
Colombo West Internationa Terminal | SRI LANKA

New Priok Container Terminal One, Jakarta | INDONESIA

Qingdao Qianwan Intelligent
Container Terminal | CHINA

Wanhai Lines Kaoshiung | TAIWAN

Port of Tangshan | CHINA

International Container
Terminals Manilla | PHILIPPINES

China Rail Nanchang | CHINA

Beibu Gulf Port Qinzhou | CHINA

Flagship projects
Vizhinjam

- Auto Gate system
- BoxCatchers (crane OCR)
- Yard Automation
- RTLS
- Digital Twin
- VBS

CASE STUDY

New maritime gates for India

DEPTH
18–20 METERS, SUITABLE FOR ULCS VESSELS

LOCATION
ONLY 10 NAUTICAL MILES FROM INTERNATIONAL SHIPPING ROUTES

CAPACITY
5 MILLION TEU PER YEAR (AFTER PHASE 3)

INVESTMENT
₹18,000 CRORE (APPROX. €1.98 BILLION)

TEST PHASE
285 VESSELS AND 620,000 TEU HANDLED

FIRST
INDIA'S FIRST TERMINAL WITH A PREDOMINANTLY FEMALE OPERATIONS TEAM

INDIA

THE AREA
Vizhinjam is a coastal area in Thiruvananthapuram, the capital of Kerala. It is the only village in Neyyattinkara Taluk that falls under the Thiruvananthapuram Corporation. Located 16 km south of Trivandrum International Airport, it lies along National Highway 66.

> The new port, located in Thiruvananthapuram, is not only a technological breakthrough but also a symbol of social progress, featuring a team of female operators at the helm of the terminal.

NEW MARITIME GATES FOR INDIA

ON MAY 2, 2025, THE VIZHINJAM INTERNATIONAL DEEPWATER MULTIPURPOSE SEAPORT WAS OFFICIALLY INAUGURATED BY INDIAN PRIME MINISTER NARENDRA MODI, TOGETHER WITH KERALA CHIEF MINISTER PINARAYI VIJAYAN. THE OPENING MARKS A SIGNIFICANT MILESTONE IN INDIA'S AMBITION TO BECOME A MARITIME SUPERPOWER.

Vizhinjam is India's first fully automated deepwater terminal, designed to accommodate the largest container ships in the world. Built through a public-private partnership between the Kerala government and Adani Ports, the port will help India drastically reduce its dependence on foreign ports such as Colombo, Singapore, and Dubai.

Prime Minister Modi emphasized the importance of this development: "Vizhinjam will not only enhance India's maritime capabilities but also contribute to economic growth and create numerous job opportunities." With an annual capacity of 5 million TEU, the terminal will play a crucial role in relieving pressure on existing ports and improving national economic efficiency.

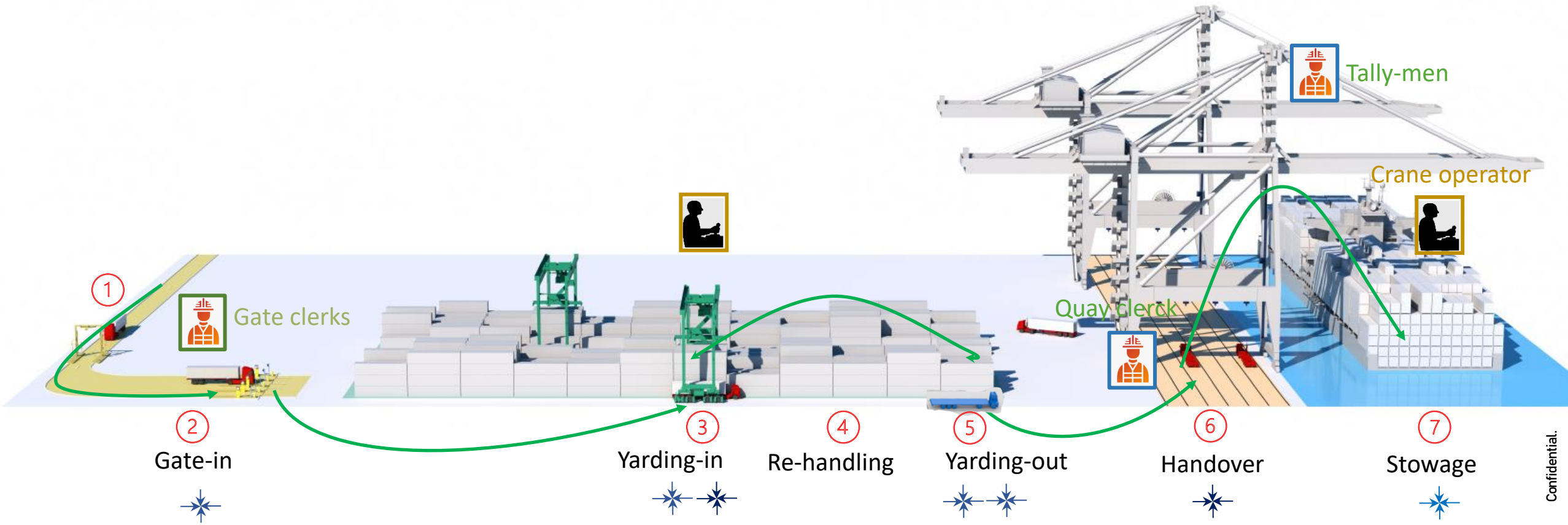
Camco's key role in automation

Camco Technologies delivered a fully integrated automation package for the terminal, seamlessly aligning all processes—from gate access to cranes and yard management. At the gates, OCR and OFR cameras and kiosks ensure smooth and error-free registration of drivers and containers. Camco's BoxCatcher technology was installed on the eight STS cranes for reliable container recognition, day and night. In the yard, a Real Time Location System (RTLS) guarantees precise tracking of containers and equipment, while the Real Time Digital Twin provides a visual overview of all terminal activities. These solutions come together in THE BRIDGE, Camco's unified platform that enables full visibility and control over operations. In short, Camco's technology forms the backbone of the terminal, making Vizhinjam a pioneer in port automation in India. ▶

Transforming terminal operations by digitalizing the human factor

A container move from road to vessel (manual operated)

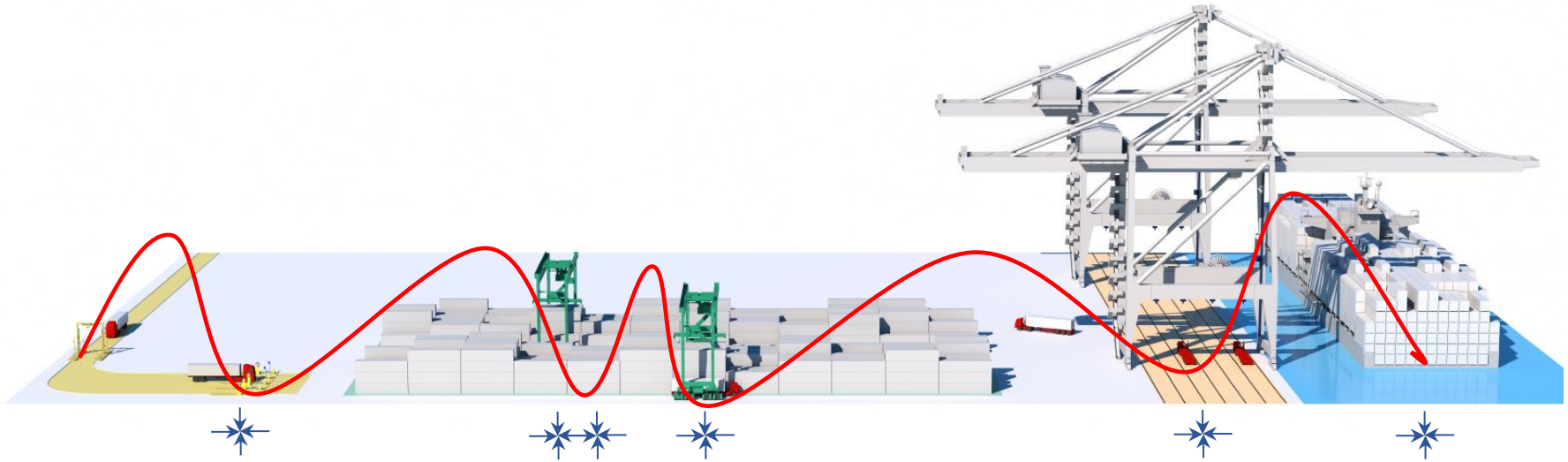
Lets follow a container from road to vessel



