bulk terminals Antwerp 2024
24 October
session 2 security, safety & risk

Innovation in safety technologies

Richard Steele
CEO ICHCA International

ICHCA

the voice of international cargo handling

ICHCA INTERNATIONAL

independent, not-for-profit

improving safety, productivity and efficiency of global cargo handling and movement worldwide

REPRESENTATION

STANDARDS

INSIGHT

ICHCA INTERNATIONAL

terminals, service providers, government, individuals, NGOs, trade unions

making cargo handling safer together

ICHCA INTERNATIONAL

create safer, healthier cargo handling workplaces

sustainability through safety

passion to do the right things right

future of safety is not beyond the horizon

can change the ways we work for the better

28 entries

15 countries

digest available for free www.ichca.com

Learning & Engaging

technology meets traditional safety training through virtual reality & advanced simulation

transforming how you think about cargo training and safety

Making Operations Safer

Segregating People & Machines

Turning Data into Insight

Associated British Ports

virtual reality port safety induction and training

challenge

deliver induction training across 21 ports - safely, sustainably and engagingly

innovation

VR port environment using open-source platform

adaptable, expandable

cloud based analytics

result

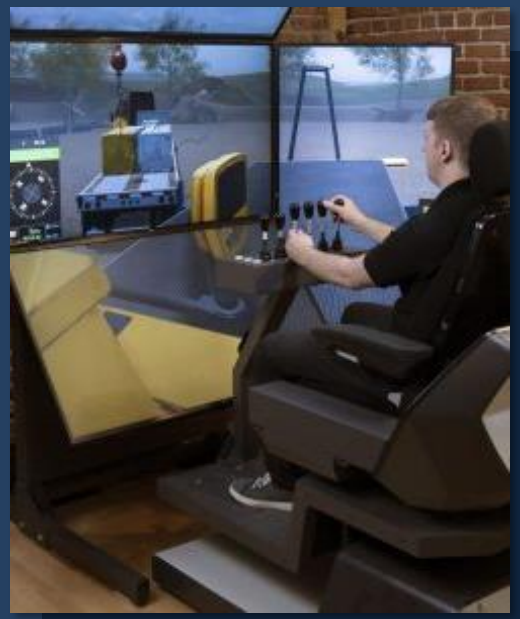
realistic insight into port environments

effective, meaningful learning

empowering employees to apply knowledge confidently in real-world situations

CM Labs Simulations

port equipment simulation training solutions



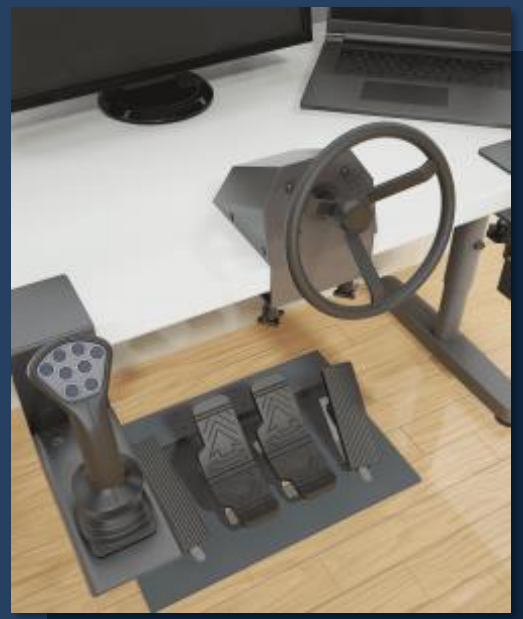
challenge

safely and efficiently train equipment operators

risks:

pedestrians struck by cargo or equipment

overturn



innovation

solve the ‘realism gap’ with simulation based on:

authentic machine behaviours

accurate controls and machine features

result

fewer accidents

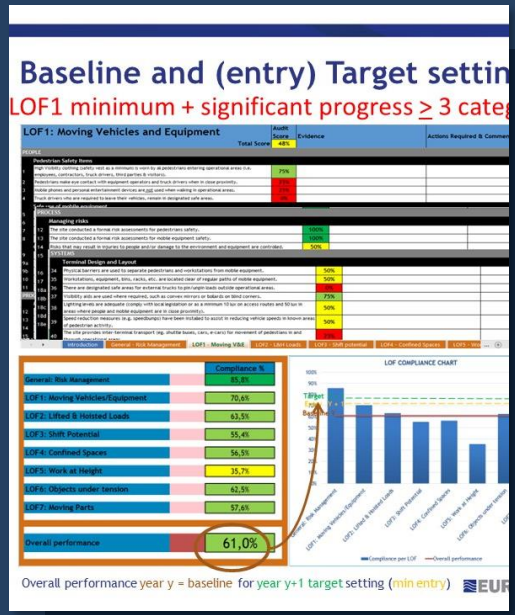
improved operator assessment

improved training effectiveness

reduced learning curve

Euroports Group HQ, Antwerp-Belgium

Line of Fire program



challenge

improve protection for people working in the vicinity of heavy machinery and in the confines of vessel holds and other limited spaces

mitigate primary risks in bulk and break-bulk handling

innovation

self-assessment tool

scoring for priority fatality potential risks

risk mitigation improvement plans

measure success

result

delivered stronger pro-active safety improvement culture

significantly reduced serious safety incidents

Flint Systems

Virtual Reality Training Simulator

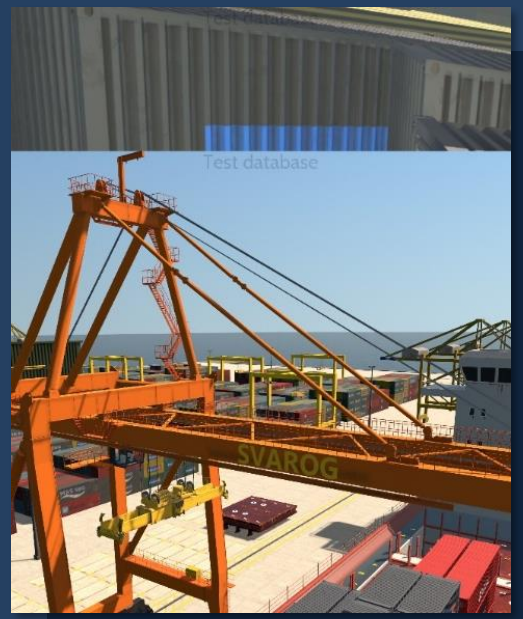
challenge

safely and efficiently train equipment operators

risks:

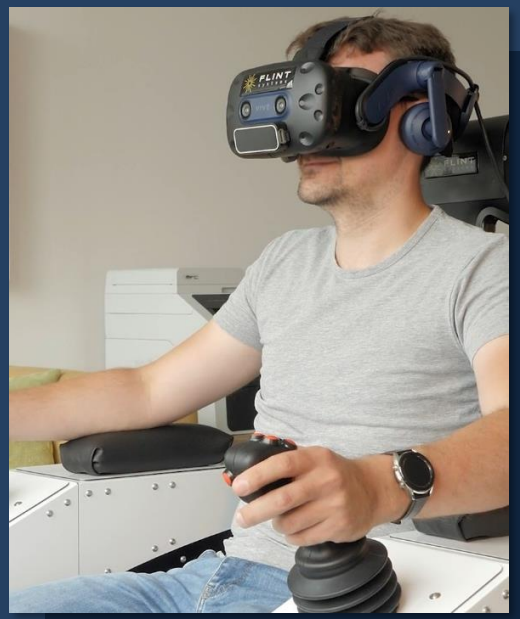
pedestrians struck by cargo or equipment

overturn



innovation

customisable universal hardware platform, able to reflect training on every machine



result

risk-free environment

realistic training scenarios

refining skills in controlled environment

9/10 successful pass rate

Learning & Engaging

technology meets traditional safety training through virtual reality & advanced simulation

transforming how you think about cargo training and safety

Making Operations Safer

groundbreaking ways of making cargo handling physically safer

from advanced cargo securing to automated systems that can reduce human exposure to risk

Segregating People & Machines

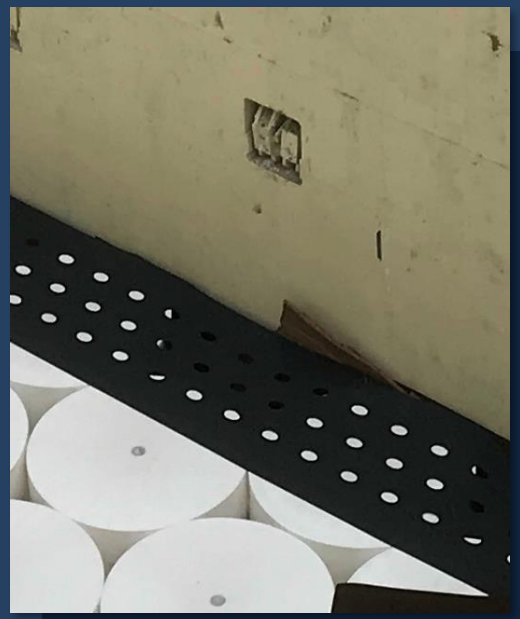
Turning Data into Insight

Cross Currents 88

and

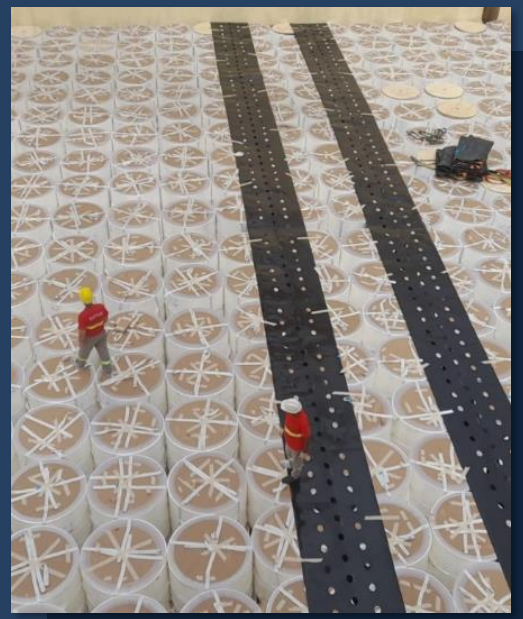
G2 Ocean AS

“Spyder Netting”



challenge

fall from height risk through gaps in breakbulk stowage



innovation

a thin layer of plastic film netting, which can be rolled out across gaps and secured between layers of cargo

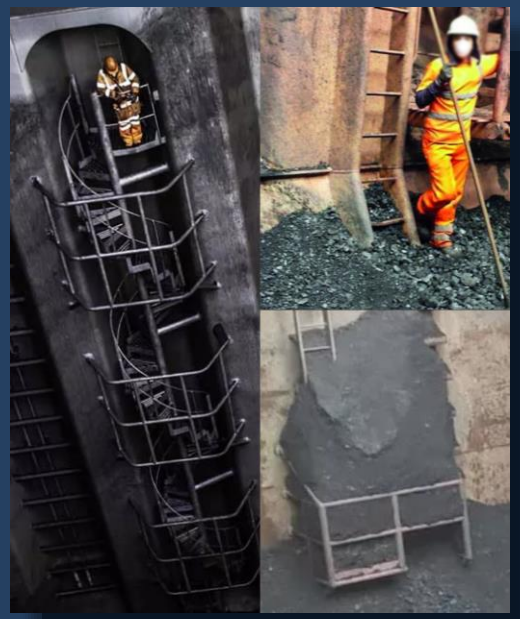
result

soon after the adoption of the product, Cross Currents were personally thanked by a stevedore in Italy, who’s fall was arrested by the netting

