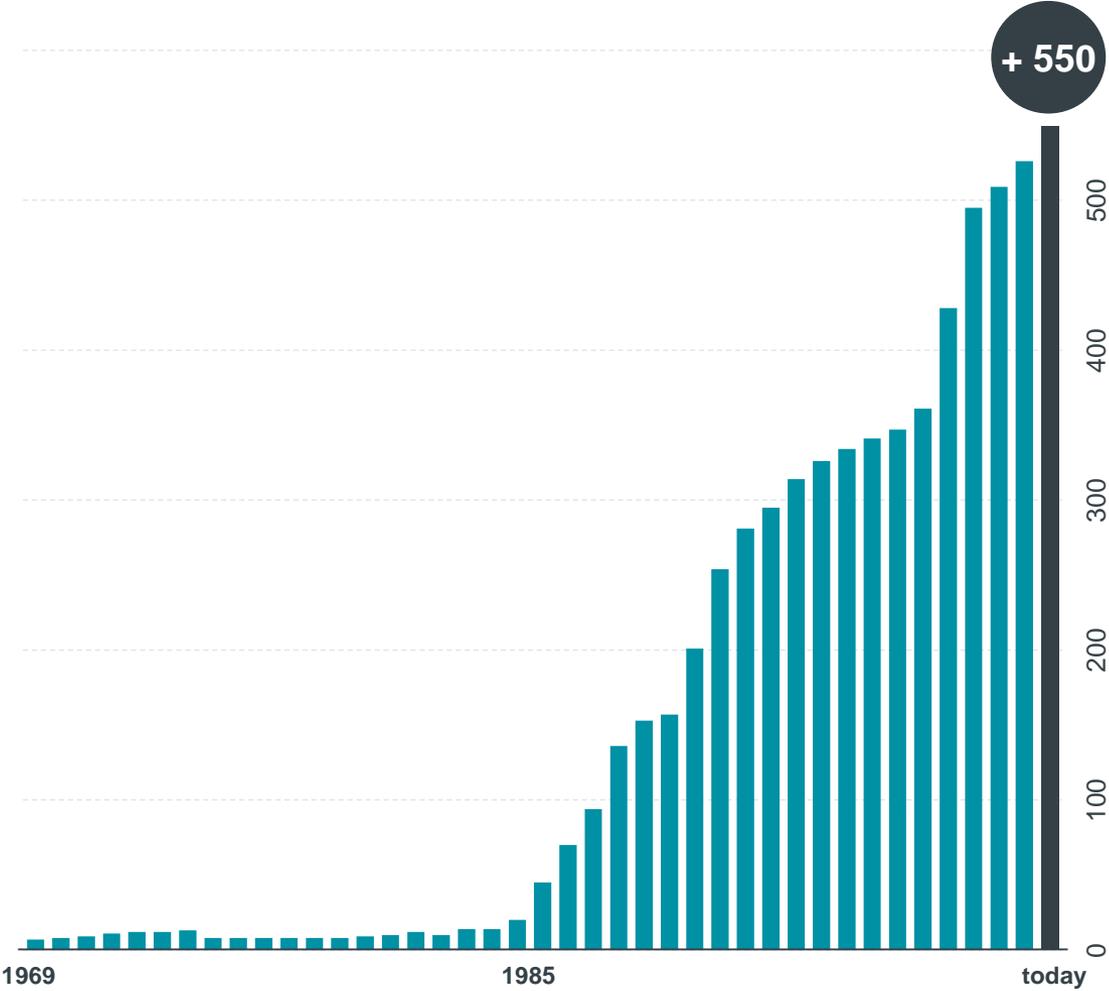


# Agile Optimization in Inland Terminals

**Dr. Ingo Marko**  
Senior Consultant | Logistics Division

# Facts and Figures



- established in 1969
- organically growing, no external investors
- since 1985 always profitable
- internal ownership (directors, staff)
- today more than 500 employees
- principal corporate objective: long-term sustainability

# Business Divisions

## General Logistics



- Truck Fleet Dispatch
- Distribution & Parcel Centers
- Container Logistics
- Mobile Asset Logistics

## Manufacturing Logistics



- In-plant Materials Handling
- Supply / Inbound Scheduling
- Automotive Logistics
- Healthcare Logistic

## Aviation Logistics



- Airport Ground Handling
- Airline Hub Operations

## Inventory & Supply Chain



- Inventory Optimization
- Advanced Demand Planning
- Sample Inventory Counting

## Production Scheduling



- Production Scheduling (APS)
- Intelligent Capacity Planning

## Risk & Fraud



- Fraud Prevention
- Banking Sector
- Insurance Sector
- Telecoms

# Selected Customer References

A world map is centered on the slide, with the text "> 1,000" overlaid in the middle. Surrounding the map are numerous logos of customer references, including:

- Top Row:** BDF Beiersdorf, Continental, BOSCH, AIRFRANCE, Fraport, BRITISH AIRWAYS, ThyssenKrupp Steel, FUCHS, HHLA.
- Second Row:** Linde, ICO, DILLINGER HÜTTE, Emirates, APM TERMINALS, ALSTOM.
- Third Row:** FINNAIR, Shell, bud Budapest Airport, Molteno, DAIMLER.
- Fourth Row:** FROSTA, AIR CANADA, SIEMENS, IPC, MERCK, H&R.
- Fifth Row:** MAN, AXA, ANDRITZ, CLAAS, VATTENFALL.
- Sixth Row:** HEIDELBERG, MTU Aero Engines, Audi, CARGOBULL PARTS & SERVICES, QVC.
- Seventh Row:** Henkel, BMW Group, interseroh, AIR NEW ZEALAND, Hermes, Alliance 友盟, Prague Airport, KLM, LIEBHERR.
- Bottom Row:** MEYER WERFT, Leica, TURKISH AIRLINES, SAS, Lufthansa, LAFARGE, VW VOLKSWAGEN, Hanson, SWISS POST.

# INFORM – Core Competence

INFORM specializes in agile optimization based on Operations Research and Fuzzy Logic.