5 single moves from road to vessel

A container move from road to vessel

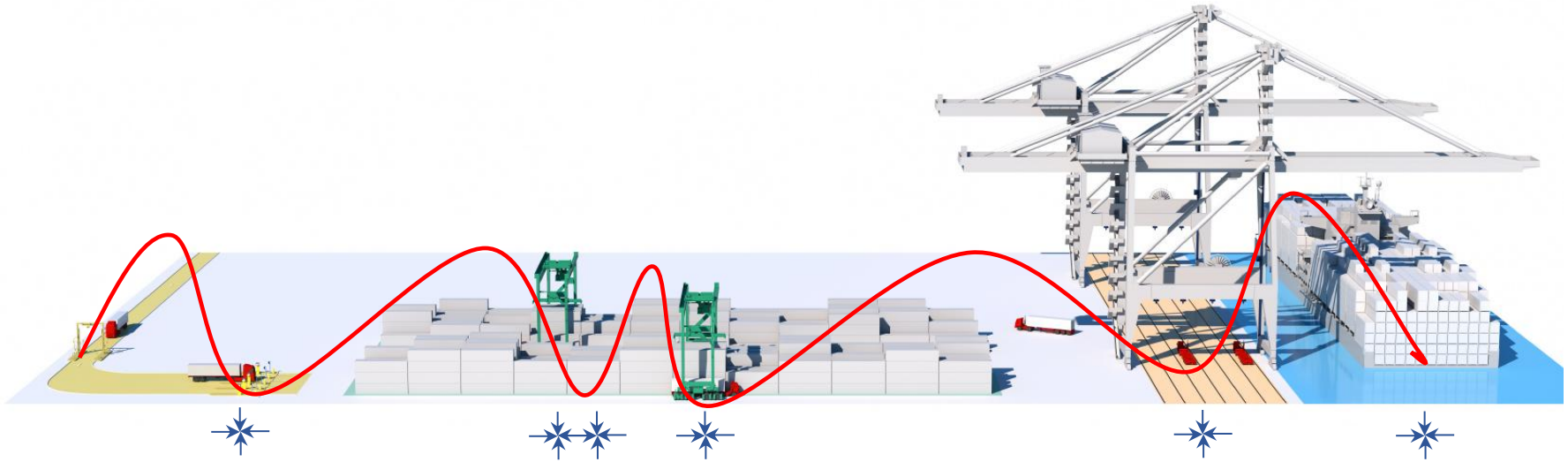
Two essential checks must be completed to validate any container move.



For every single container move, two essential checks must be completed to validate the move

A container move from road to vessel

Two essential checks must be completed to validate any container move.



Is this the right container being pickup up?

Reading container number

Reading via truck-ID (license plate/tag/roof)

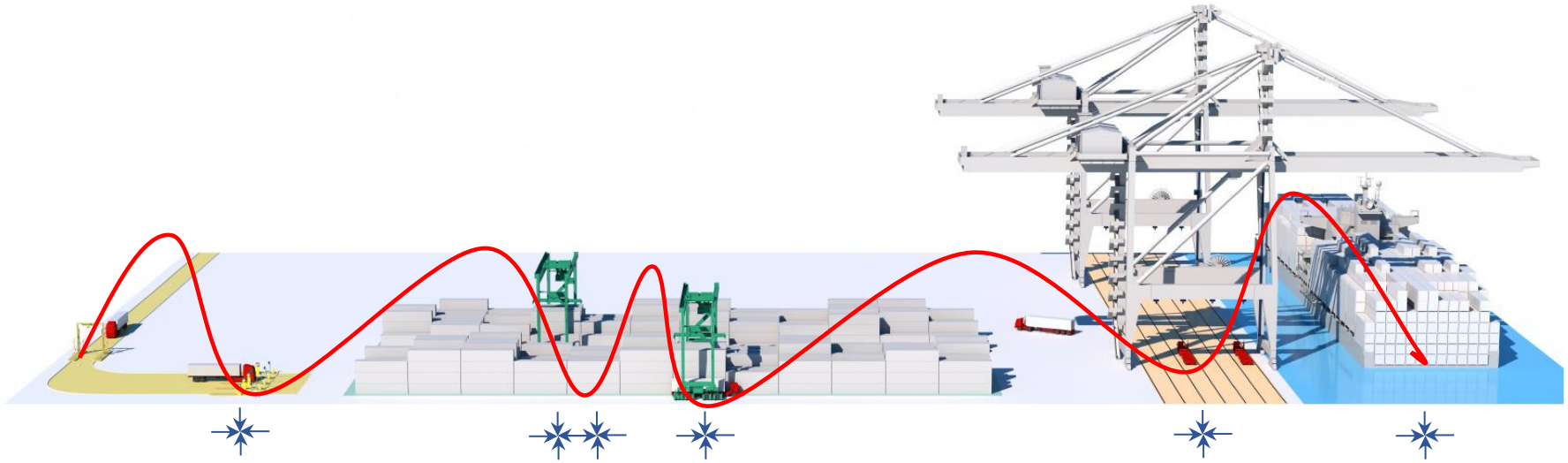
Is this the right pickup or drop location?

Gate (2x20” location), Rail (wagon location)

RTG (Stack locations), STS (lane location)

Vessel (bay/row/tier location)

A container move from road to vessel



The essential checks:

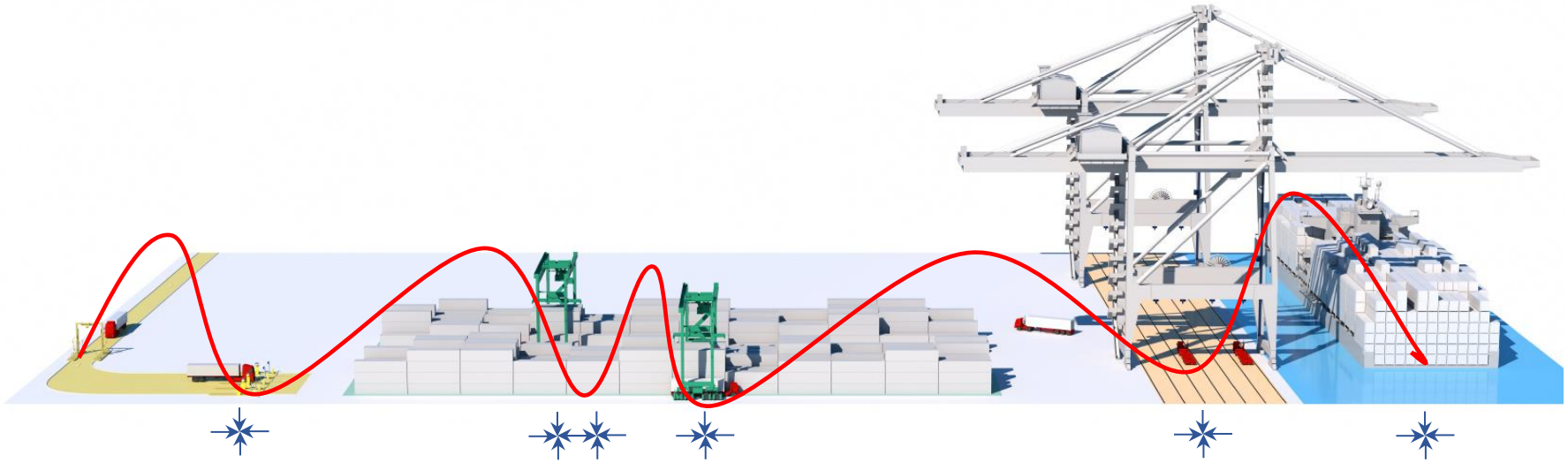
Container ID check

Location check(s)

→ Both are visual!

A container move from road to vessel

Human factor.