KG5
Consultancy Ltd

Vibrotrim™

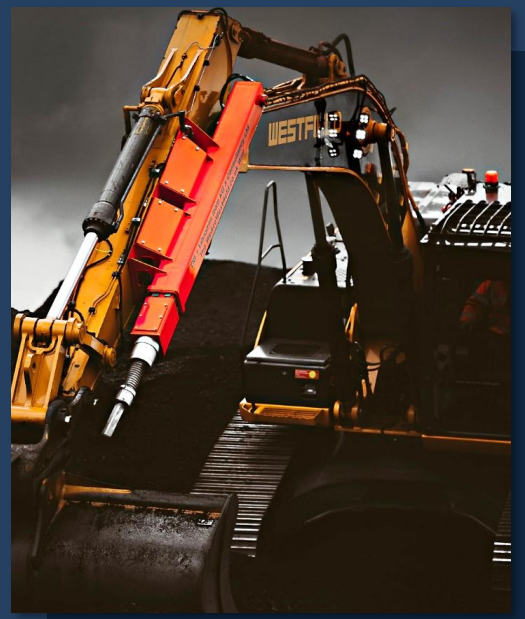
"The Swiss-knife of ship trimming"



challenge

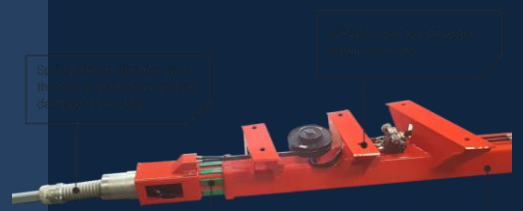
make bulk trimming safer

reduce operations where workers have to physically knock cargo loose



innovation

mechanical bulk trimming, protecting workers from fall, crush, struck and engulfment risk



result

removed pedestrians from hazard zones

reduced fall from height risk

reduced crane lifts

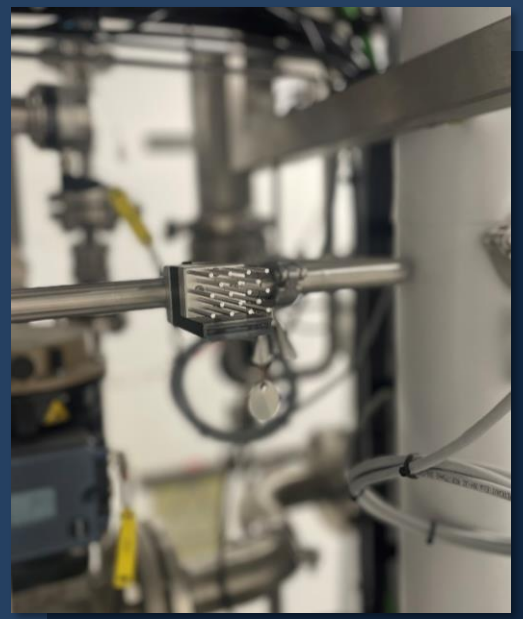
increased productivity

TEGnology Aps

SensEver HSI hot surface indicator

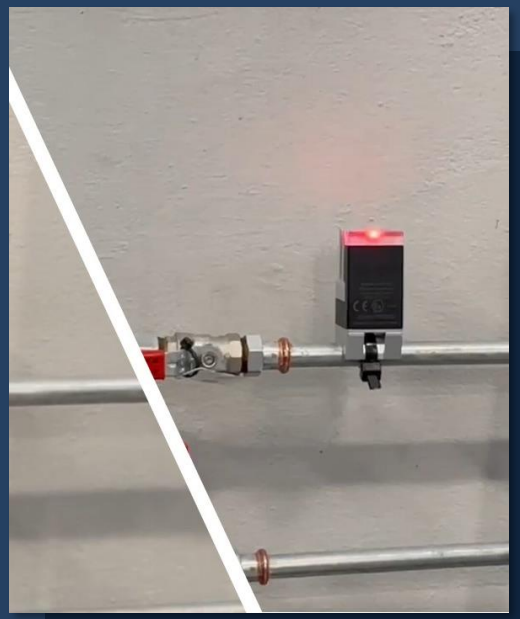
challenge

reduce incidence of Contact Burns in industry to protect workers



innovation

autonomous, maintenance free preventive safety device that can easily be installed on surfaces or pipes



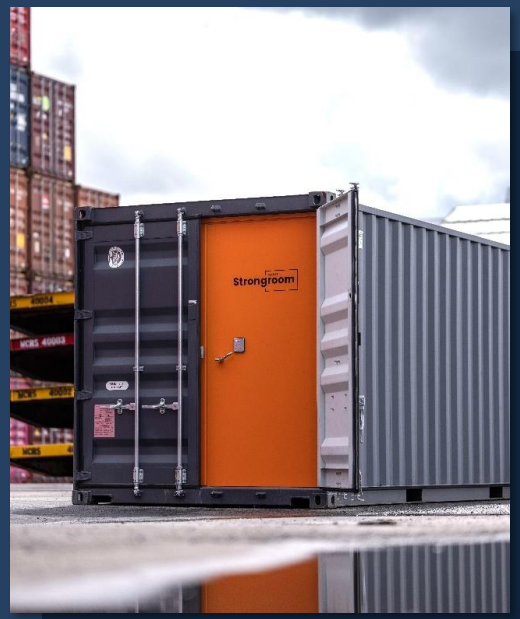
result

zero contact burns at installed sites

increased awareness of and attention to the risk

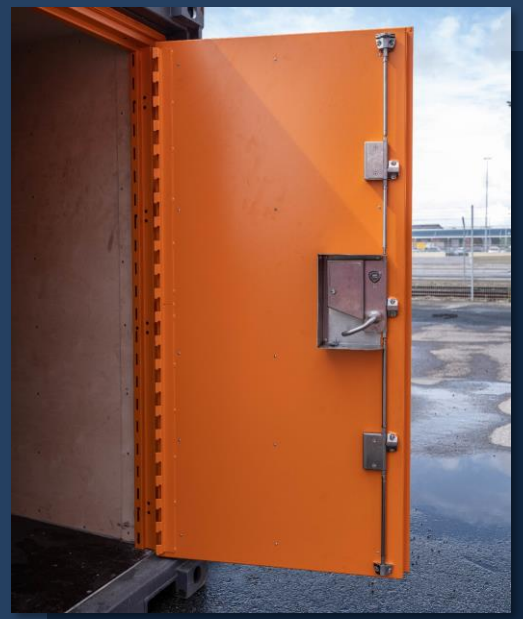
FM Global Safety Solutions AB

Mobile Strongroom



challenge

criminal networks are finding increasingly sophisticated ways to commit cargo theft and exploit system vulnerabilities

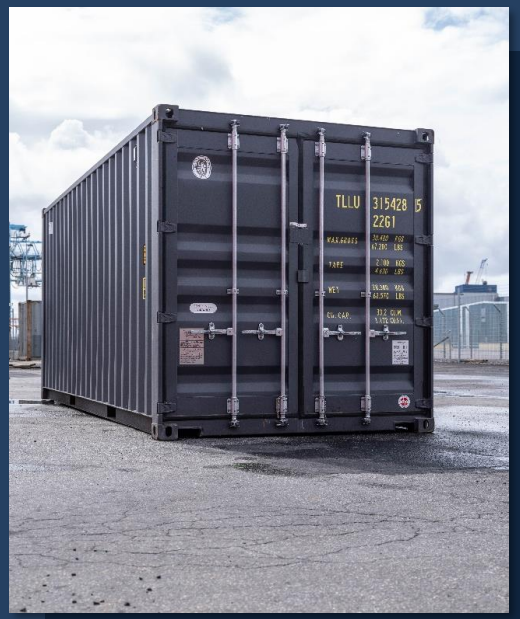


innovation

patented and certified

break-in proof

intelligent shipping container strongroom



result

ISO/IEC 17067:2013). Grade 3

secure storage for cash, explosives, weapons, and ammunition

certified under the Swedish National Accreditation Body system

Learning & Engaging

technology meets traditional safety training through virtual reality & advanced simulation

transforming how you think about cargo training and safety

Making Operations Safer

groundbreaking ways of making cargo handling physically safer

from advanced cargo securing to automated systems that can reduce human exposure to risk

Segregating People & Machines

keeping pedestrians and moving equipment apart is safety critical

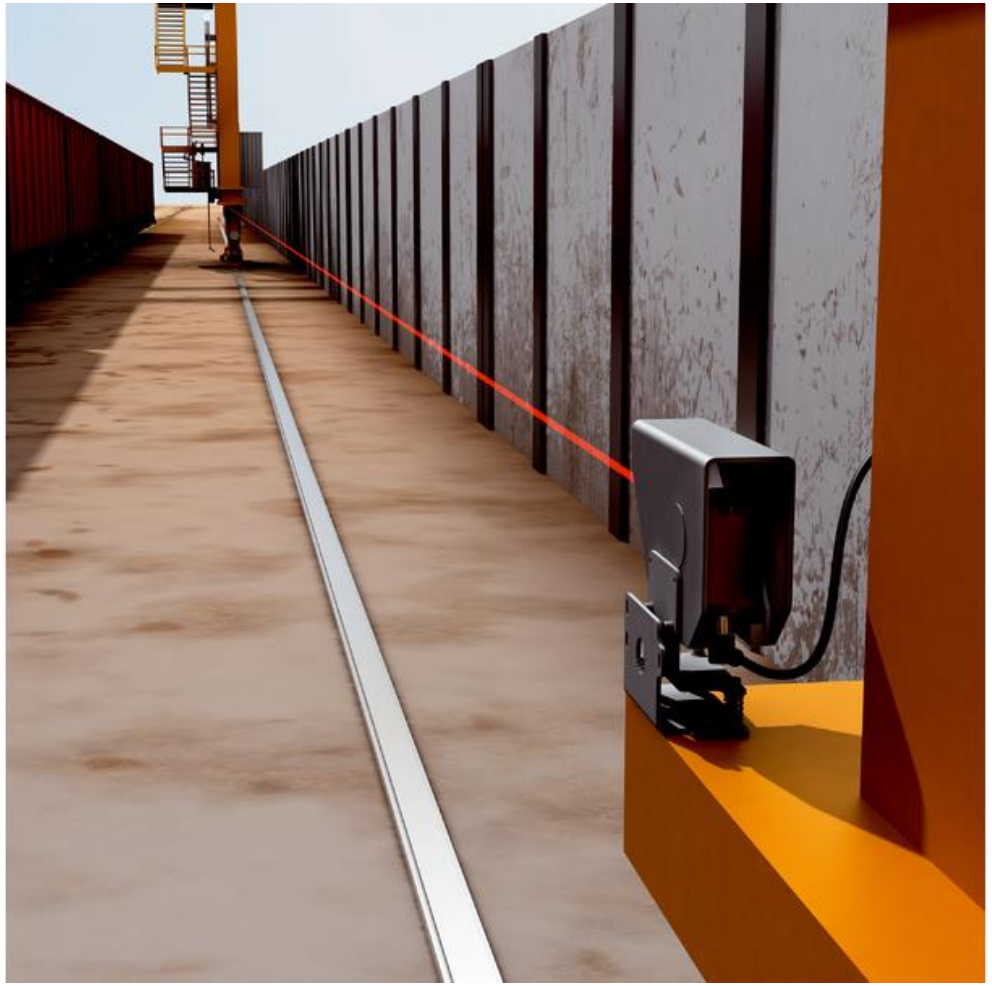
state-of-the-art collision avoidance, remote operation & AI driven safety monitoring systems

