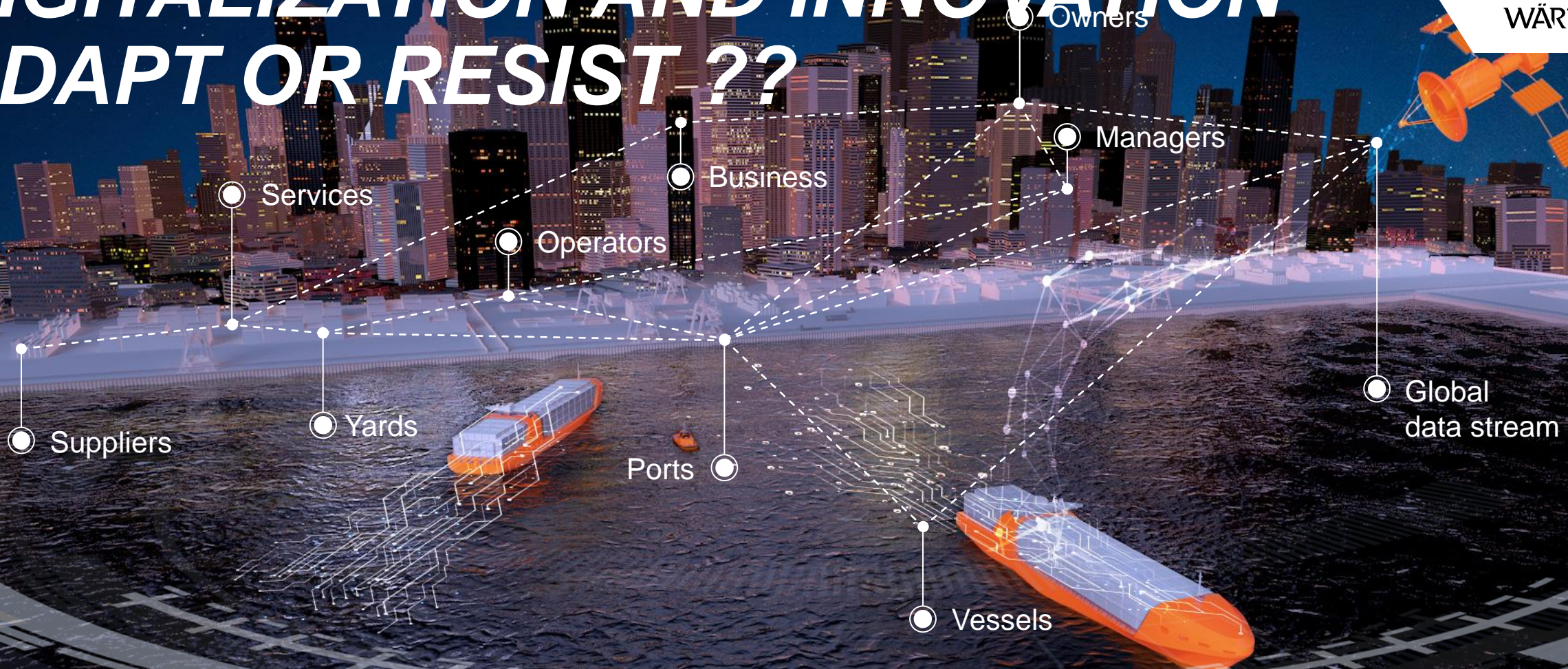


DIGITALIZATION AND INNOVATION – ADAPT OR RESIST??