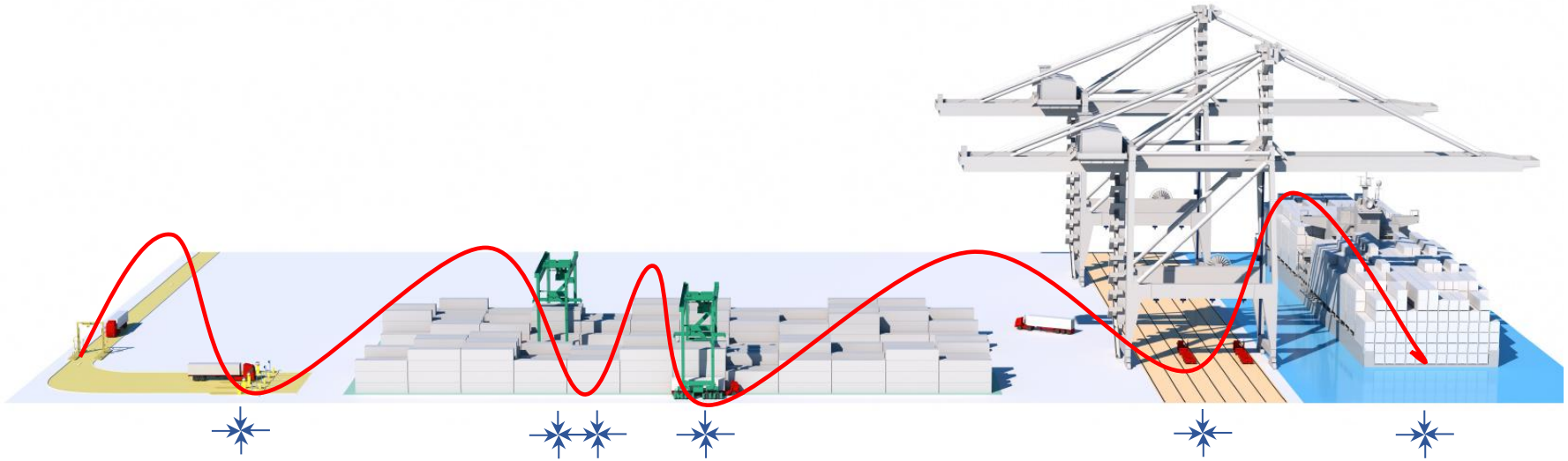


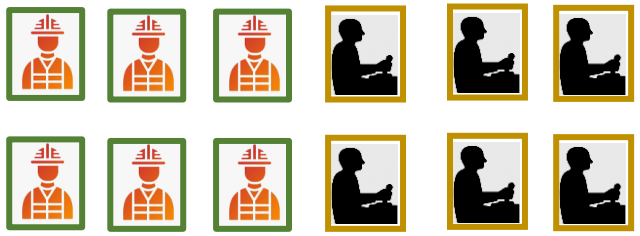
Those container moves are guided by the Terminal Operating System dispatching jobs to clerks and crane operators.

These clerks and crane operators rely solely on visual checks to execute those instructions

A container move from road to vessel (manual operated)

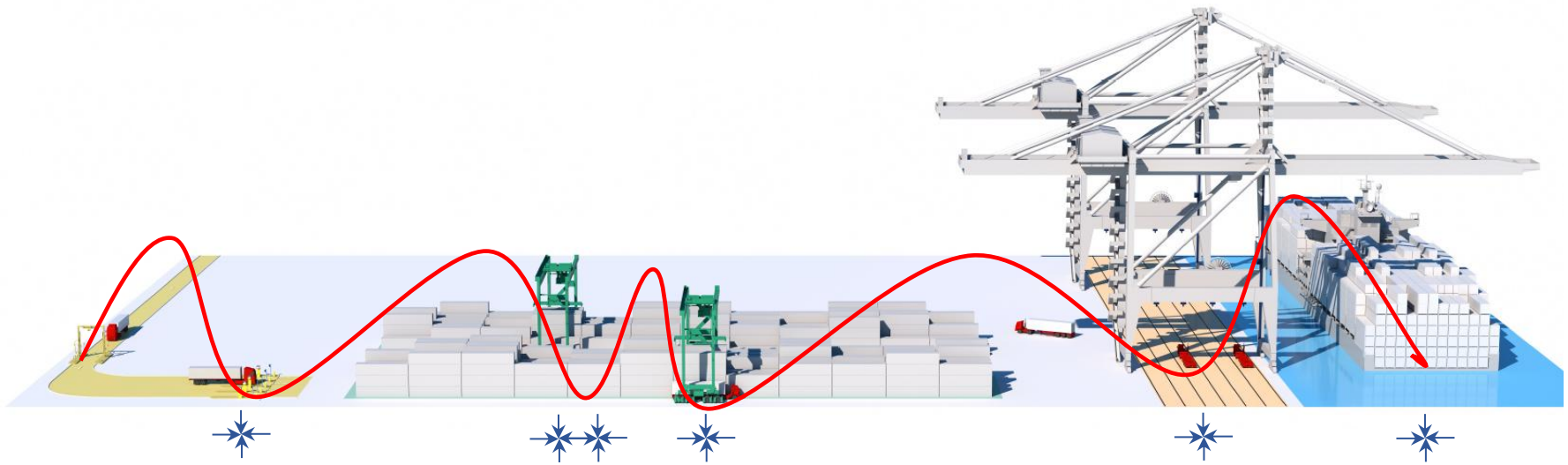
Two essential checks must be completed to validate any container move.





Feedback to TOS is purely depending of a human factor

A container move from road to vessel

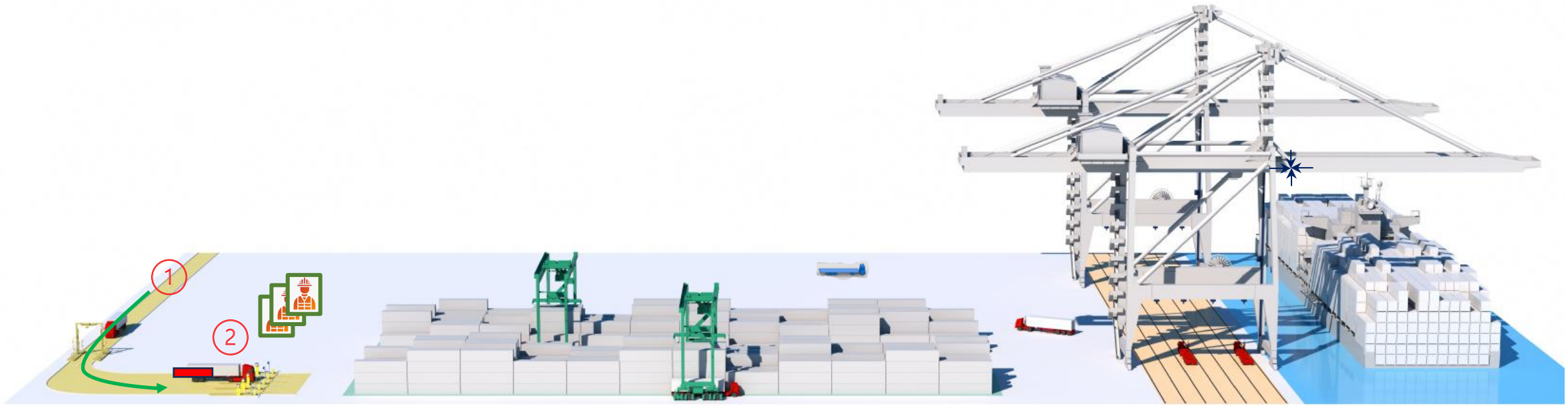


On a manual operated terminal the TOS is blind

Lets count the human factor of a container move from road to vessel traject

A container move from road to vessel (manual)

Checking at the gate

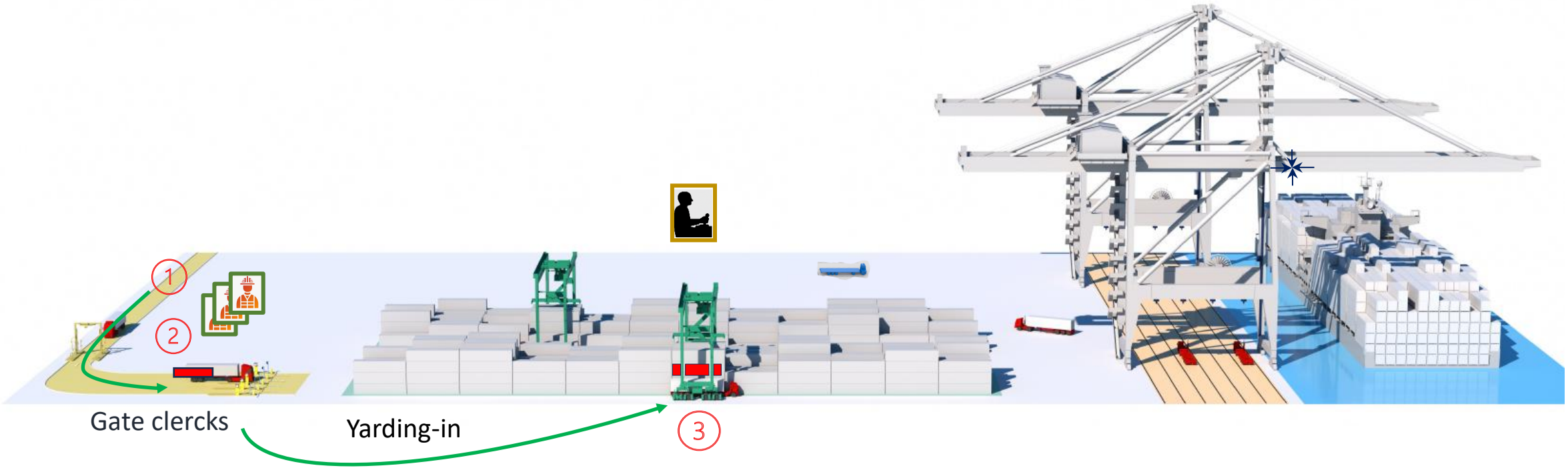


Gate clercks

2	Identification of the container:	1
	Checking drop/pickup location:	1
	Total	2

A container move from road to vessel (manual)