Turning Data into Insight

Sensors, Guidance and Location Systems

Some methods:

- cameras
- lasers
- light curtains
- sound
- radar
- 3D light detection and range (LiDAR)



©SICK crane collision prevention

Sensors, Guidance and Location Systems

Sensing dimensions 2-D/3-D

Range

Range accuracy

Field of view

Object classification

Adverse weather

Dust

Night vision

Small object detection

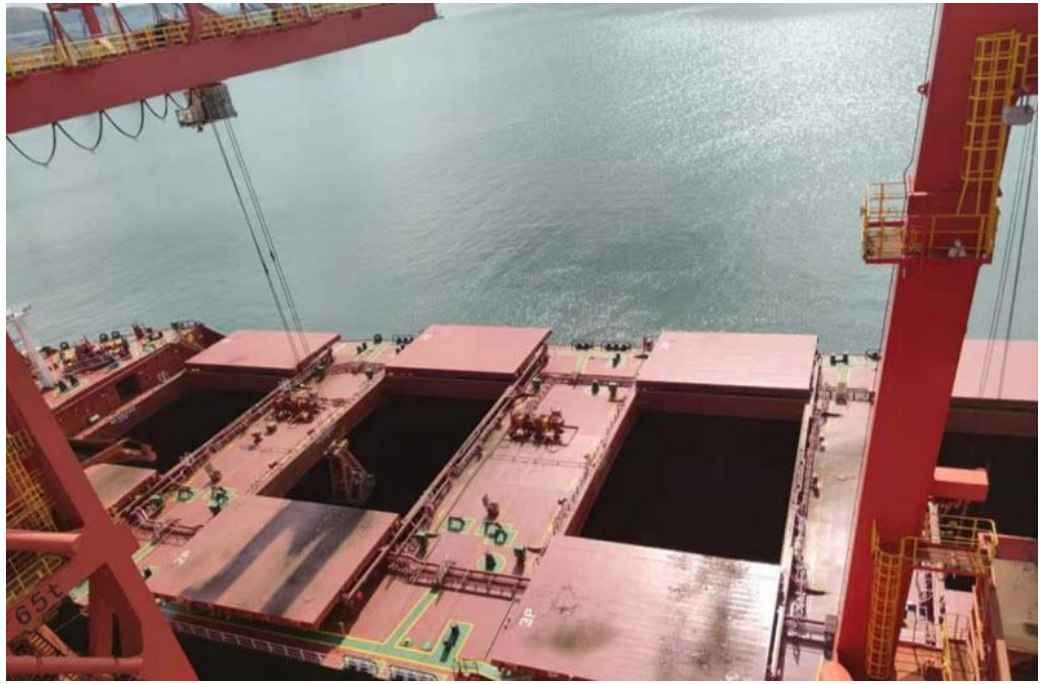
Sensors, Guidance and Location Systems

LiDAR case study

Shandong Port Group (China)

Quanergy M-Series 3D LiDAR sensor solution selected to fully automate bulk material operation

- real-time analysis of ship, cabin, and stockpile shape to enable automatic unloading of solid materials/ensure safe operations
- operators use visual displays to precisely evaluate stockpiles, obtain coordinates of cabins, define safe operation zones, move grab buckets to desired locations



©Shandong Port Group

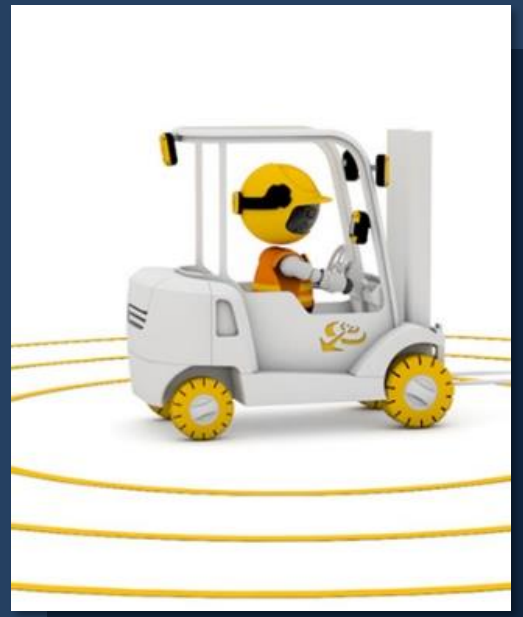
Advanced Microwave Engineering

SMART 5.0 Anticollision System

tailor made anticollision solution

challenge

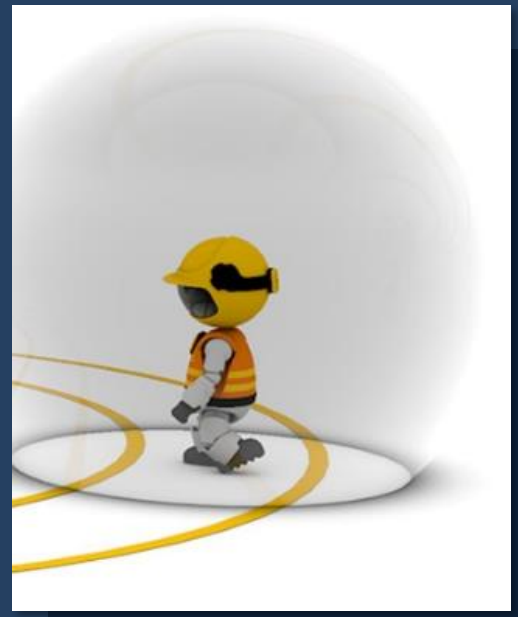
create a safer work environment where there are vehicles and pedestrians in the same space



innovation

sensor detects the position of vehicle and warns the driver in real time

adjustable detection pattern, range and size



result

real time accident-avoidance information

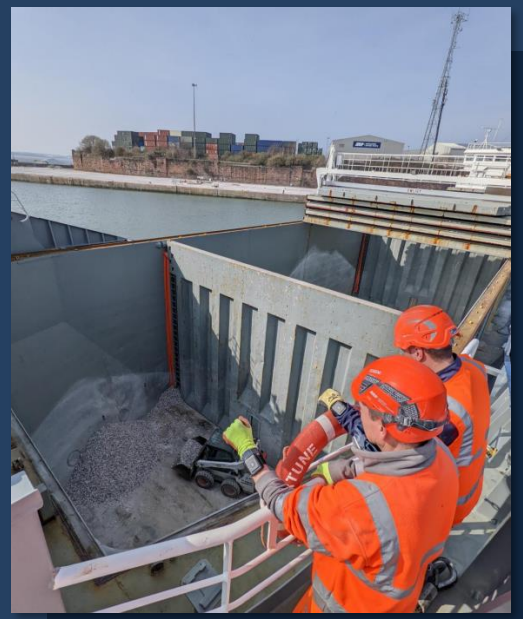
collecting and analysing data - gives insight into danger "hotspots"

ABP & Rombit - Worker Safety Solutions

real-time prevention of vehicle/ pedestrian collision

challenge

Vehicle-vehicle and vehicle-pedestrian collisions represent 20% of UK workplace fatalities



innovation

Digital Drive Coach: cockpit monitor prevents improper vehicle control

Collision Avoidance: accurately measure vehicle-pedestrian distance within a tenth of a second

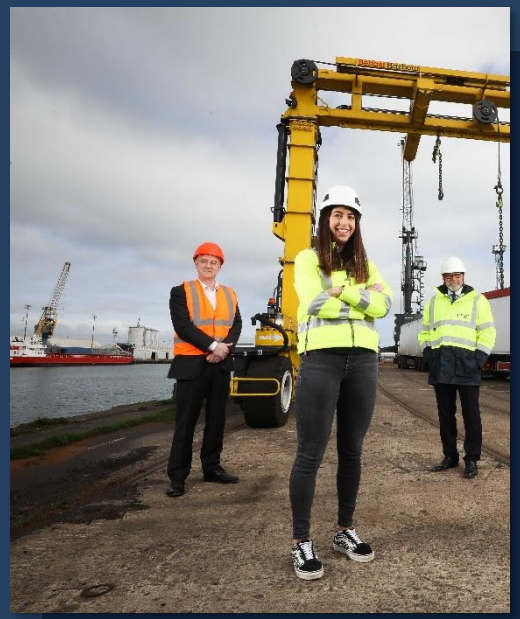
result

project fully up and running within a day after delivery

⇩25% unsafe events/ people entering danger zones around moving equipment

Machine Eye Technology

Machine Eye platform



challenge

protecting employees, contractors and visitors from risks associated with collision or crush

innovation

centralised, 24/7 means of monitoring and controlling pedestrian-plant interface compliance across the terminal/ port site

result

pedestrian interactions with machine red zone decreased 70% within 4 weeks

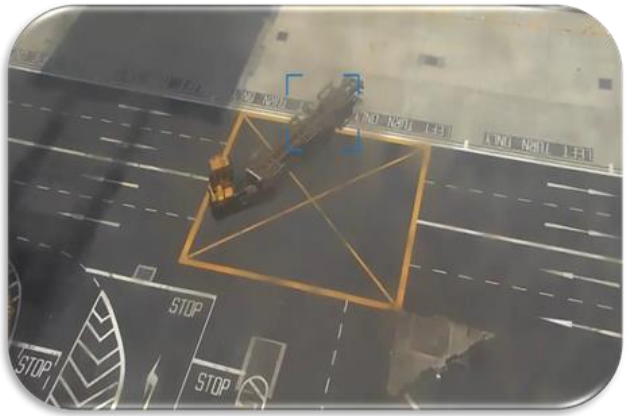
increased awareness of the risk amongst workforce, leading to positive behavioural change

Detection of twistlock (highlighted by red rectangle)

Comparison between a yard crane (YC) equipped with Video Analytics (VA) and one without (bottom)

PM failing to stop at stop-line

Detection of Lashing personnel within 2-container width distance of working spreader