SAFETY

ENVIRONMENT

EFFICIENCY

***Unknowingly or Knowingly Digitalization and Innovation have been progressing....
Some of the examples are...***

Navigation – POSITION FIXING / PASSAGE PLANNING



SEXTANT



PAPER CHARTS



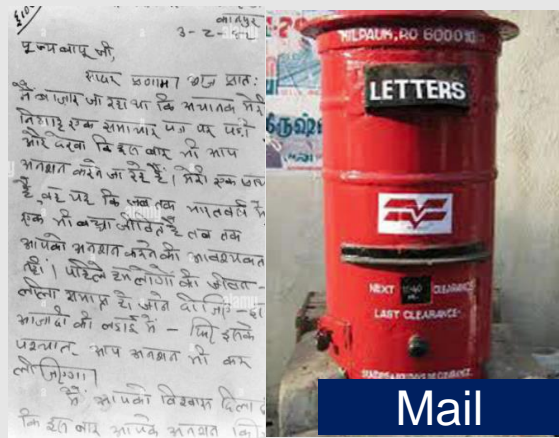
SAT NAV / GPS



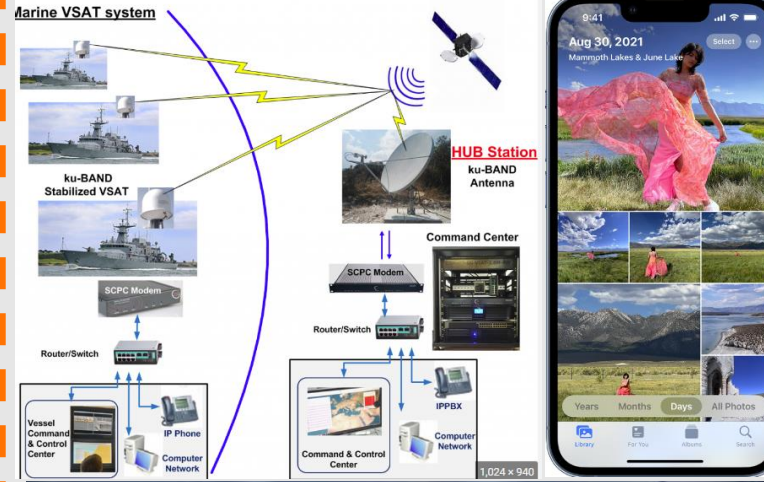
ELECTRONIC CHARTS

Digitalization journey - Analog to Digital

Communication –



Mail



54777 GEOPH HX
447702753=VRGO X
CI
KDD INMARSAT-C SERVICE 5-DEC-2014 23:25:33 UTC REF:255953
447702753=VRGO X (POR)BRXX VRG06 052333 99031 11083 41598 63208 10272
20217 40135
551170022 8/ 766 22284 02231 2 / / / / 30000 80233=
54777 GEOPH HX
447702753=VRGO X
TOD 060726



Morse code

Marconi



Mail → Radio Telegraphy → Telex messages → Email → Chats → Video calls

Digitalization journey - Analog to Digital

Vessel Reports & Monitoring

NOON REPORT

SHIP'S NAME (IN ABBREVIATE FORM) : OPOW

VOYAGE NUMBER : 12019

DATE (DD MM YY) : 01-05-2012

LATITUDE AT NOON (DEG MIN N/S) : N

LONGITUDE AT NOON (DEG MIN E/W) : E

AVERAGE SPEED DONE SINCE LAST NOON REPORT : KN

AVERAGE RPM : RPM

WIND DIRECTION AND FORCE : SE/2

SEA AND SWELL CONDITION : SLIGH/LOW

RING FULL AWAY (DD HH MN) : LT

DISTANCE TO GO : NM

ETA- PORT/ TIME : LT

R.O.B.-:

FRESH WATER (MT) : 105 MT

FUEL OIL (MT) : 66.175 MT

DIESEL OIL (MT) : 22.817 MT

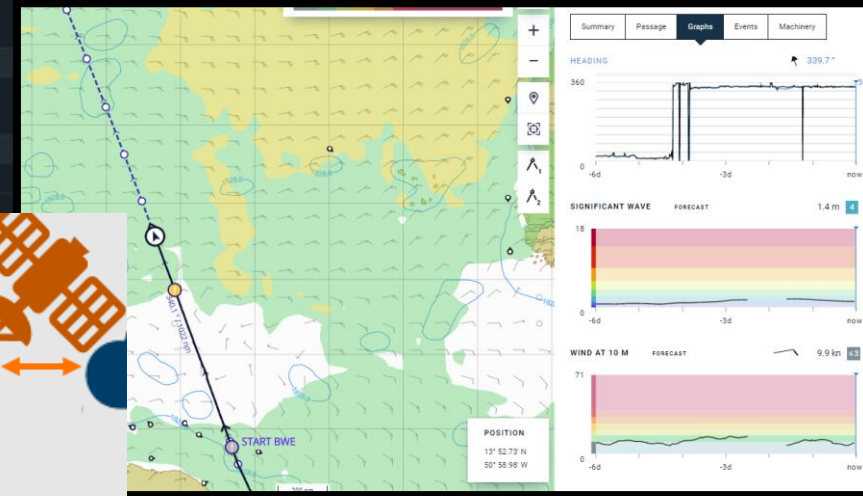
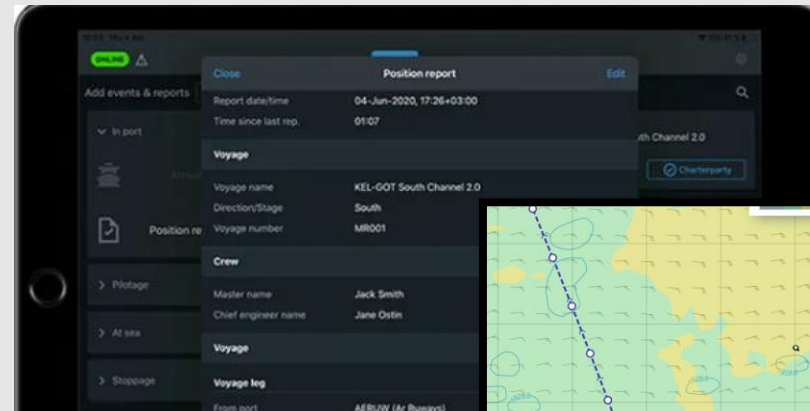
LUB OIL (M/E) (MT) : 2260 LTR

LUB OIL (A/E) (MT) : 1210 LTR

LUB OIL (HYD) (MT) :

In Port- ETC :

REMARKS: VESSEL MOORED AT TANKSTORE SINGAPORE.



FOS Planning station (NPL)



Translink\Firewall



Comms link



WiFi



VESSEL	SMARTLOG VERSION	LATEST OPERATIONAL REPORT TIME (UTC)	TOTAL GAP COUNT	OPERATIONAL REPORT COUNT	AT SEA	IN PORT	ANCHORED	MANEUVERING	DRIFTING	PASSAGE COUNT	REPORTING STARTED
All Vessels			0	56	68.7 %	17.0 %	10.1 %	3.7 %	0.6 %	3	2021-04-07
FOS Celeste		2022-11-21 07:00	0	64	93.0 %	5.2 %	0.0 %	1.8 %	0.0 %	7	2022-08-26
FOS Malva		2022-11-21 10:05	0	56	95.0 %	3.6 %	0.0 %	1.4 %	0.0 %	5	2022-08-26
FOS Marina		2022-11-21 07:00	0	58	93.9 %	4.5 %	0.0 %	1.6 %	0.0 %	6	2022-08-26
FOS Verde		2022-11-21 07:00	0	62	93.5 %	4.6 %	0.0 %	1.9 %	0.0 %	7	2022-08-26