Moving to the yard

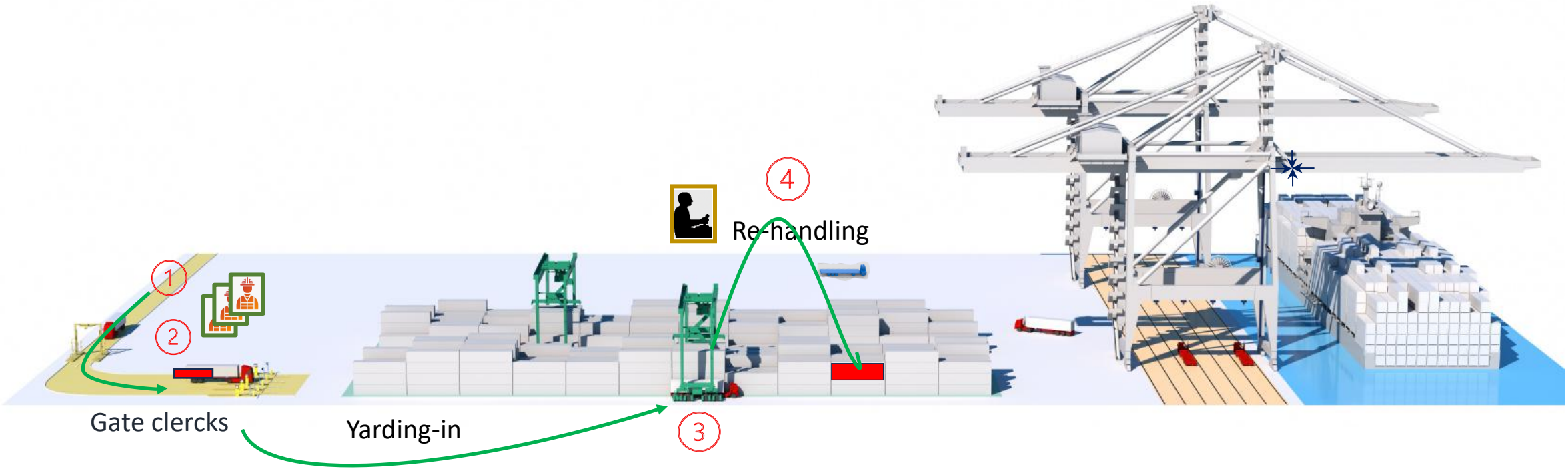


3

Identification of the container:	2
Checking drop/pickup location:	2
Total	4

A container move from road to vessel (manual)

Re-handling in the yard

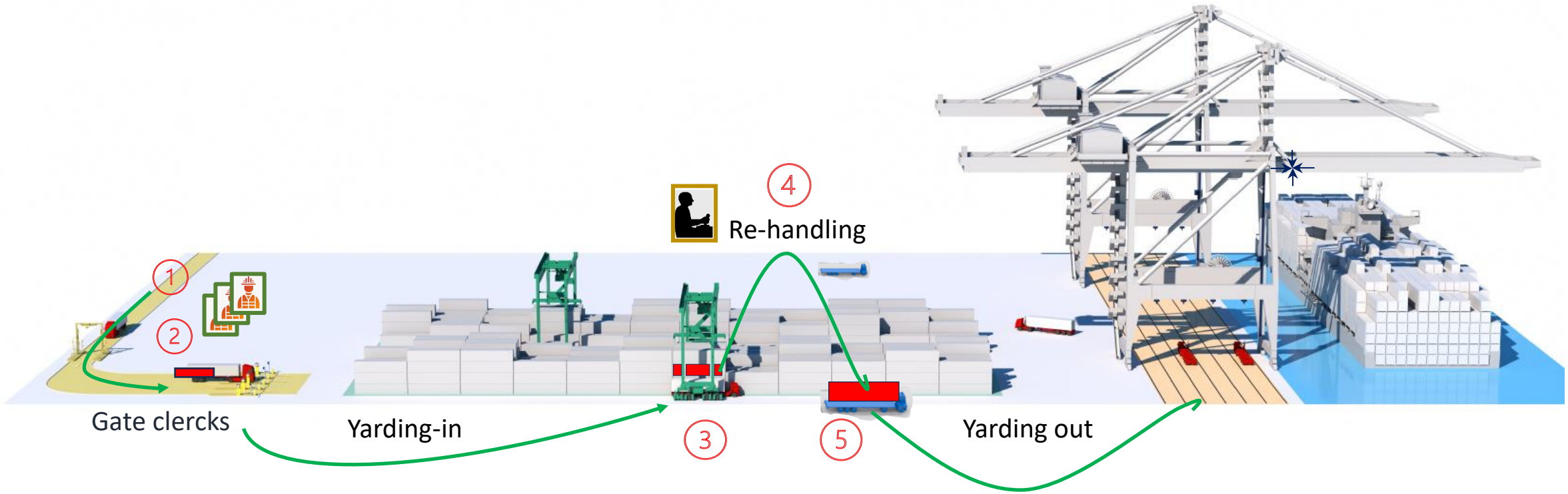


4

Identification of the container:	2
Checking drop/pickup location:	4
Total	6

A container move from road to vessel (manual)

From yard to STS cranes



5

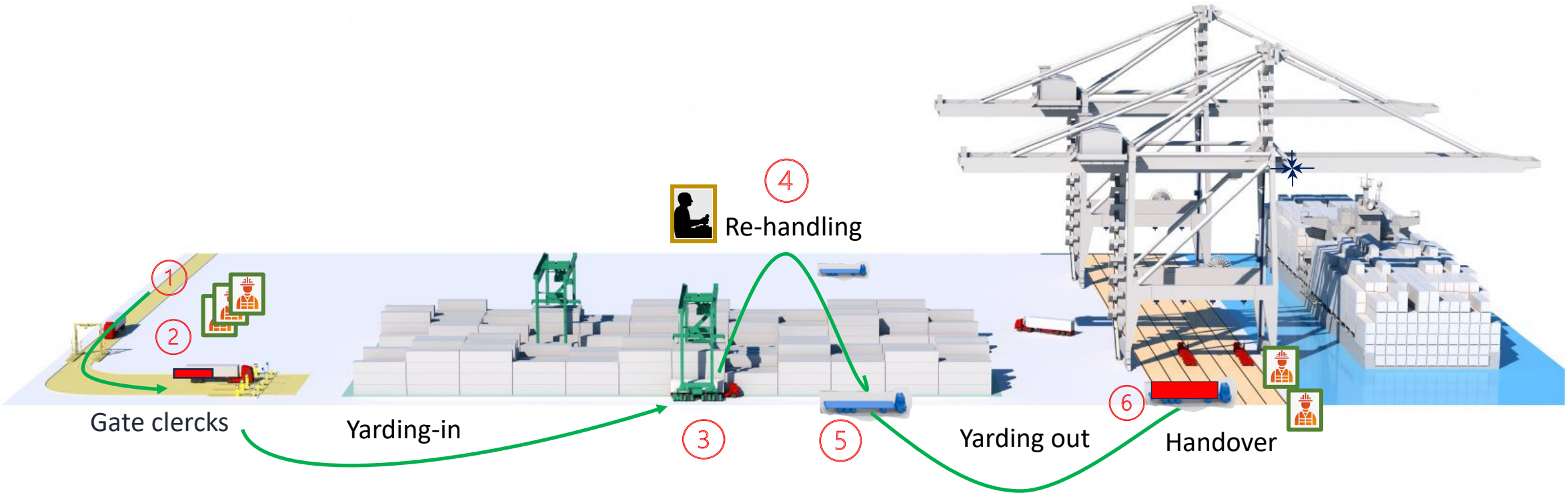
Identification of the container: 3

Checking drop/pickup location: 5

Total 8

A container move from road to vessel (manual)