## Agile Optimization

→ inspiring action

## BI / Analytics

→ creating knowledge

## Administrative IT (e.g. ERP-Systems)

→ managing data





# Global Data Volume by 2020



**44 ZB**

44 800 000 000 000 000 000 000



**350 000 000 000**

128 GB



# The Challenge

How to hear  
the signal  
from the noise



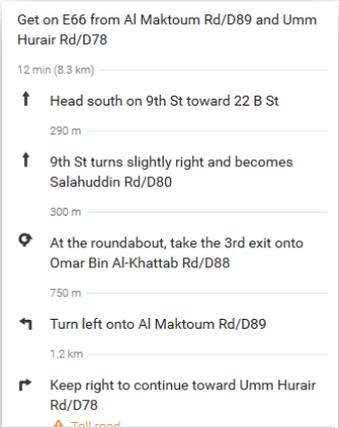
# From Big Data to Agile Decisions



Big Data



Information



Knowledge



Decision Support



Agile Optimization

# Agile Optimization Software

---

## Applying **smart** optimization technologies

- Mathematical algorithms / OR, Fuzzy Logic
- Application specific best-of-breed solutions

## Delivering **rapid** results

- Very short runtimes
- Quickly adaptable to new / unexpected external factors

## Plus **interactive** user experience

- Easy parameter setting & results visualization
- Users may overrule proposals at any time

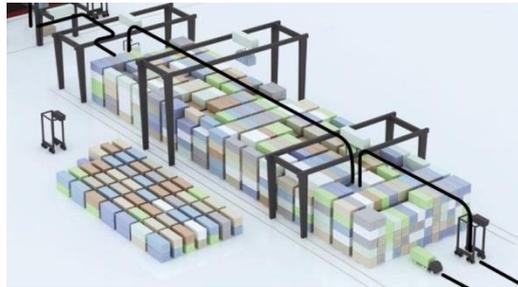
Supplementing existing IT systems (ERP, etc.)  
for better productivity & **operational resilience**

# Operations Research (OR)

Powered by algorithms, there are many techniques for greatly speeding up the search for good solutions

## Yard

- Slot suitability
- Slot restrictions
- Retrieval distance
- Operational areas

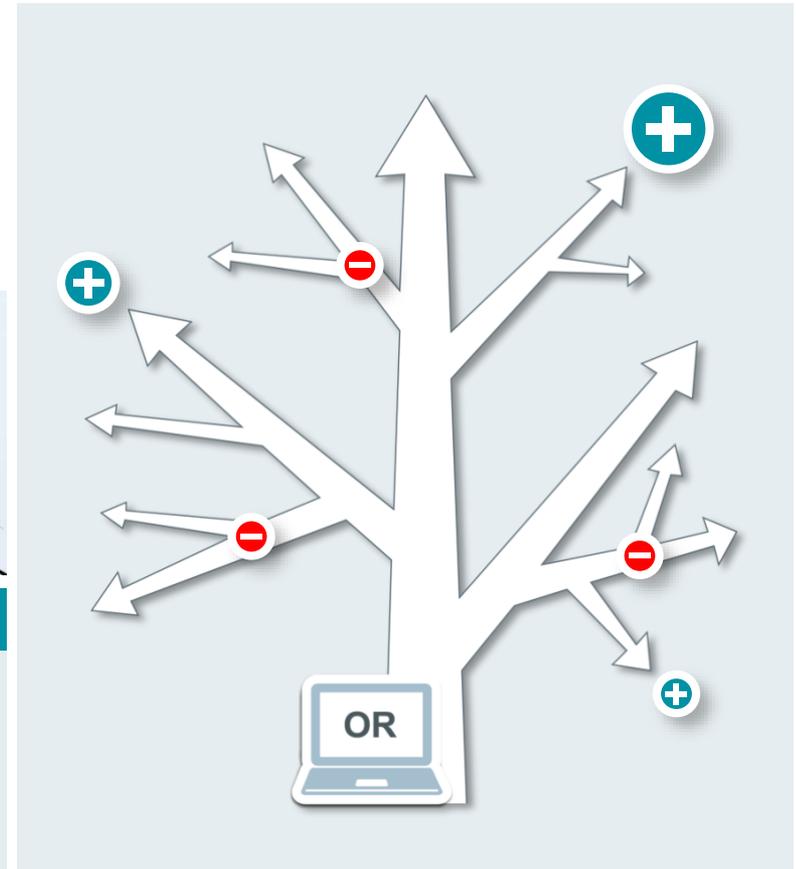


## Equipment

- Last/current position
- Job suitability
- Availability/time windows
- Driving times/distances