PM turning right from a left-turn only lane

Detection of lashing personnel not wearing life-vest at extreme row

case study **PSA International Pte Ltd**

Harnessing the power of Video Analytics (VA) to solve common safety issues

case study **Port of Virginia**

Video Analytics and AI to improve safety

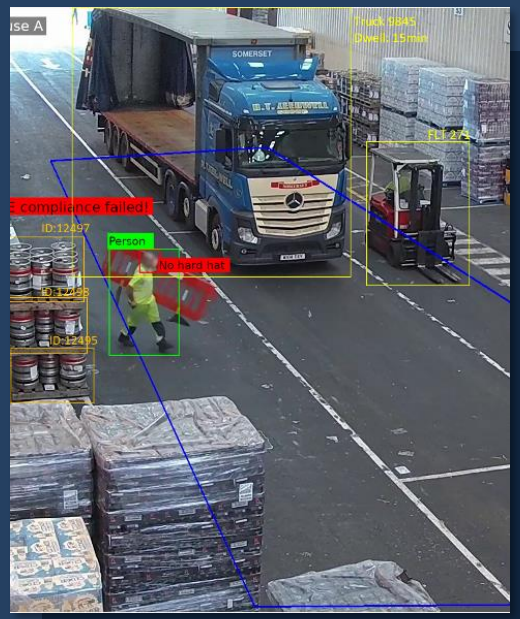
- algorithms quickly analyse many hundreds of hours of site video footage to identify positive (subsequently rewarded) safety actions

and

- risk actions which are managed with learning interventions

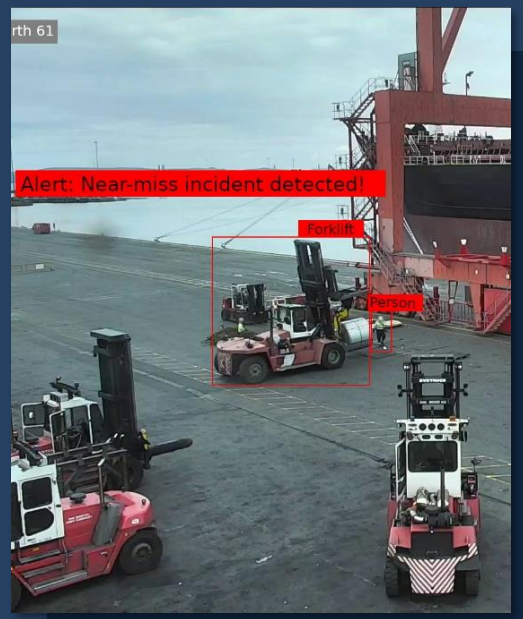
RoboK

SiteLens



challenge

reduce near-misses, unsafe working at heights, speeding plant vehicles, restricted zone breaches and PPE non-compliance



innovation

AI real-time proactive analysis of CCTV to pre-emptively detect and alert hazards

attuned to the nuances of human-machine interactions and compliance with safety protocols

result

90% reduction in safety breaches within first quarter of operation

improved personnel situational awareness

insights into user behaviour & ops dynamics – targeted risk mitigation

automated gate systems

substantially faster gate time

- optical character recognition (image on the container) and
- radio frequency identification (tag on container)

electronic documentation before pick-up/drop-off

reduced errors and associated delays

photos of containers and equipment can also be automatically taken and stored

drivers use mobile technology to schedule pick up/drop off

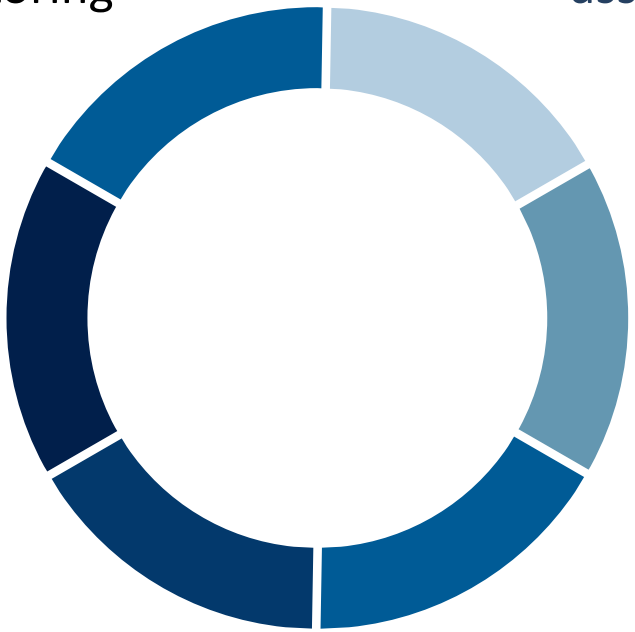
demand planning/prediction

©PD Ports Teesport

asset management systems

predictive equipment alarms, maintenance & fuel monitoring

smart fleet monitoring of equipment and assets in real time



equipment productivity data

dynamic dashboard & reports, monitor live camera feed

integration with port terminal operating system

real time monitoring of job, alerts & exceptions

Predictive Maintenance: Ropes at Container Gantry Cranes

Client: HHLA, Hamburg, Germany | Project period: 2021 – 2022

- **Problem:**
  - Hundreds of steel ropes are deployed at the container gantry cranes in the container terminals in Hamburg
- **Consequence:**
  - Cost-intensive and frequent inspections of ropes according to static maintenance schedule to detect potential damages in time
- **Solution:**
  - Development of a machine-learning model to provide a dynamic inspection and maintenance schedule
  - Data from the container gantry cranes' operation and the ropes' maintenance documentation was used to train the model
  - The solution provides data-driven recommendations to reduce the amount of maintenance work as well as to replace ropes just-in-time when required

HPC

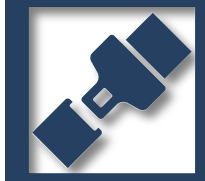
Artificial Intelligence

Learning & Engaging

technology meets traditional safety training through virtual reality & advanced simulation

transforming how you think about cargo training and safety

Making Operations Safer



groundbreaking ways of making cargo handling physically safer

from advanced cargo securing to automated systems that can reduce human exposure to risk

Segregating People & Machines

keeping pedestrians and moving equipment apart is safety critical

state-of-the-art collision avoidance, remote operation & AI driven safety monitoring systems

Turning Data into Insight

uncovering the power of data for cargo safety

advanced mooring, workplace & vessel assessment tools reflecting the pinnacle of data-driven safety

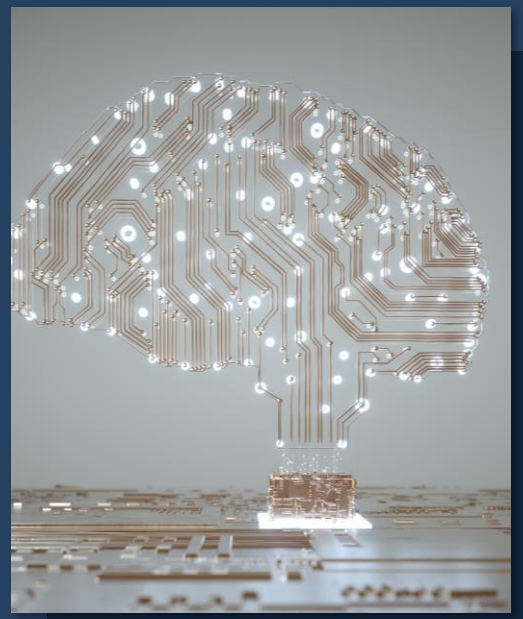
AI Data Analysis

challenge

Do we have systemic safety problems?

Are we missing latent safety issues?

Can we pre-empt serious safety incidents?

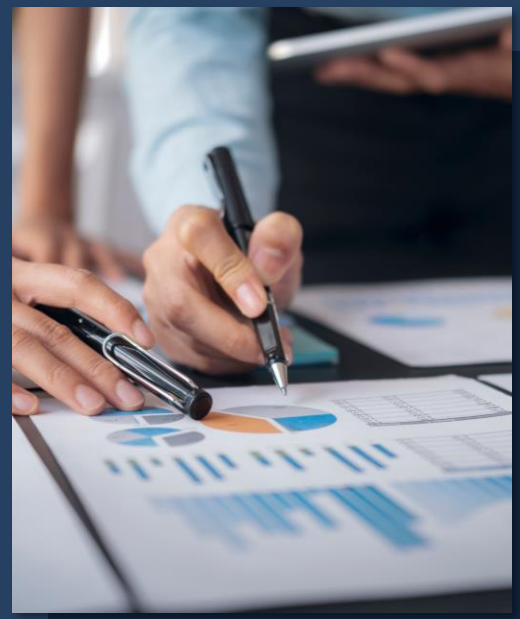


innovation

AI models analyse safety information held in

- free text incident reports
- near misses
- observations

using Natural Language Processing



result

Dashboard to access and assess insights to develop action plans and monitor progress

Predict accidents before they happen?

safety assurance

case study: **DP World**

HSE Management Software Solution

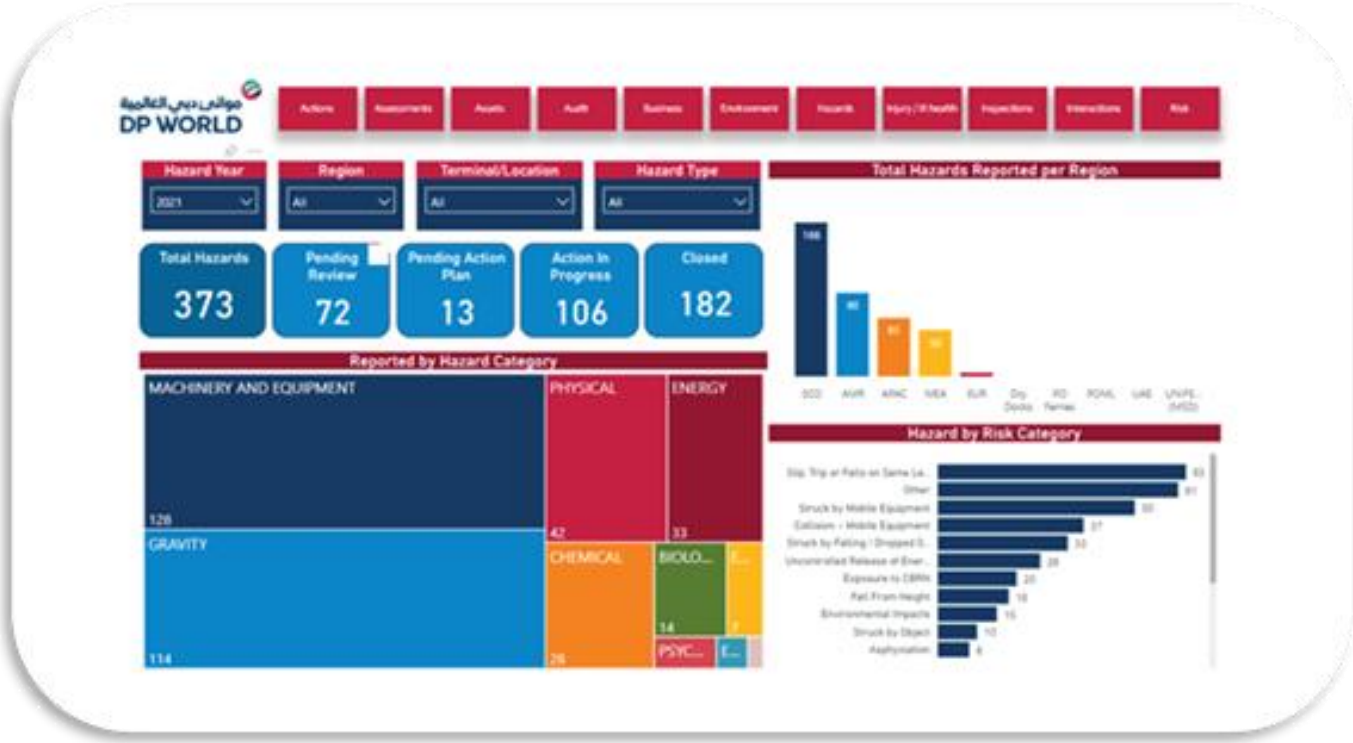
problem: bring in a HSE management solution to cover

- 181 business units in 64 countries, 56,000 employees
- logistics, marine services, ports and economic zones

centralised digital ecosystem was needed to:

- adapt to expanding/changing business requirements
- provide HSE data in real time
- remove manual report generation