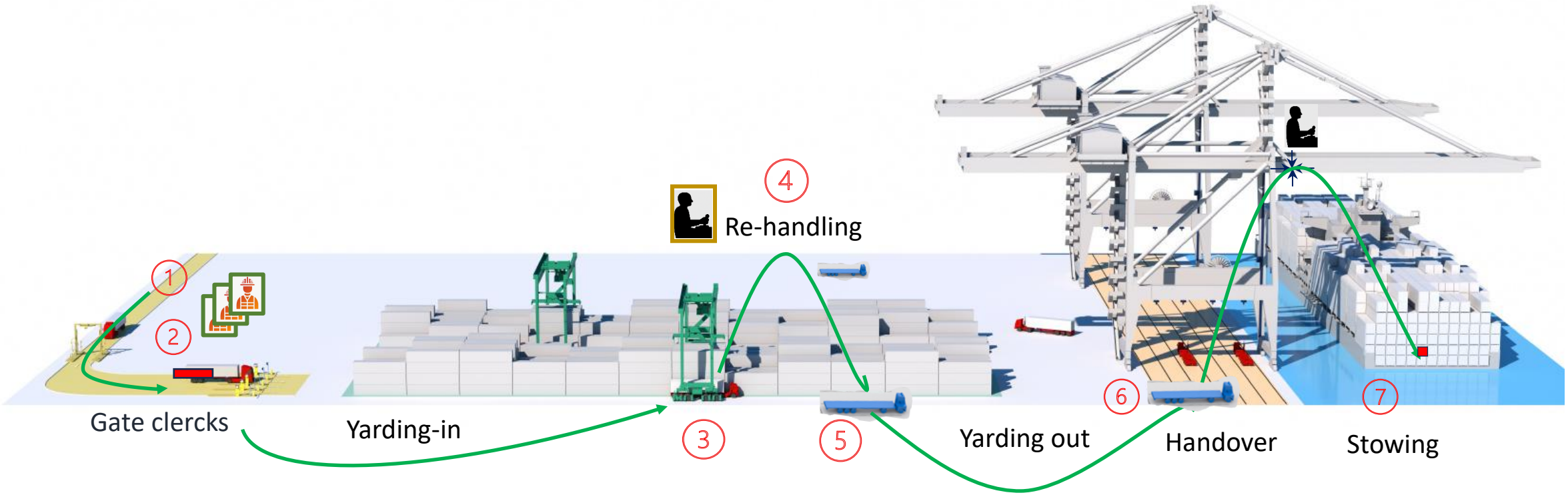
Locating under the crane



6	**Identification of the container:**	4
	Checking drop/pickup location:	6
	Total	10

A container move from road to vessel (manual)

Storing in bay/row/tier location

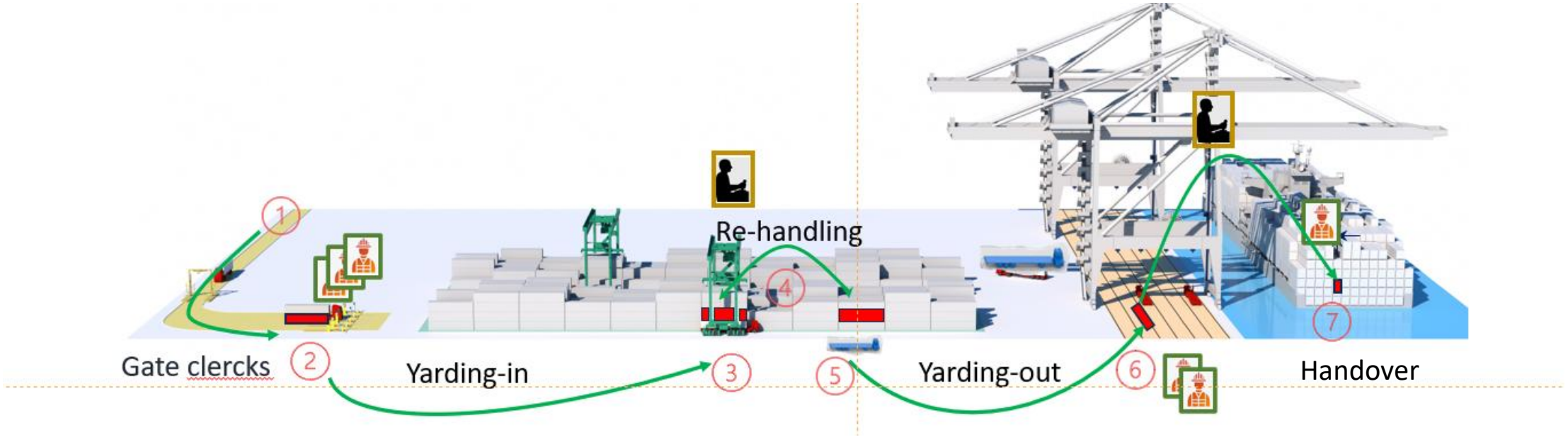


7

Identification of the container:	4
Checking drop/pickup location:	7
Total	11

A container move from road to vessel (manual)

TECH-DRIVEN INTEGRATED LOGISTICS

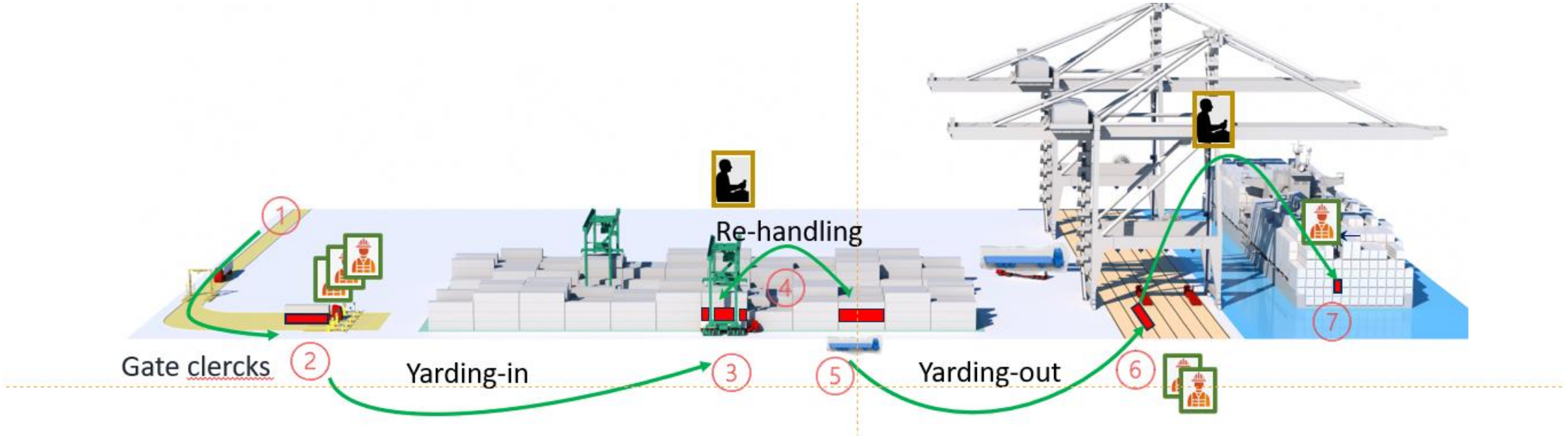


Conclusion: to move a container from road to vessel at least

4 container/truck identification checks should be done
7 Location checks

In total 11 visual checks by human interaction

A container move from road to vessel
conclusion



If one single visual check has a probability on an mistake of 0,01% (1 on 10.000)

For a complete move, road to vessel, 11 checks, it will be 0,1% (1 on 1000)

By digitalization we can reduce the mistakes to 0%

A container move from road to vessel (future)