## Load Unit

- Size, type, content, restrictions
- Departure time & destination



# Algorithms: A Powerful Tool



## Progress

1990 vs. 2010



55.000 x



1.200 x

---

$\Sigma$  66.000.000 x

### Time to solve a planning model\*

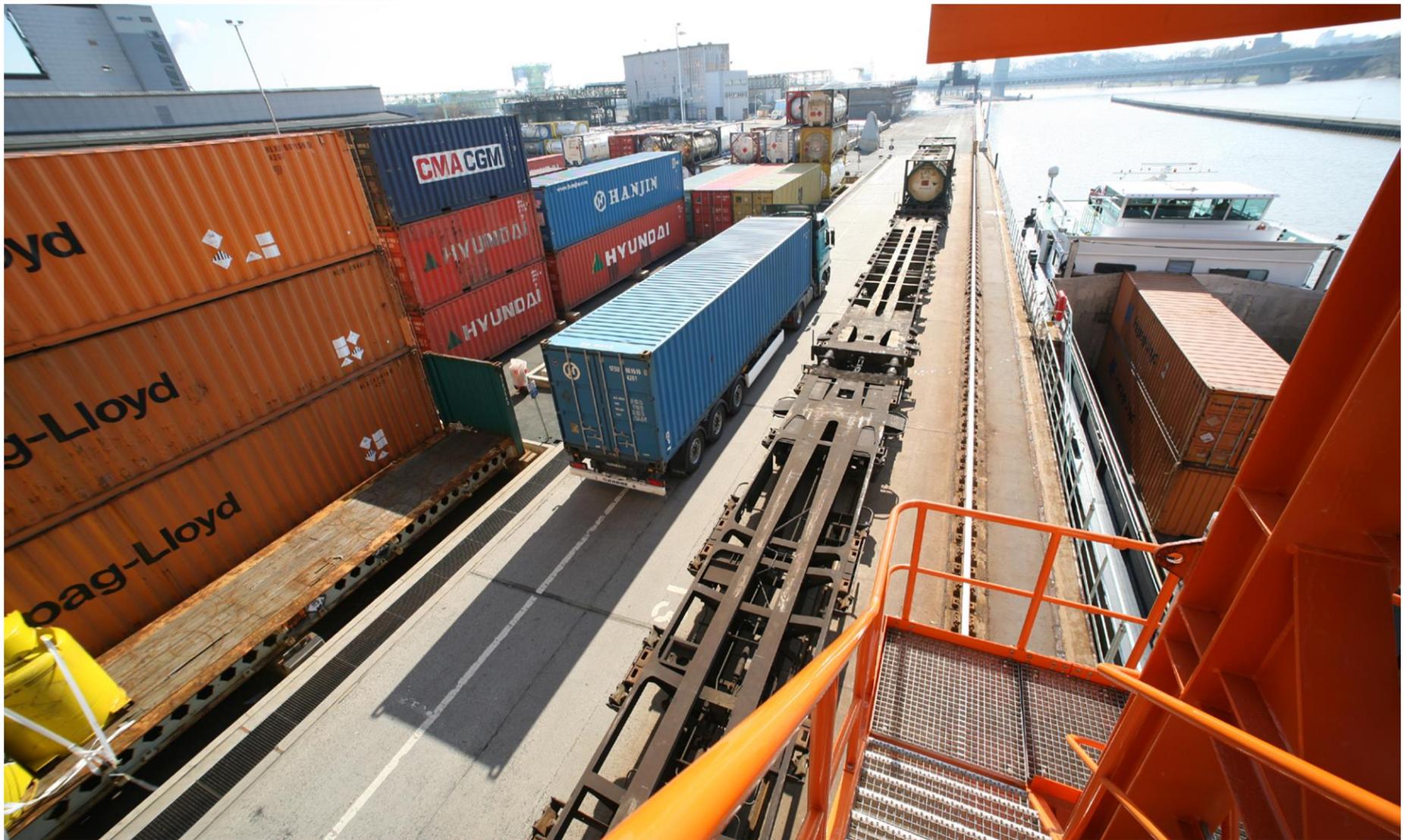
1990  
2 Years



2010  
1 Sec.