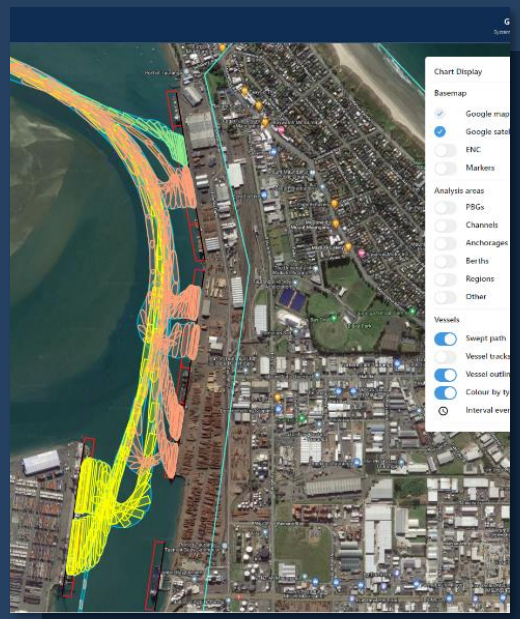
solution: build their own system



Example PowerBi Hazard reporting Dashboard

OMC International

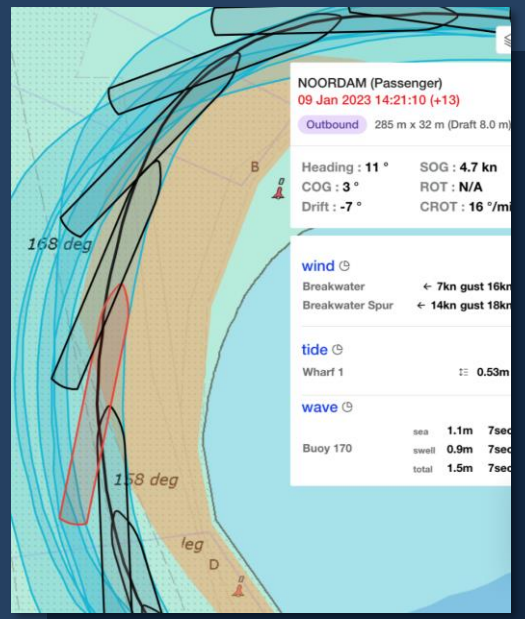
TransitAnalyst



challenge

make pilotage safer

on average, there is an incident involving vessels under pilotage every week*



innovation

use big data and AI to create actionable intelligence and full visibility of pilotage operations

powerful analytical tools - inspect, visualise, and report transit results against user defined safety

result

debrief transits

observe the transits of other pilots within the team

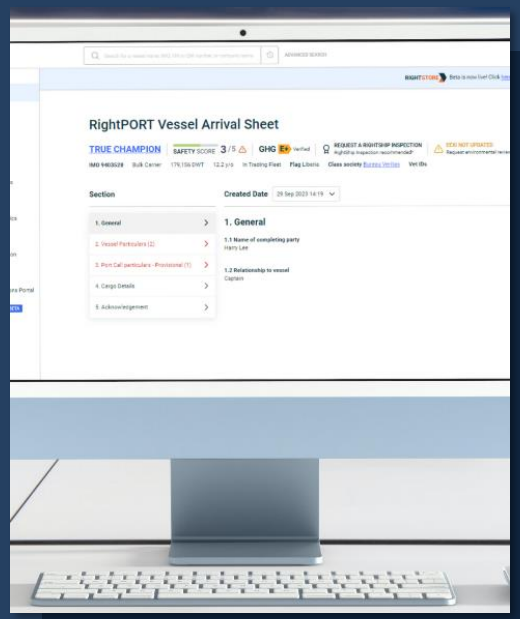
analysis of optimal transits

identification and analysis of outliers

* International Group of P&I Clubs

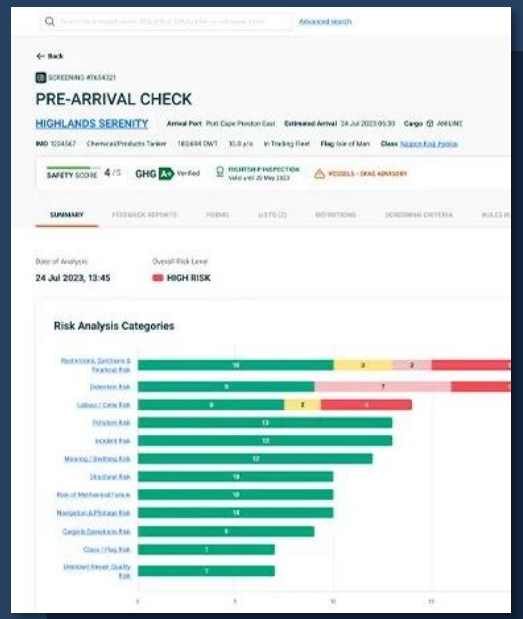
RightPORT Risk Solutions

RightPORT



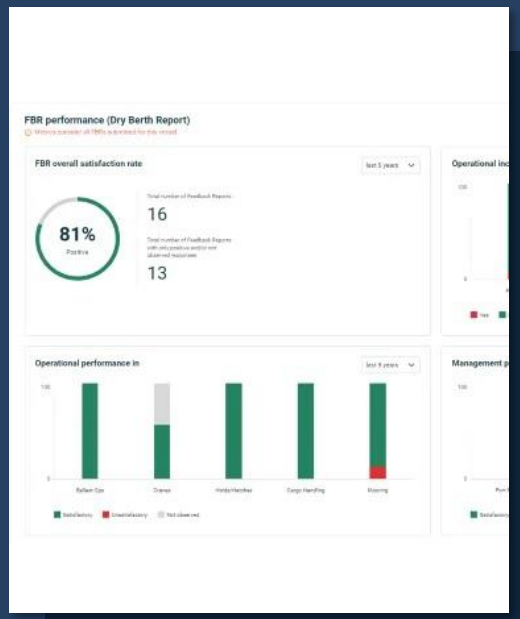
challenge

improve ports and terminals' real time knowledge of the safety of incoming vessels



innovation

harnesses extensive dataset to assess vessels based on diverse safety parameters, compliance and historical incident data



result

in-depth analysis of risk insights

'pre-arrival' vessel risk assessment enables users to proactively manage risks coming to their ports or terminals

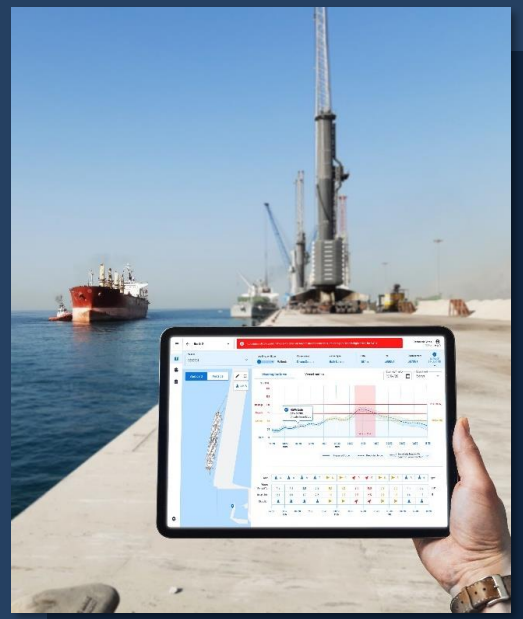
Royal HaskoningDHV

Smart Mooring

challenge

operational decisions mostly based on manually compiled data and experience

unforeseen conditions lead to dangerous outcomes: mooring lines can fail under peak tension and cause injuries



innovation

Smart Mooring

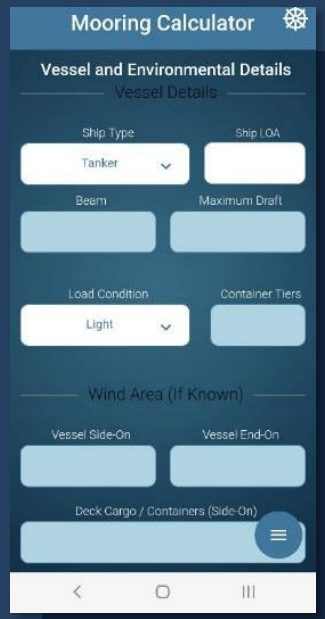
addresses the safety of moored vessel operations in sheltered and exposed ports by predicting excessive vessel motions and mooring line forces

result

"With Smart Mooring, we can immediately see where and when we could have a potential problem with moored ships, and take appropriate mitigating action"

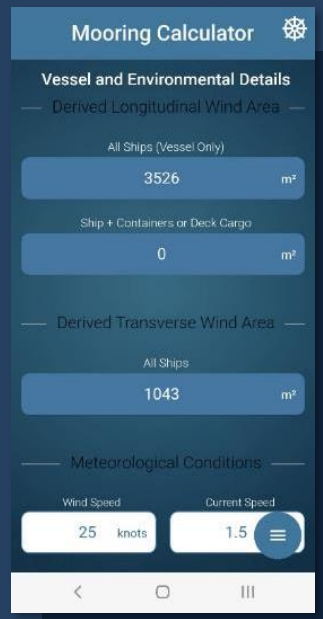
Shipmove

Shipmove Mooring Analysis



challenge

need for a simple tool to quickly and effectively assess the number of moorings a ship should deploy to ensure a safe mooring outcome



innovation

a verifiable and reliable method of determining the required number of moorings for commercial ships

result

app can, using only five (readily available) pieces of data, determine a suitable number of moorings to deploy…