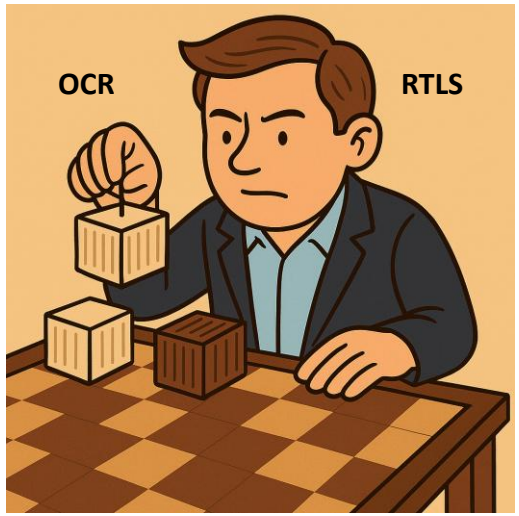
TECH-DRIVEN INTEGRATED LOGISTICS

Today

Mr TOS

Future

Mr TOS

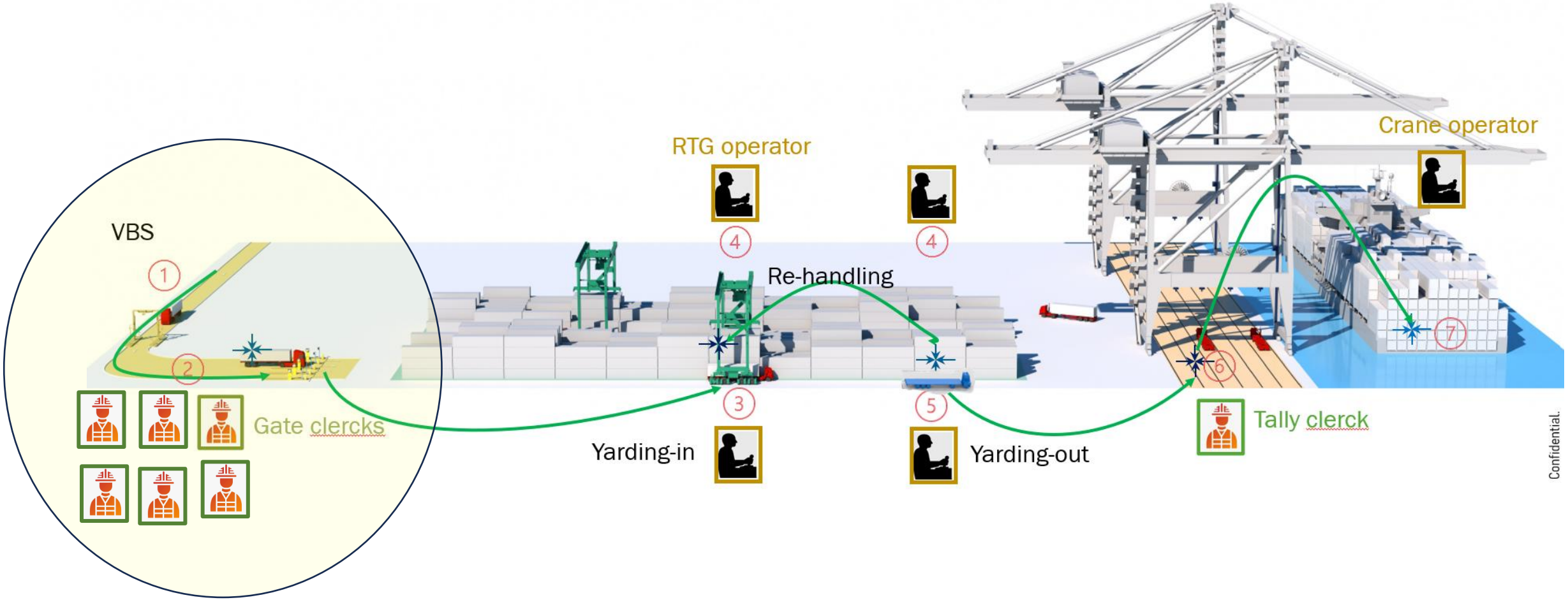


Container ID check → OCR and RFID

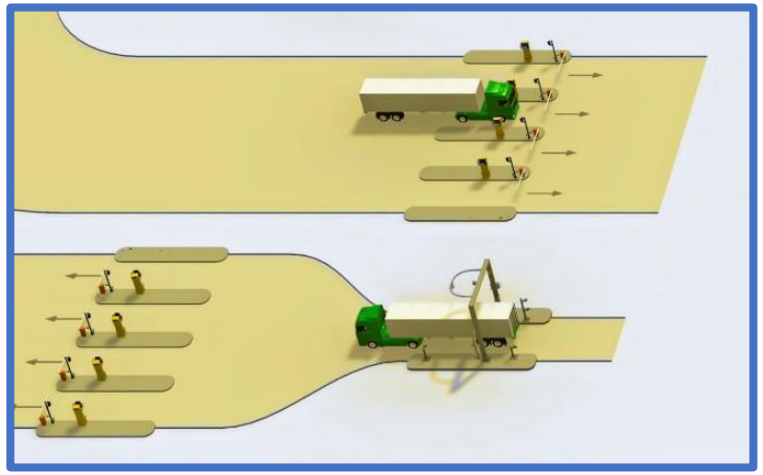
Location check(s) → RTLS, RFID, UWB

A container move from road to vessel (future)

Gate automation



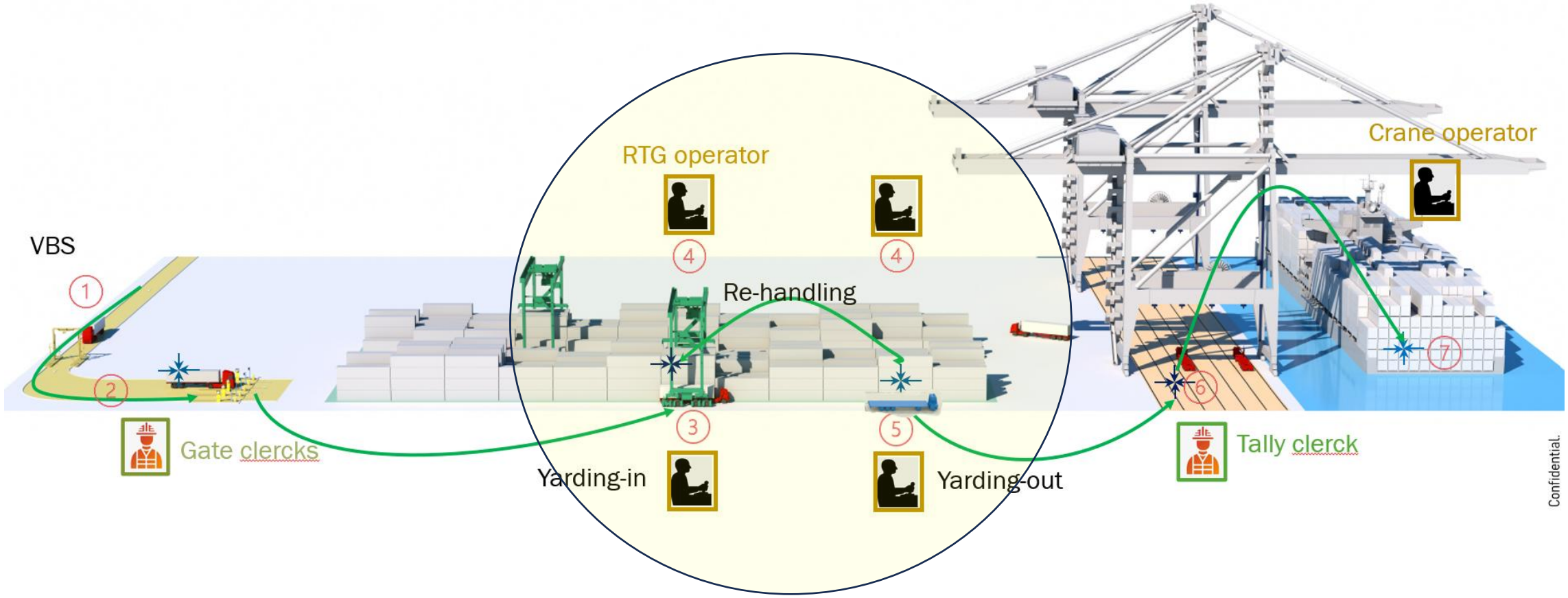
Handover in gates : future gate automation



Actions	Today (manual)	Digitised
Vehicle booking (VBS)	none	VBS+OCR portal
Identifying container numbers +ISO code	Manual/visual (gate clerks with HH)	unmanned by OCR camera portal
IMDG Labels/seal presence/door direction/damage check	Manual/visual (gate clerks with HH)	unmanned by OCR camera portal
Booking number, driver identification, security	Manual/visual (gate clerks with HH)	unmanned by Kiosks
Visual prove of move	Static, CCTV?	Fully digitilzed
Gate clerks/exception clerks	Up to 30 (3 shifts of 10)	1 x Remote operator