\*using linear programming

# The Daily Challenge



# The Daily “Ironman” Challenge



# Battle of Materiel

Head up display



Integrated lactate measurement



Electronic shifting system

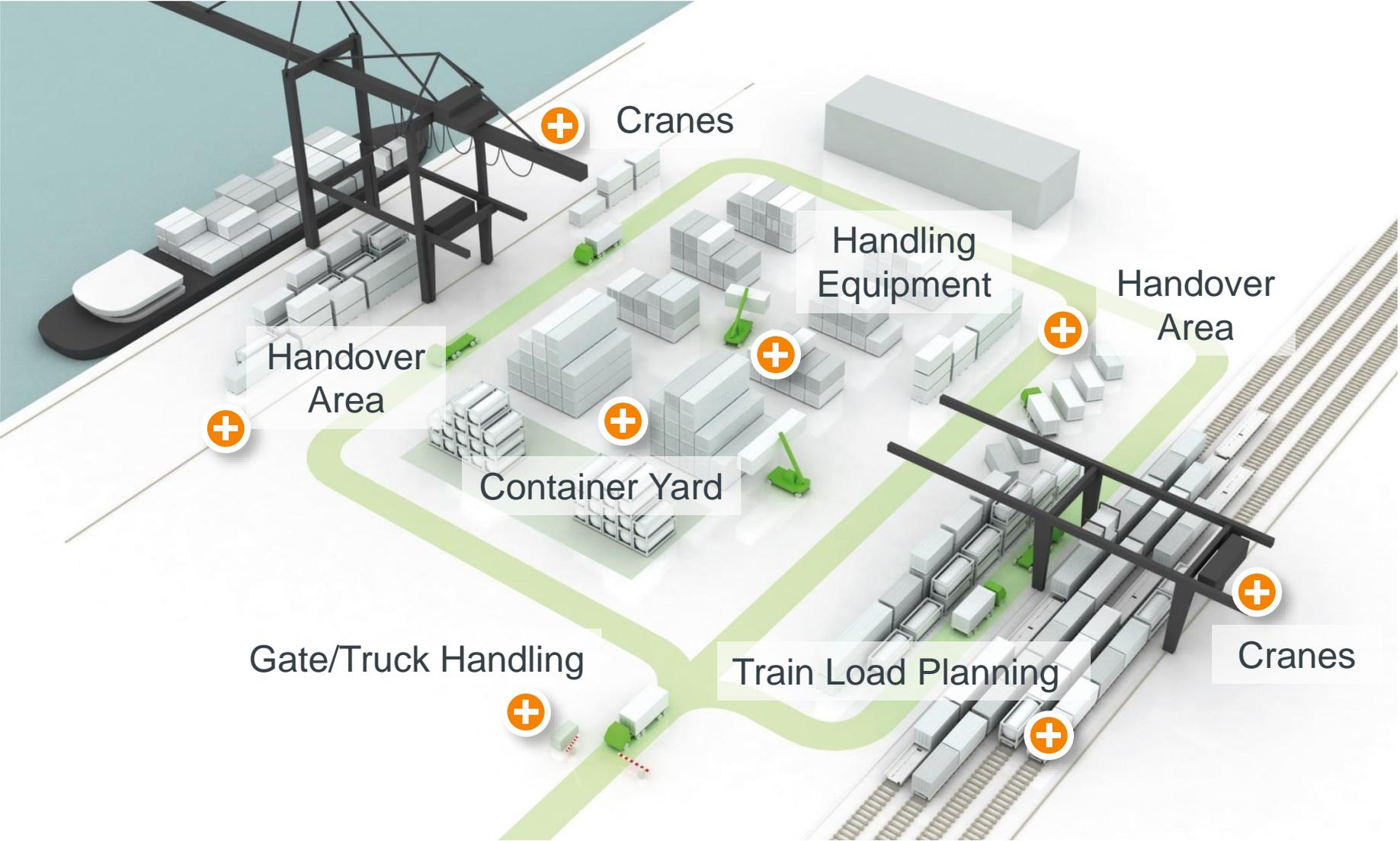


„On course“ goggles

Power meter



# Potential for Digital Doping



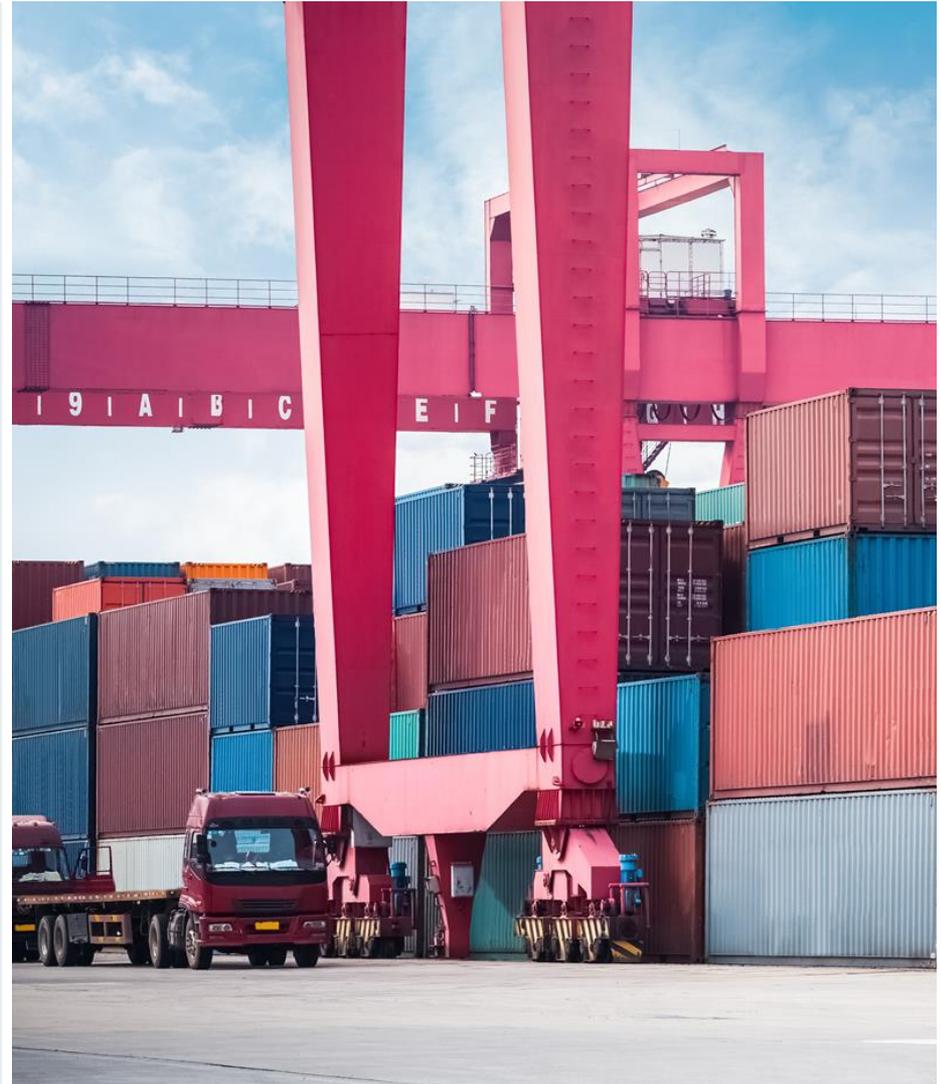
# 6 Steps to Achieve Optimized Terminal-Fitness



# Step 1: Truck Scheduler

## Reduced Turnaround Times

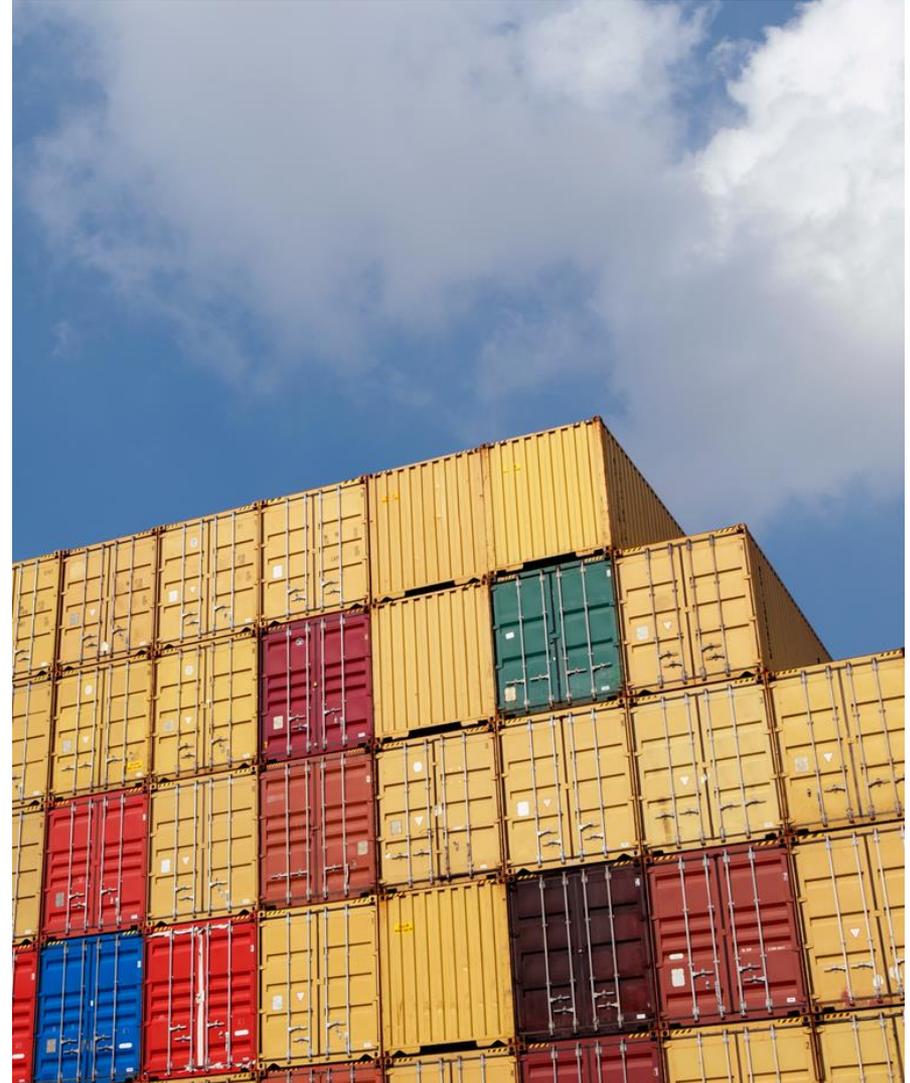
- Optimized selection and sequence of transfer points
- Consideration of potential congestions along its route
- The integration of gate automation technology is also possible (OCR-Gate)
- Standardized gate processes provide yard managers with the necessary information in real-time