…for just £10

bulk terminals Antwerp 2024
24 October
session 2 security, safety & risk

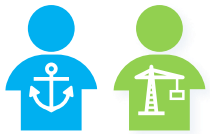
thank you

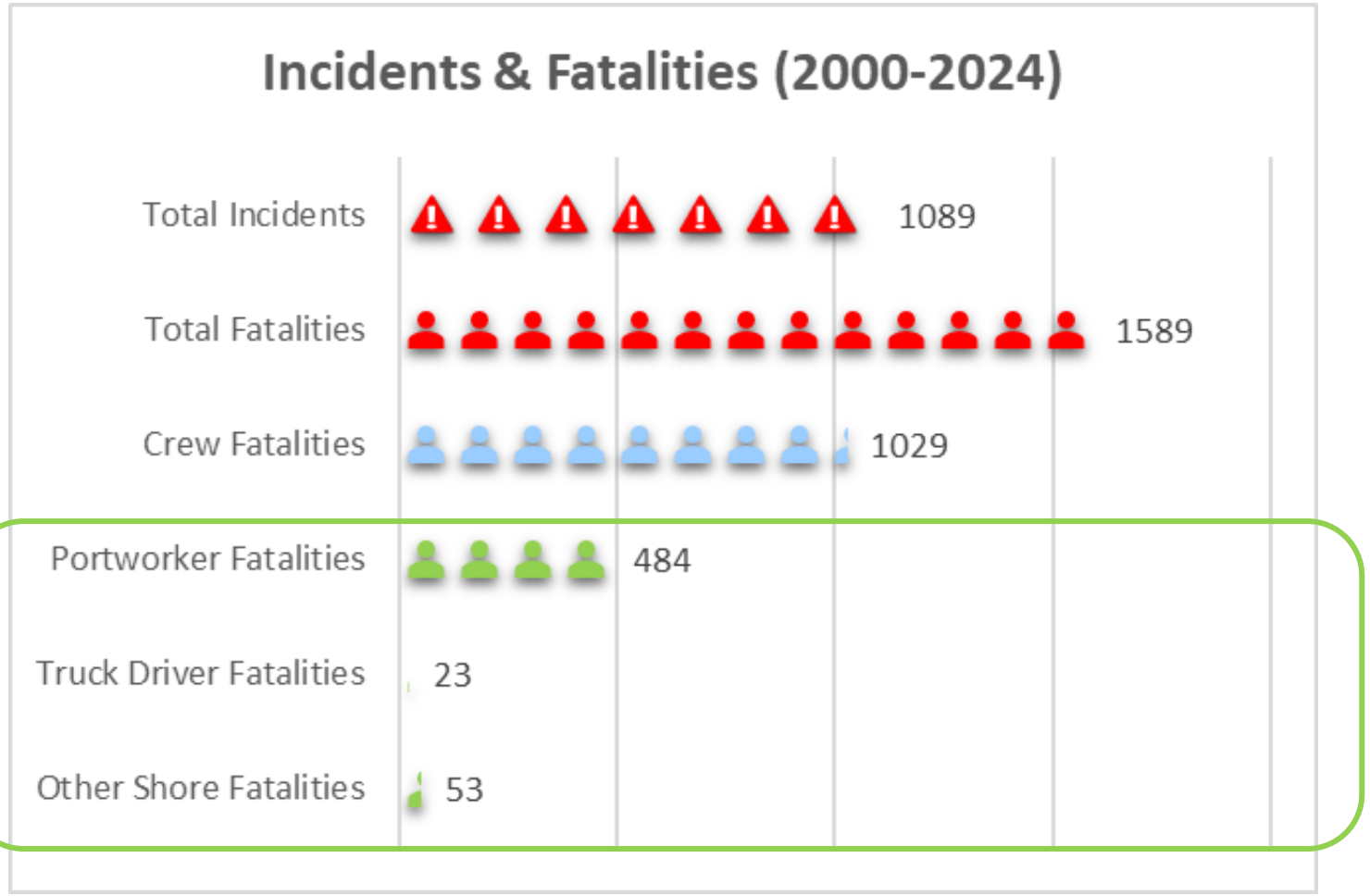
Richard Steele
CEO ICHCA International

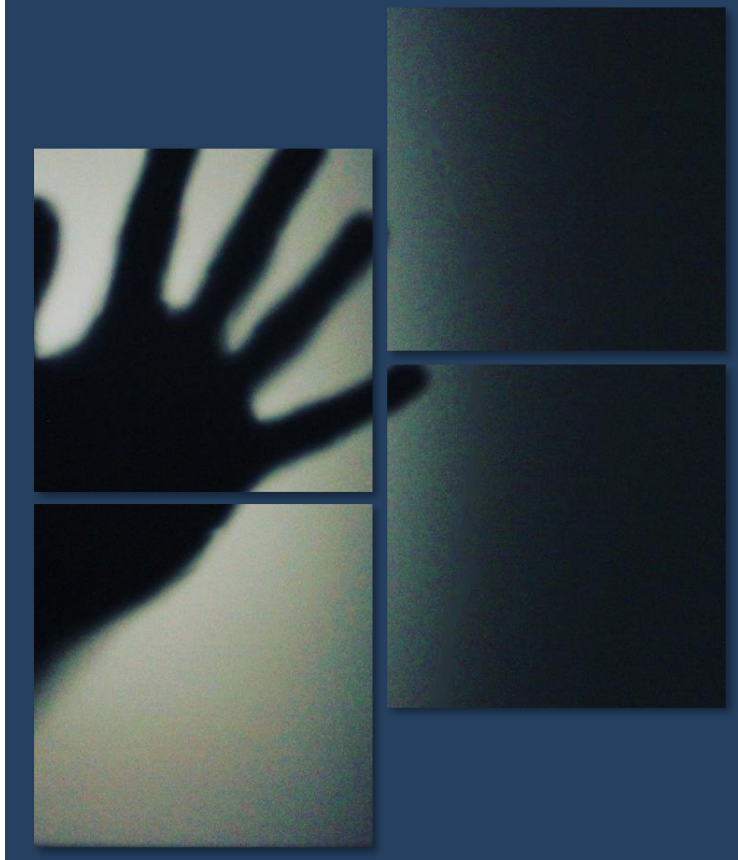
ICHCA

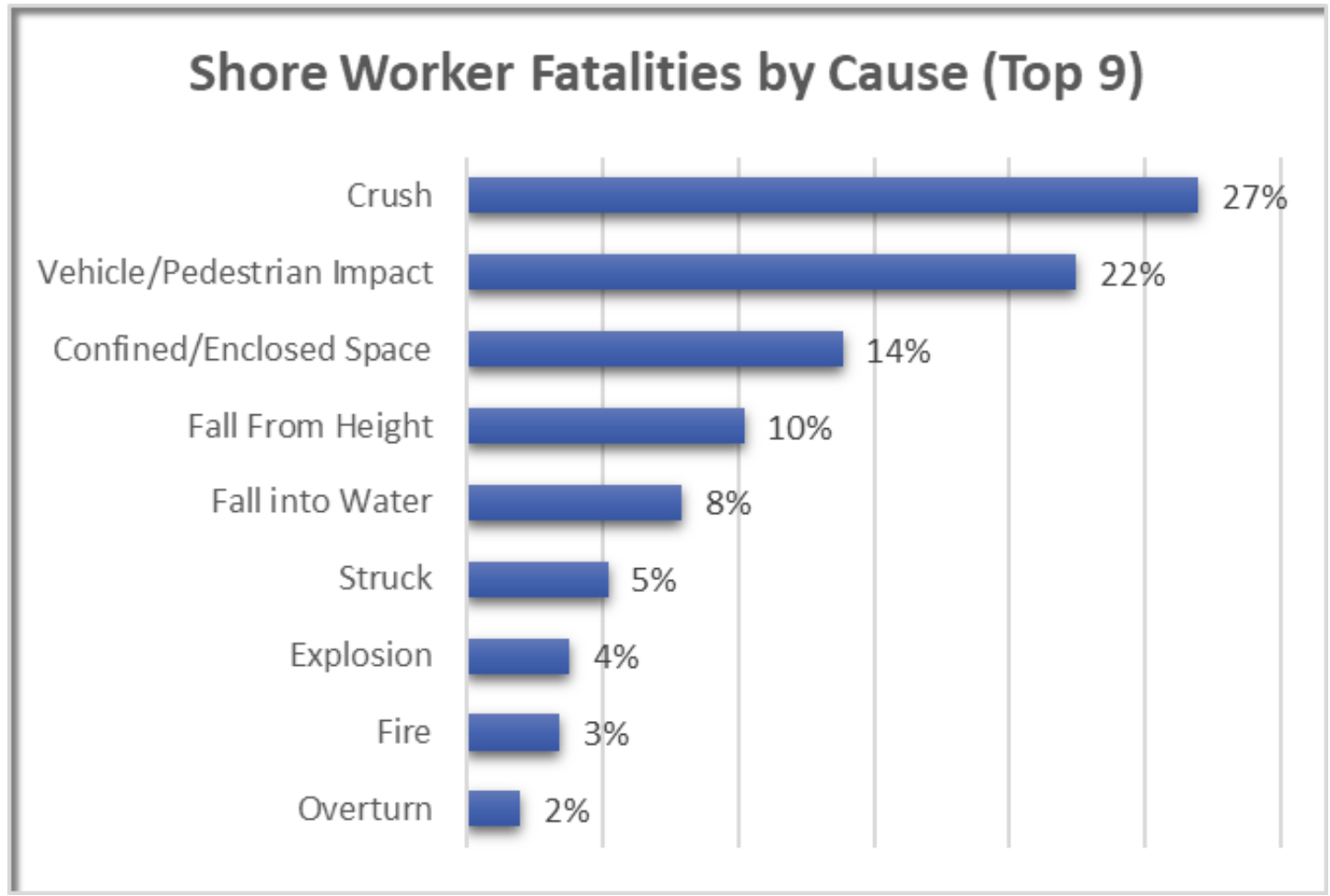
the voice of international cargo handling