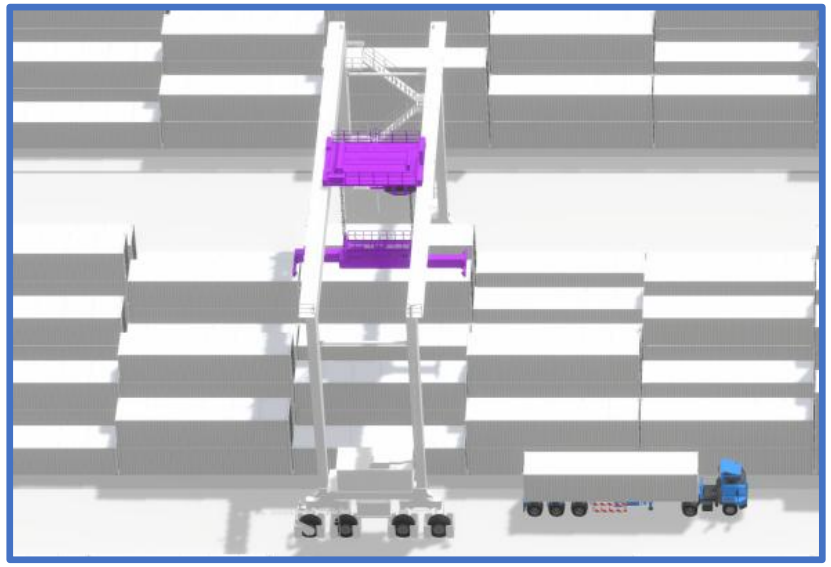
A container move from road to vessel (future)

Yard Automation



A container move from road to vessel (future)

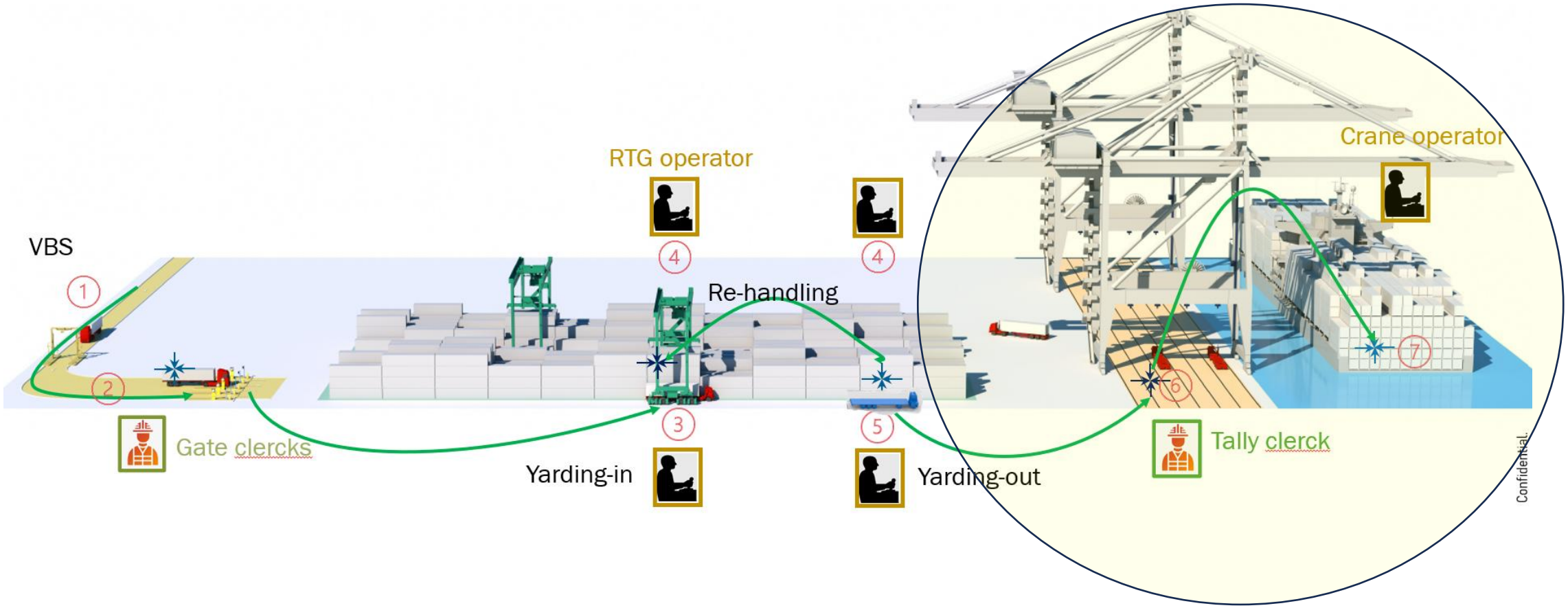
Yard Automation



Actions	Today (manual)	Digitised
Identifying container numbers *While doing stack operations as Chassis/stack, stack chassis, and stack/stack moves*	**Manual, visual check by RTG Operator** *Reads container roof number OR truck number (BAT)* *BAT truck nmbr is linked to container nmbr in the gates or under the STS crane* *BAT is roof nmbr of truck or page hold by truck driver or RFID tag waving by driver*	**Automated by RFID Tag** *RFID of internal and external truck is read by RFID readers on the RTG crane* *RFID nmbr is linked to container nmbr in the gates or under the STS crane* *The handover is automated*
Identifying pick/drop locations *Checking row/bay/tier when doing stack operations as chassis drop/pickup or shift a container in the stack*	**Manual by visual check by RTG Operator** *VMT shows bay/tier* *Row is based on slot numbering*	**Automated by GNSS + PLC data** ***Row** is detected by GNSS receiver (RTG GPS location)* ***Bay/tier** by PLC connection of RTG crane*

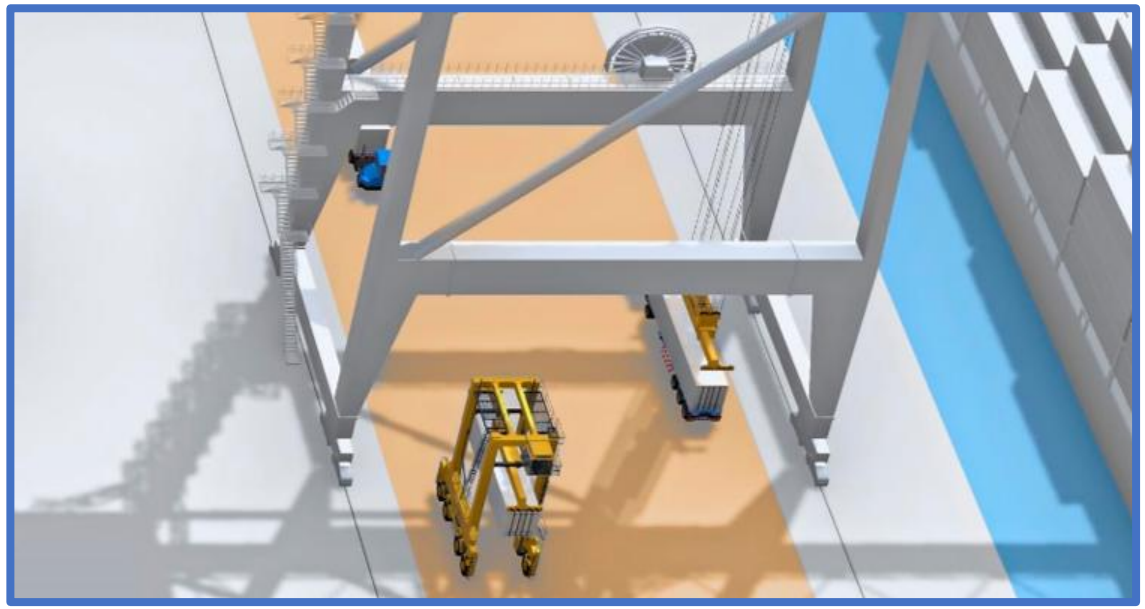
A container move from road to vessel (future)