# Step 2: Yard Optimizer

## Tap the Full Potential

- Efficient utilization of storage areas
- Higher stacking possible
- Minimized re-handlers & distances
- Scattered stacking terminal wide or within target areas
- Real-time knowledge of all containers in the yard
- Swift decision making when container arrives or needs re-handling



# Step 3: Vehicle Optimizer

## Minimized Driving Distances and Times

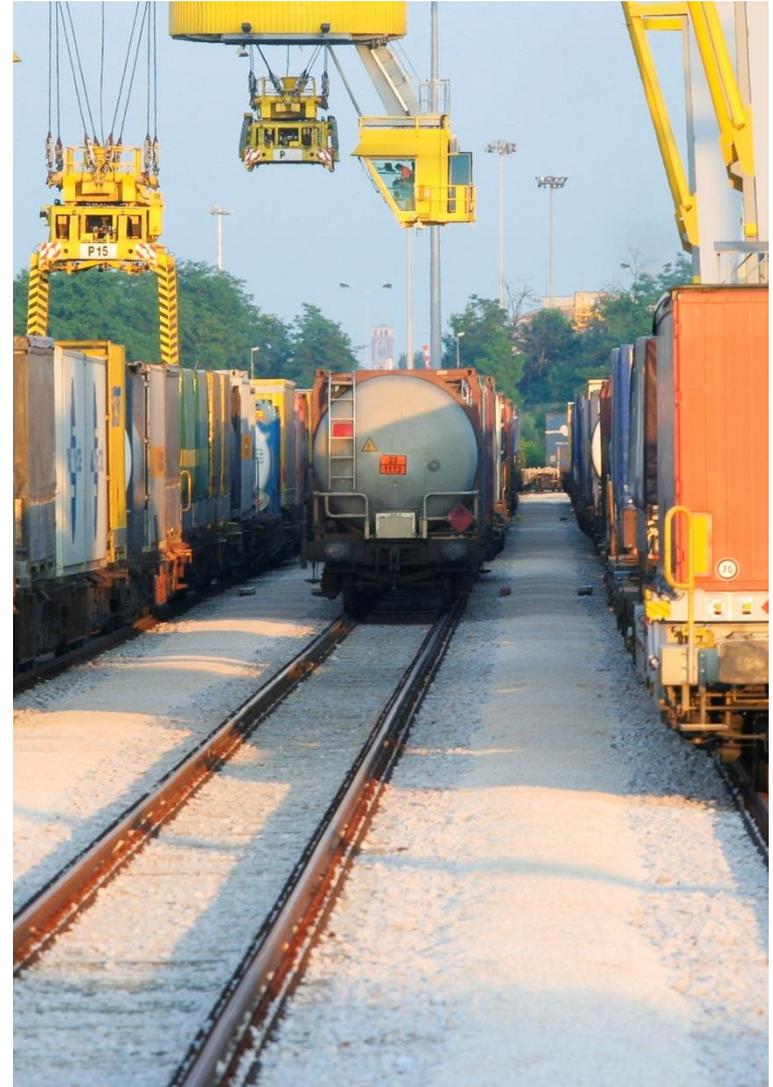
- Increased productivity thanks to simultaneous, real-time optimization of container moves
- Reduced time for idle equipment
- Vehicle Pooling
- Integration of positioning systems
- For different resource types (Straddle Carrier, Yard Truck, Reach Stacker, Front-Row Stacker, Empty Handler)



# Step 4: Crane Optimizer

## Minimized Driving Distances and Times

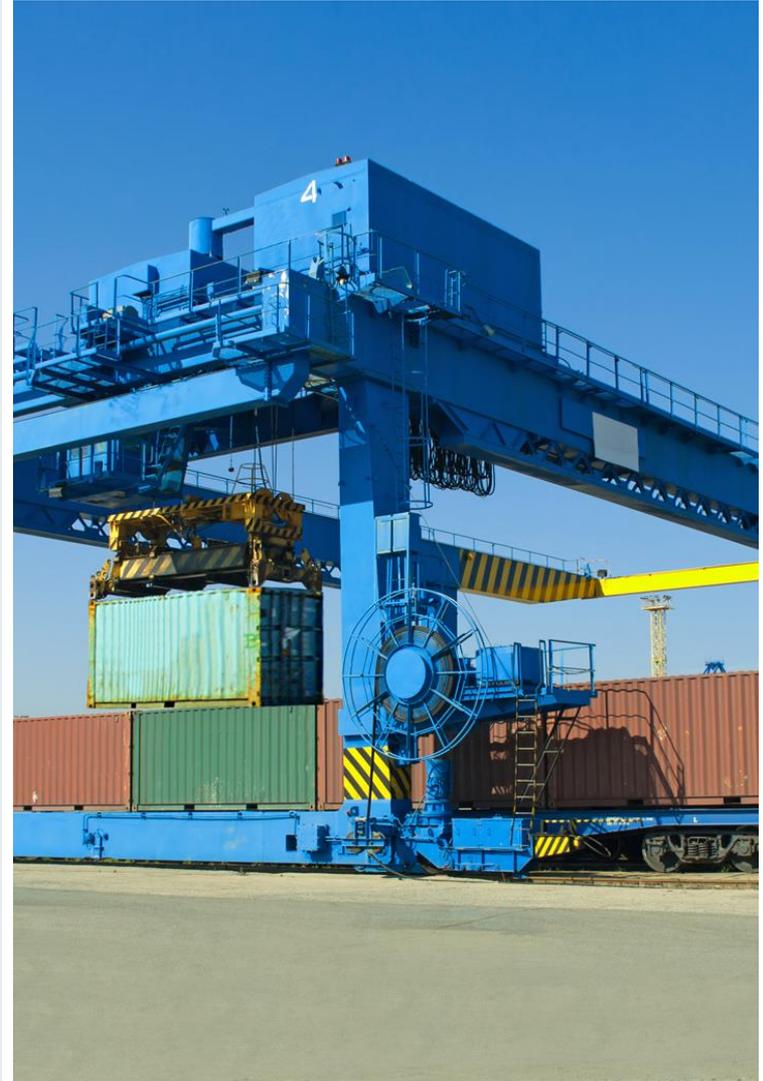
- Increased productivity thanks to simultaneous, real-time optimization of container moves
- Minimization of additional handling equipment changes (e.g. OHF, J-Hooks)
- Minimization of spreader changes
- Proposes double-cycling when reasonable
- Dynamic crane split
- Integration of positioning systems & (semi-) automation possible