severe consequence incidents

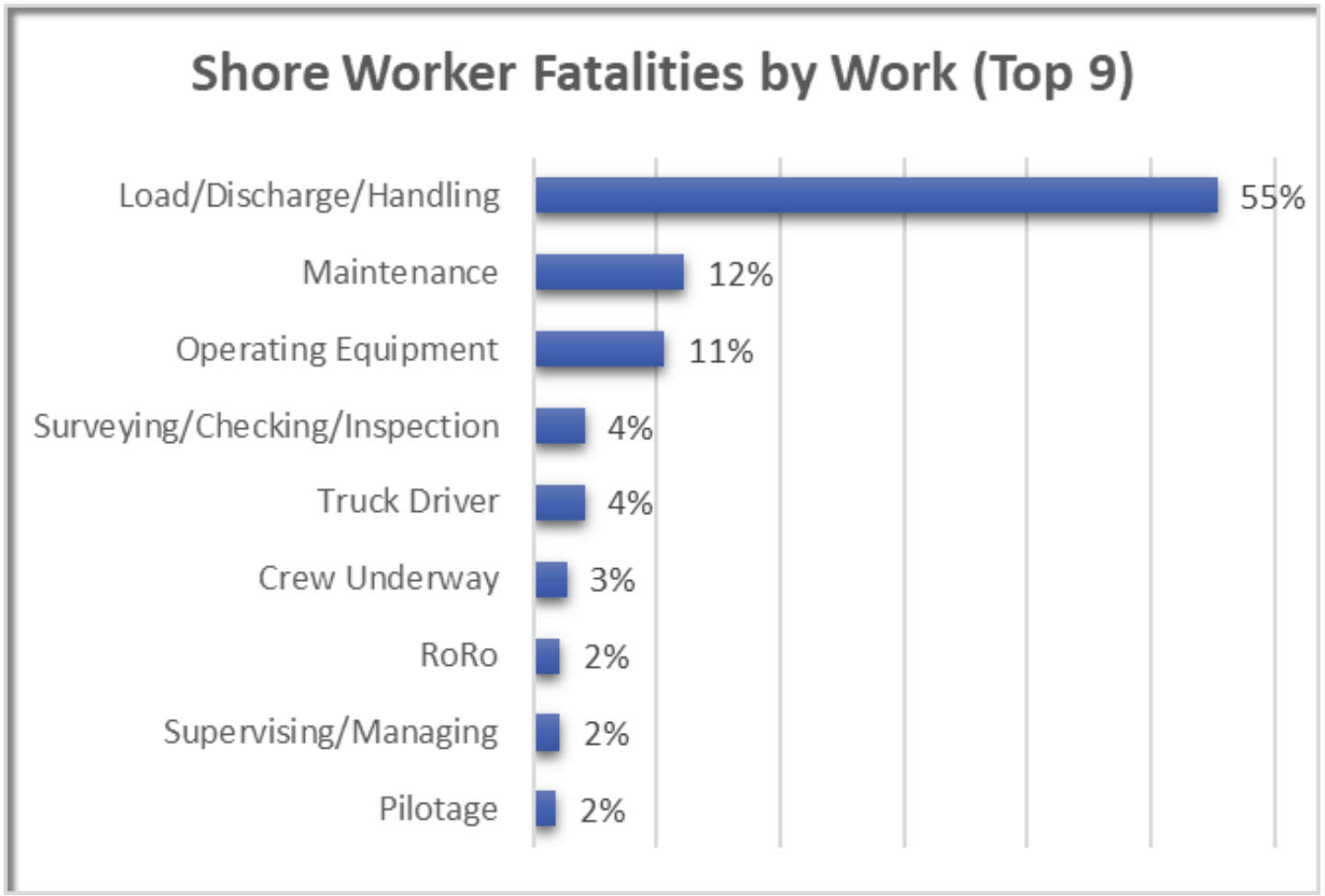


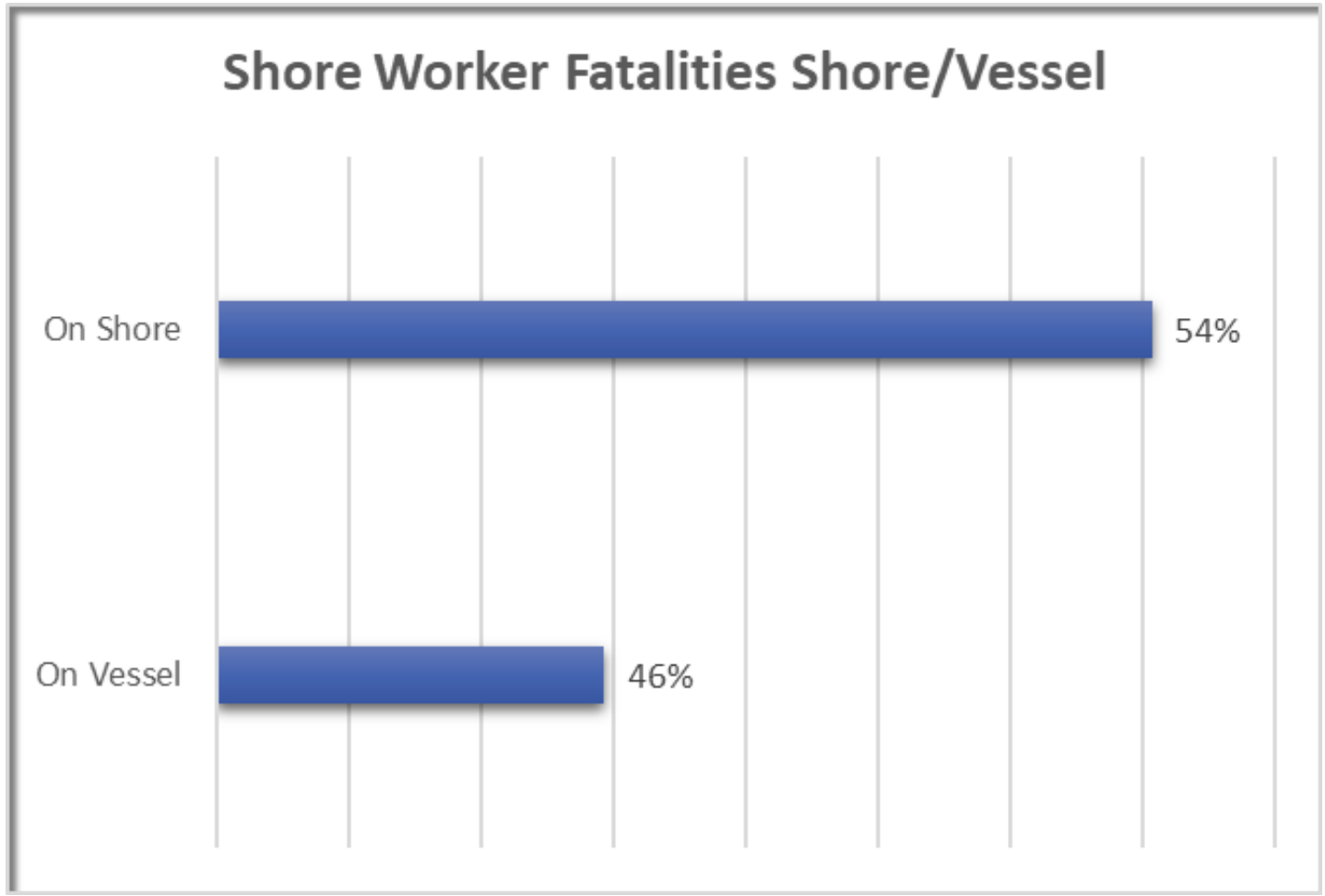




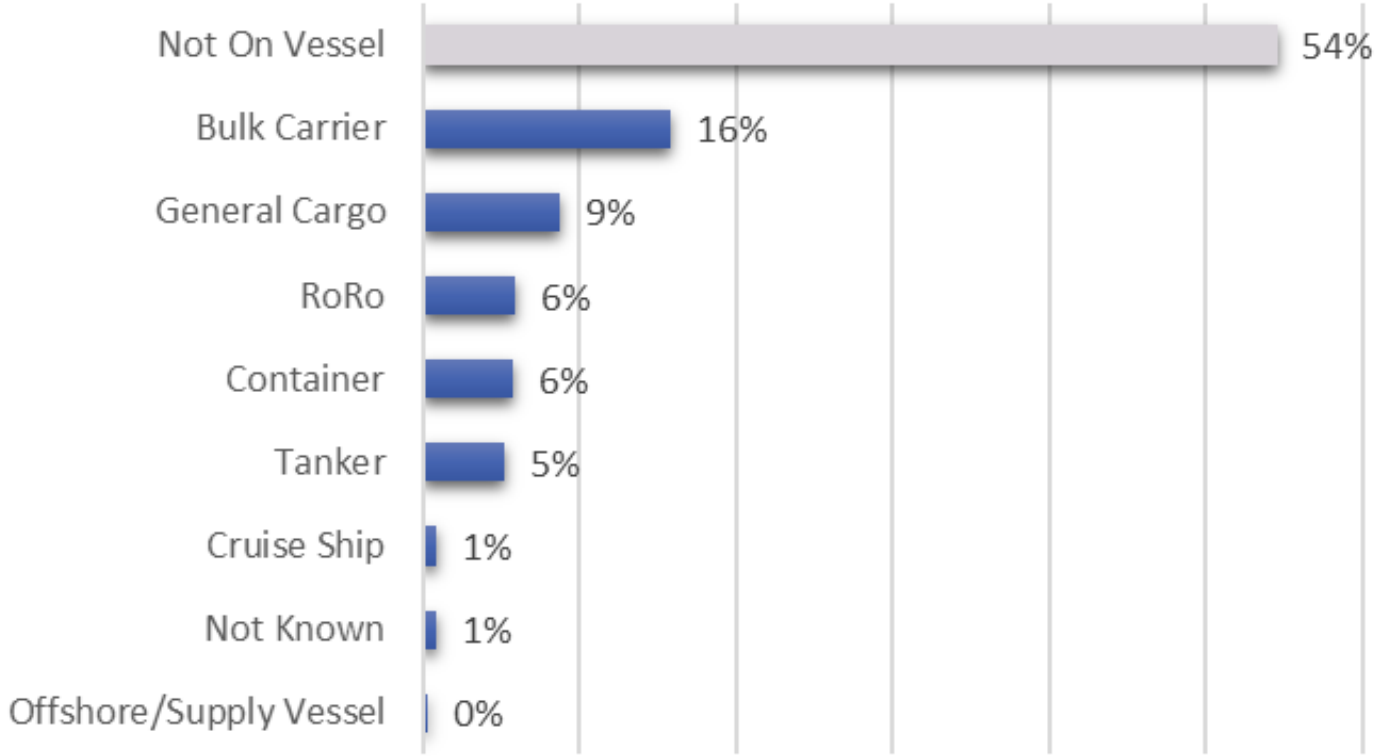


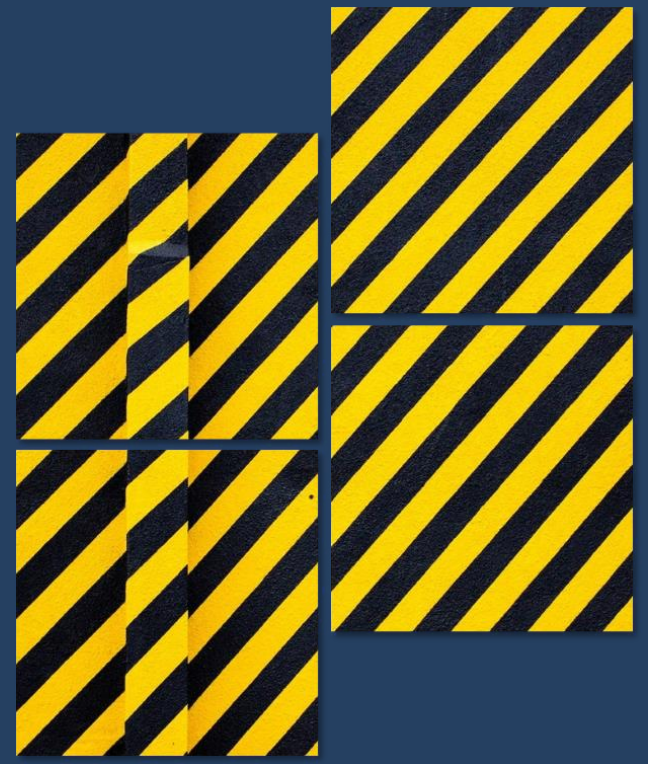
Crush	trapped between, by or under cargo (inc. cargo falling onto person)
Struck	hit by moving, flying or falling object (not including vehicle in motion)
Overturn	vehicle fall over from normal operating alignment



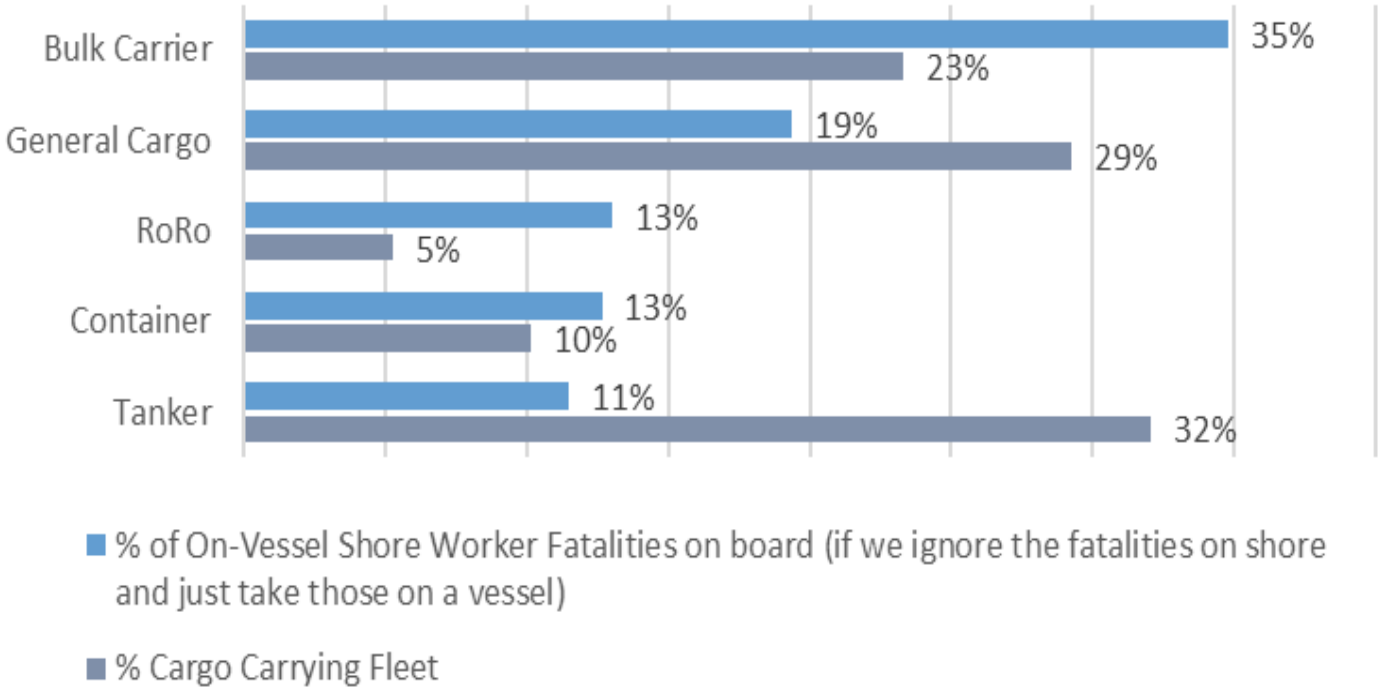


Shore Worker Fatalities by Vessel (Top 8)