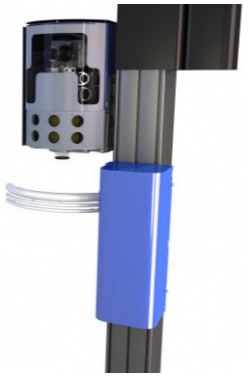
Crane Automation

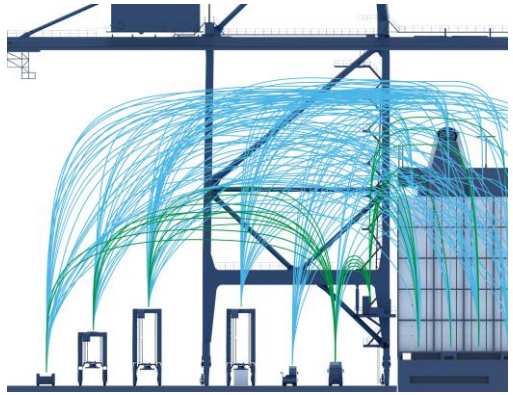


A container move from road to vessel (future)

Crane Automation

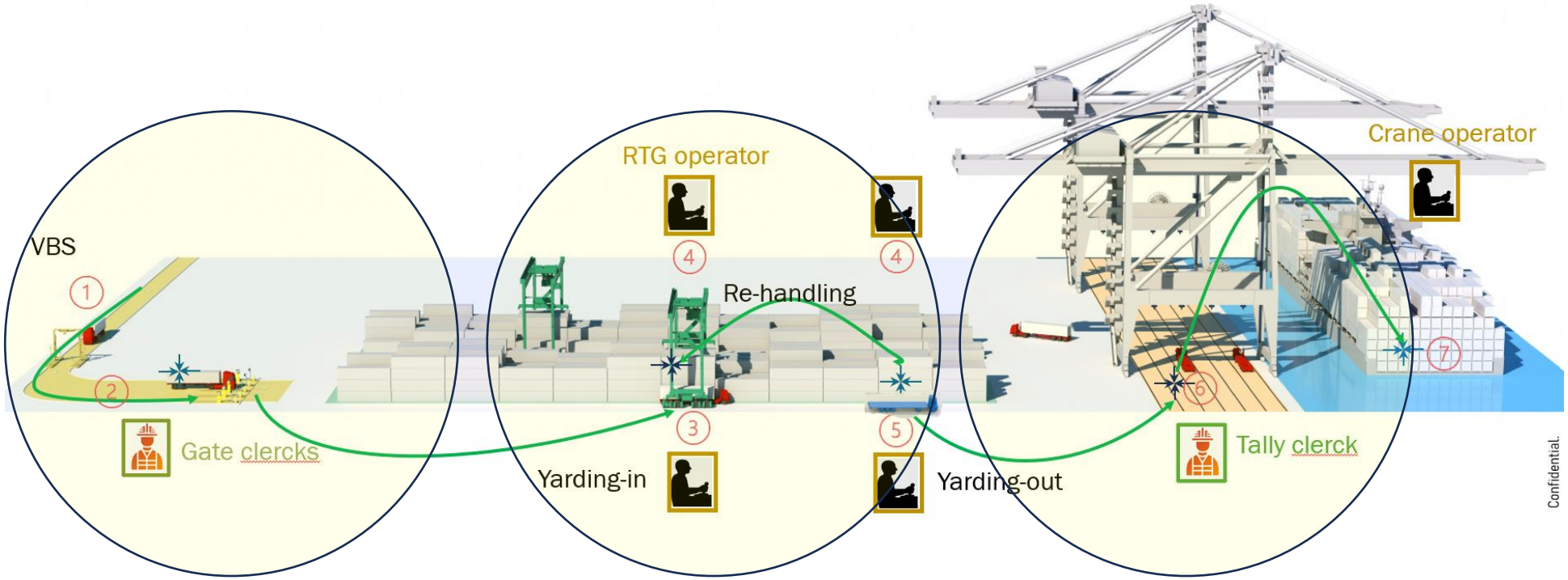




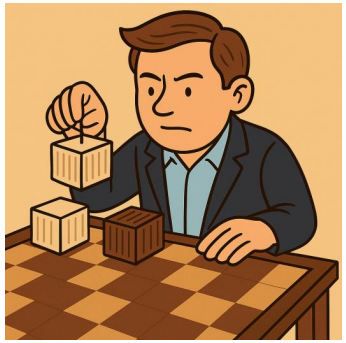


Actions	Today	Digitised
Truck/container marriage *Match between container and chassis (terminal truck)*	**Manual by tally clerck** *Tally clerk checks container number, Truck ID and lane*	**Automated** *Truck roofnumber (+ lane) +* *Crane OCR (container nmbr)*
Container information *IMDG Labels/seal presence/door direction/damage*	**Manual** *by tally clerk*	**Automated** *Crane OCR system*
Vessel loading *Position in Vessel*	**Manual** *by crane operator or tally clerk*	**Automated**
Tally clerks/exception clercks	>2 STS crane	1 x remote clerk

From manual black box operations to fully digitised terminal

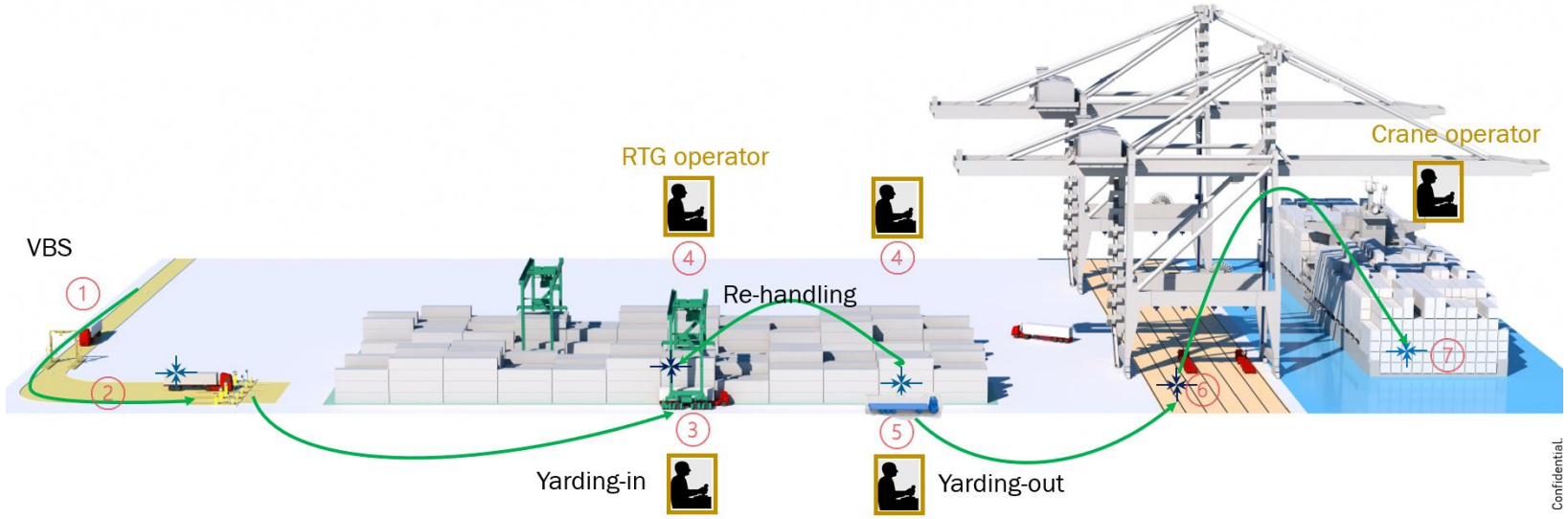


Gate automation | Yard automation | Crane automation



- Digitalisation brings high visibility on the terminal processes
- Gate/yard/crane automation generates visual, location and timestamp data by move
- Makes TOS 100% copy of physical situation on the yard/vessel/train
- Higher efficiencies
- Less clerks on the yard, higher safety

From manual black box operations to a fully digitised terminal



Enhancing productivity and maximizing efficiency

Automated checking reduces truck, train and vessel turnaround time. Faster and more accurate checking means better use of the infrastructure, leading to shorter visits increasing throughput and capacity.

Removing human mistakes and frauds

Providing man less access control at perimeters and validation of asset ID to eliminate the human element so common in theft, pilferage and other criminal activities.

Increase operational control

Providing real-time visibility of an asset and its location to enable process automation and control.

Increasing safety

Ensuring the safety of personnel and equipment, typically within a facility environment.

Reduce costs

By digitalization and automation of the operation process, one can save on operational costs. Some experts project operational cost savings up to 55% with automation.

Enhance Sustainability

Offset Carbon emissions > 10% or more

We automate, you operate.

Thank you!