# Step 5: Train Load Planning

## Improved On-Schedule Performance

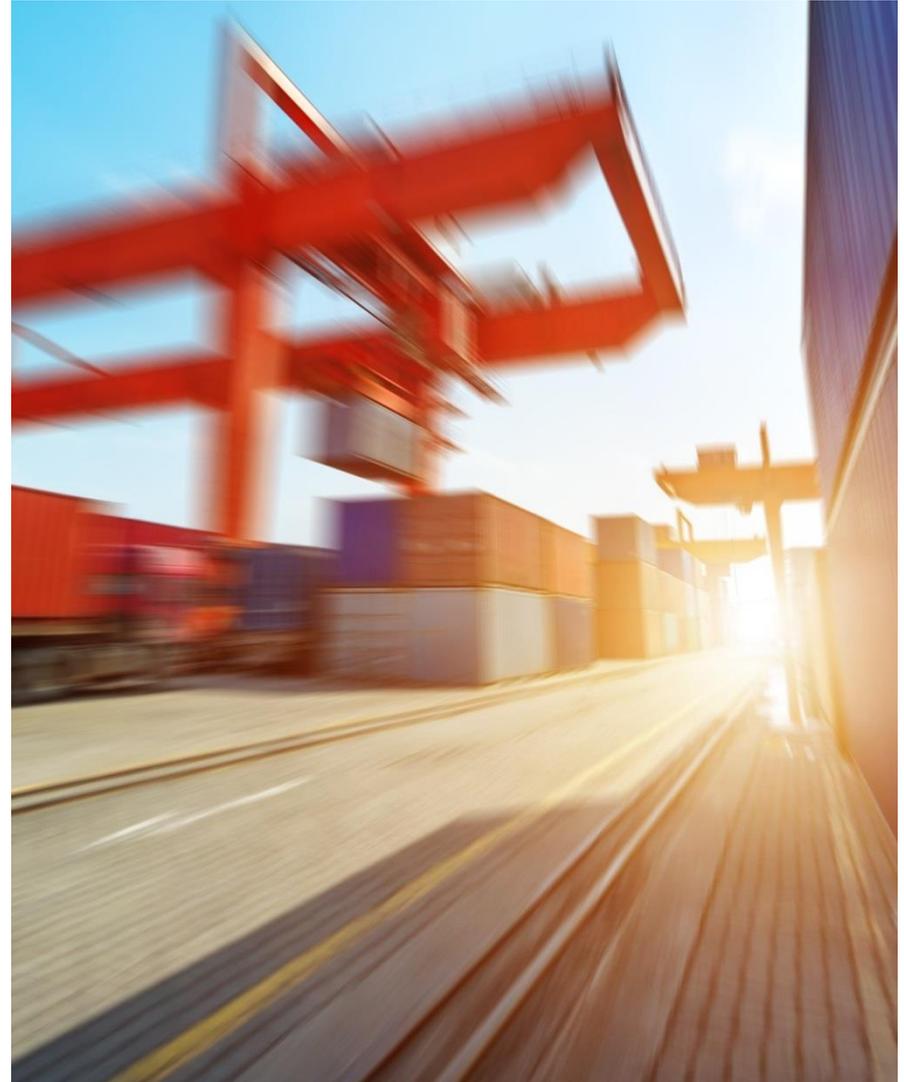
- Maximized wagon/slot utilization
- Minimized yard re-handling, loading distance & (pin) configuration changes
- Load plan is re-optimized in real-time when data changes
- Keeping wagon weight and height restrictions as well as axle and trailing load restrictions
- Ensuring hazardous containers are separated as per segregation rules