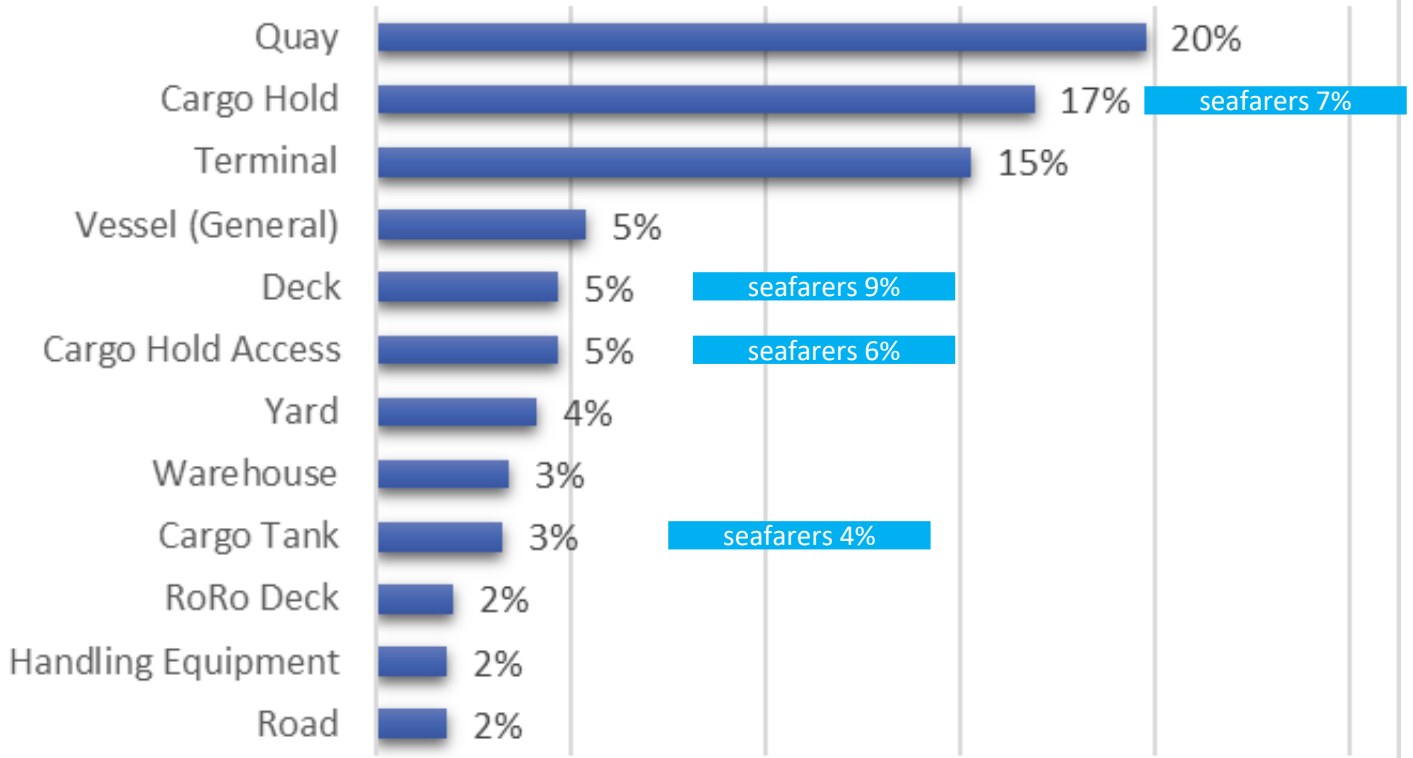


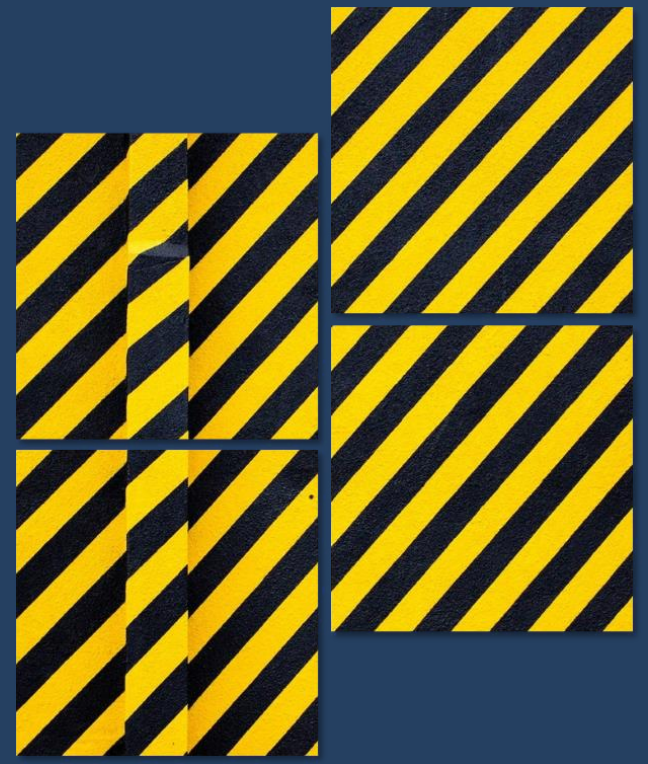


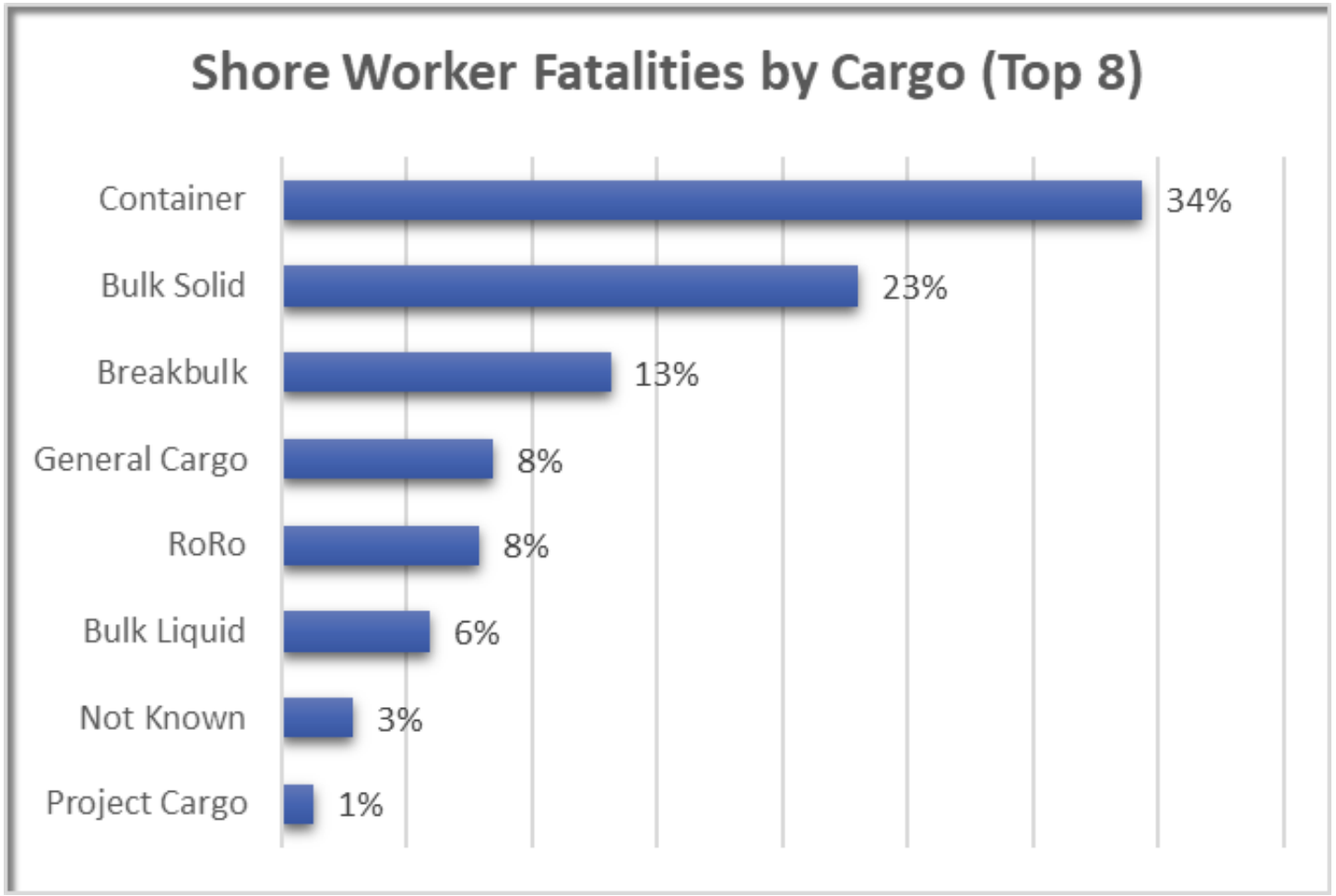
Shore personnel fatalities on board compared to world fleet size

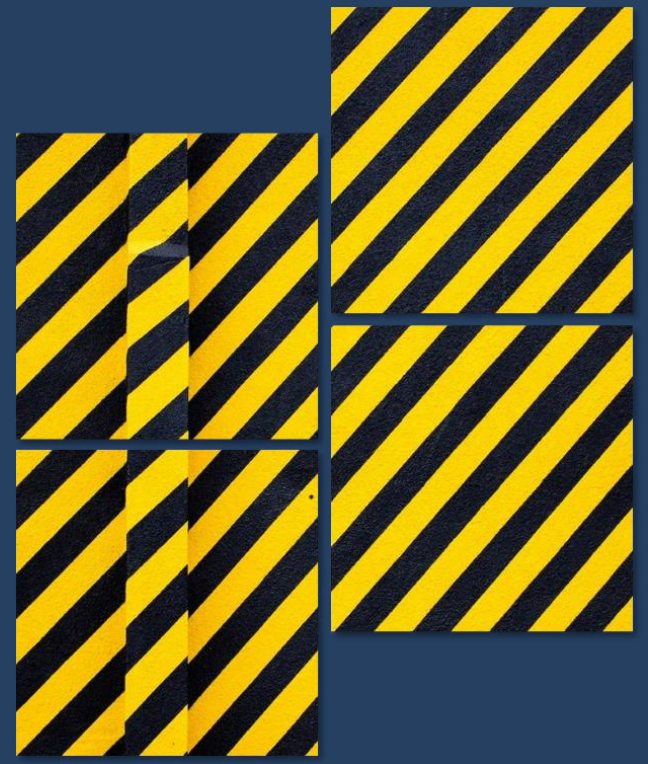


Shore Worker Fatality Locations (Top 12)









top risk locations for shore personnel	top hazards for shore personnel	top hazard work shore personnel	top hazards for crew	top risk locations for crew	top hazard work crew
Quay	Crush	Cargo Handling	Loss of Vessel	Deck	Underway
Cargo Hold	Vehicle Impact	Maintenance	Confined/ Enclosed Space	Cargo Hold Access	Maintenance
Terminal	Confined/ Enclosed Space	Driving Plant	Fall From Height	Cargo Hold	Load/ Discharge