# Step 6: Rail Scheduler

## Optimizing Container Handover

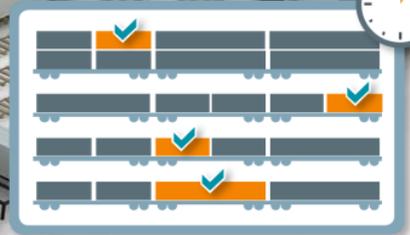
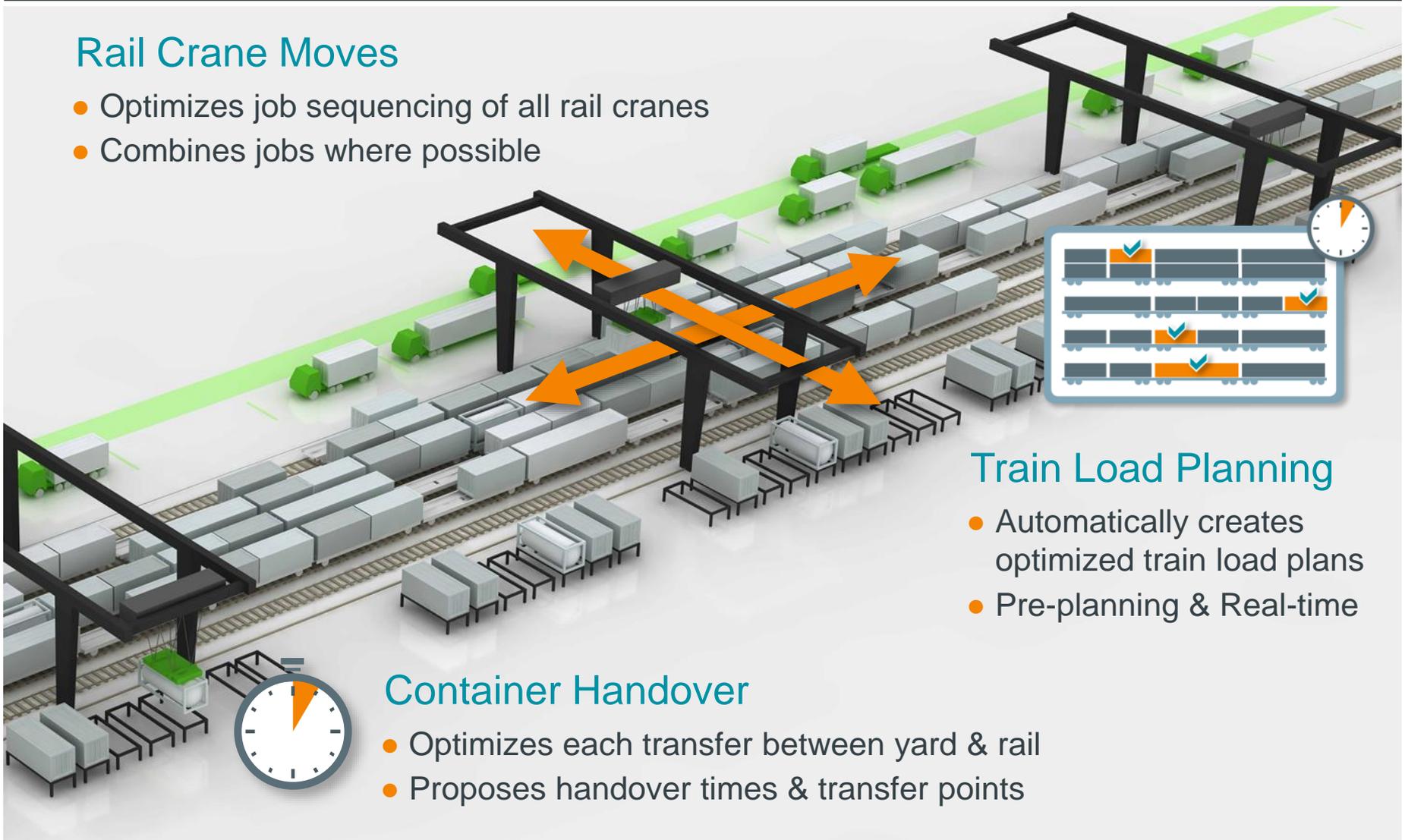
- Optimization of processes between the yard and the rail area
- Aims at keeping train's ETDs
- Highest rail productivity via look-ahead (next few hours) and real-time optimization of executable jobs and rail transfer zone utilization
- Monitors and adjusts according to the progress of jobs in the chain



# Optimization of Rail Processes

## Rail Crane Moves

- Optimizes job sequencing of all rail cranes
- Combines jobs where possible



## Train Load Planning

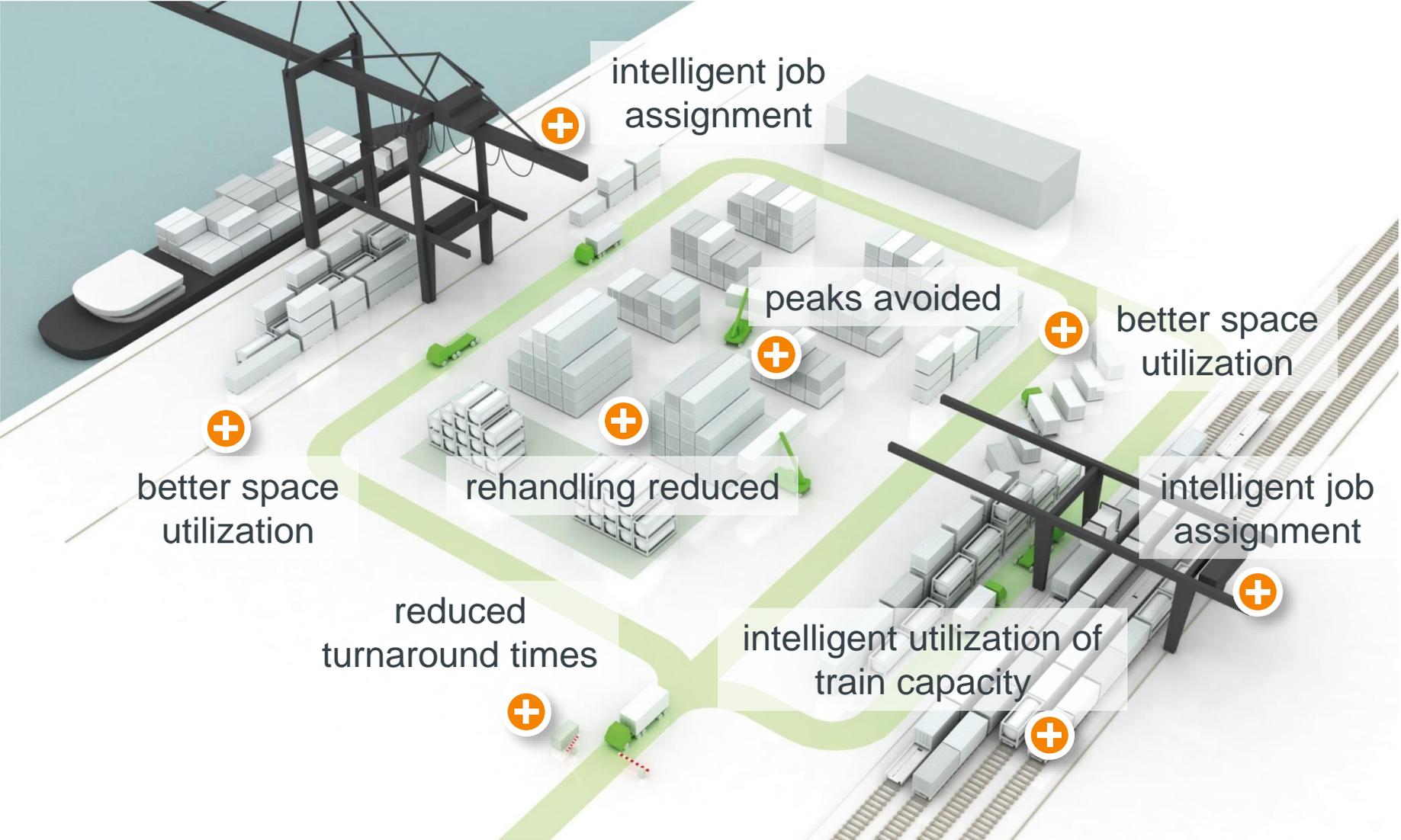
- Automatically creates optimized train load plans
- Pre-planning & Real-time

## Container Handover

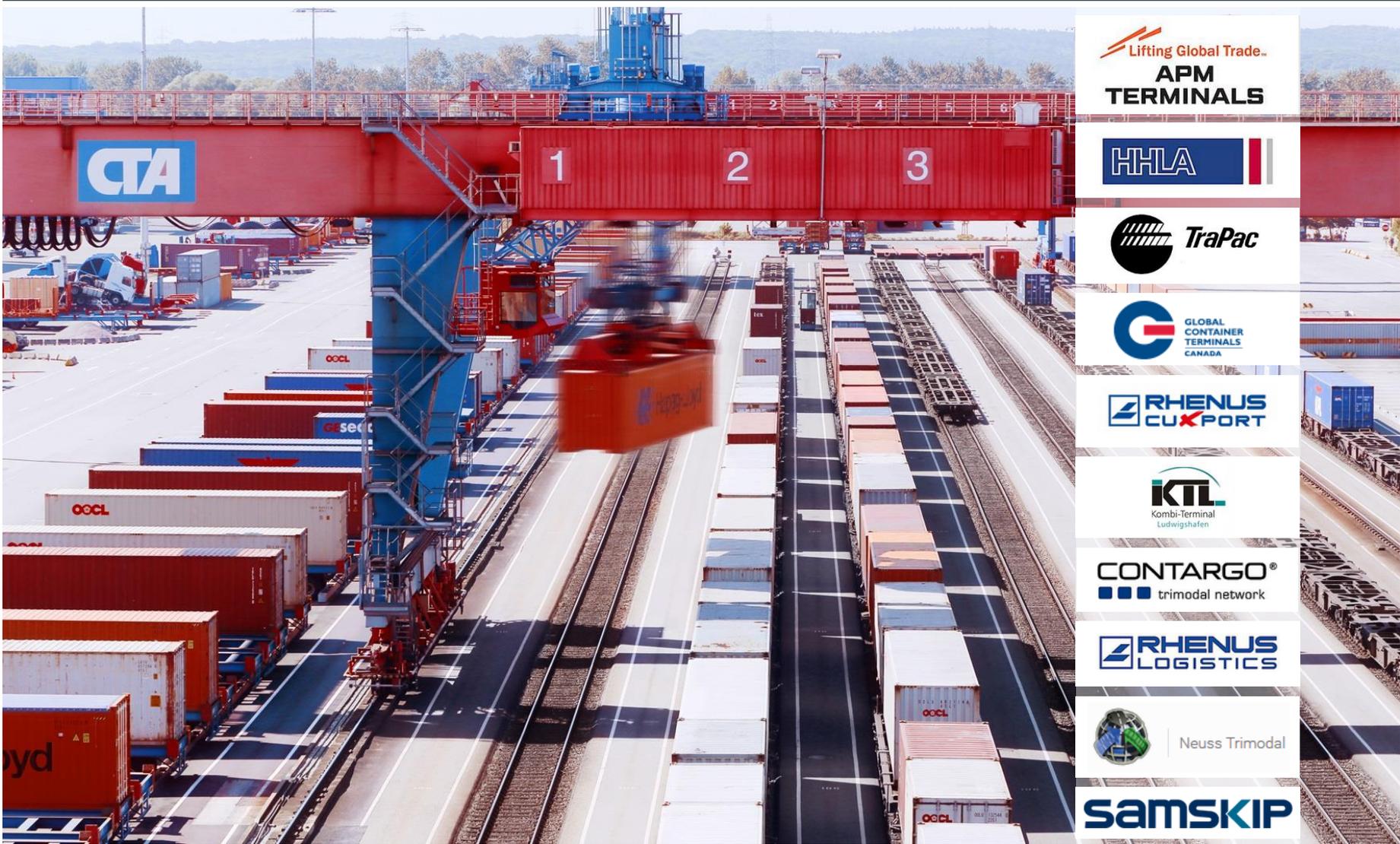
- Optimizes each transfer between yard & rail
- Proposes handover times & transfer points



# Do more with and for less



# Agile Optimization in Action



# Container Terminal Altenwerden (CTA) – Hamburg

“Handling 500,000 boxes by rail – this is a great success for us. [...] At CTA, efficient handling processes go hand-in-hand with a high performing hinterland system”.

Oliver Dux,  
Managing Director, CTA

Germany's largest  
Container Rail Terminal



Photo: HHLA / Michael Zapf

## Hinterland Steering & Optimization

- > 3 M TEU/a
- 500,000 boxes (813,000 TEU) by rail in 2013
- 9 rail tracks of 720 m with 4 RMG (30 trains/d)
- 12 tractors, 200 chassis
- 2,500 trucks/d (gate)

# KTL Kombi-Terminal Ludwigshafen



## Administration & Optimization

- Up to 500,000 load units/a
- 11 tracks
- Yard optimization
- Train load planning
- Rail cranes (RMG), reach stackers & terminal tractors
- Container handover
- Multiple-step jobs
- Truck scheduling

# Samskip Van Dieren, Duisburg



## Administration & Optimization

- 9 tracks of 740 m
- Yard optimization
- Train load planning
- Rail cranes (RMG) & reach stackers
- Container handover
- Multiple-step jobs
- Automated gate

# Stay on Top!



[www.inform-software.com/logistics/containerterminals](http://www.inform-software.com/logistics/containerterminals)

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