Manual, Human error

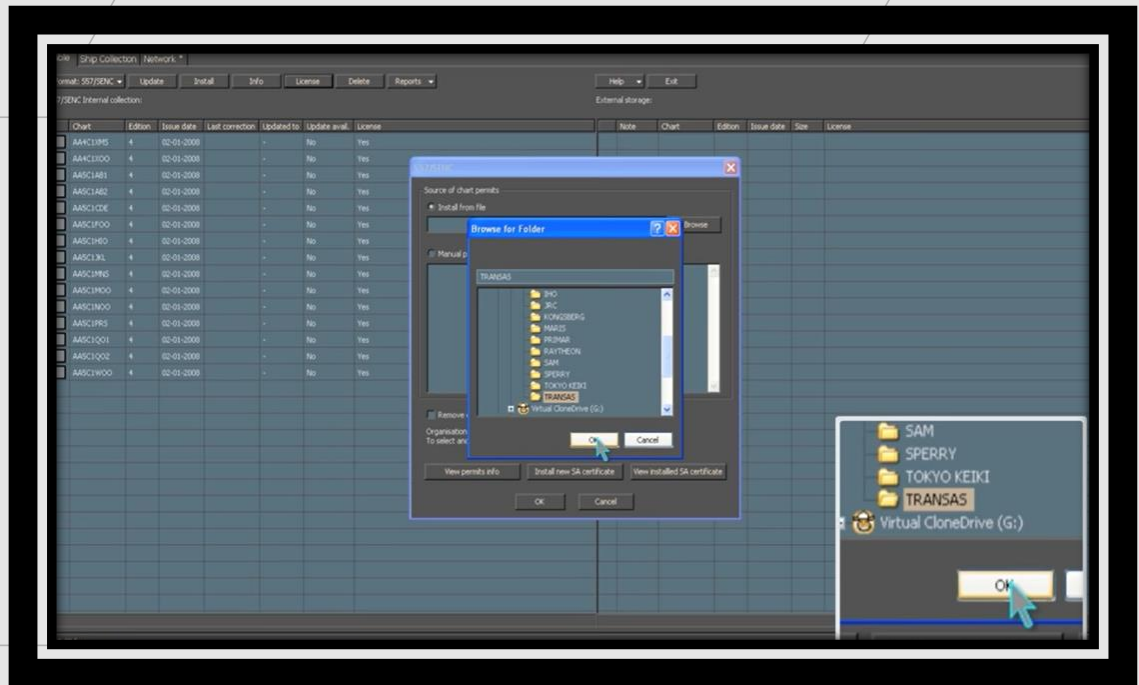
Hybrid, Reduced Human error

Digitalization journey - Analog to Digital

Chart Correction



Manual task, time consuming, error prone, judgement issue



Automated, saves time, free of human error,

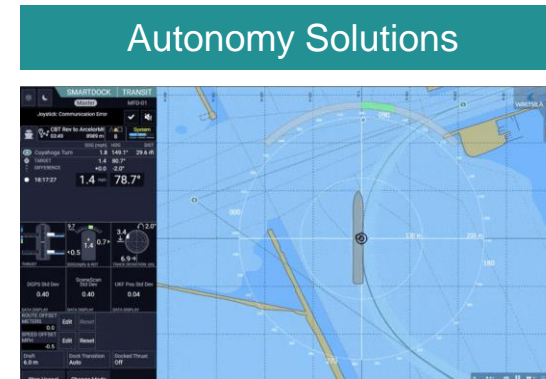
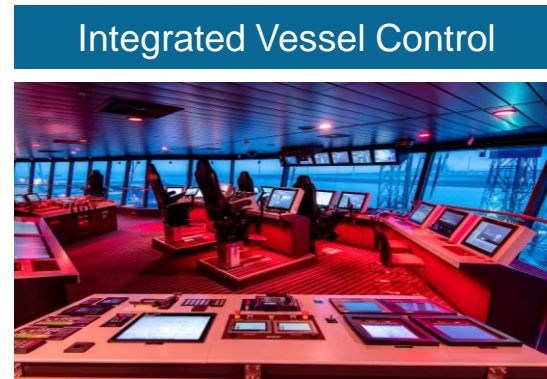
Digitalization journey - Analog to Digital

Is Digitalization causing disruption...?

Do We have Choice ??

Let us see...!

DIGITAL TRANSFORMATION TO UNLOCK SHIPPING'S POTENTIAL



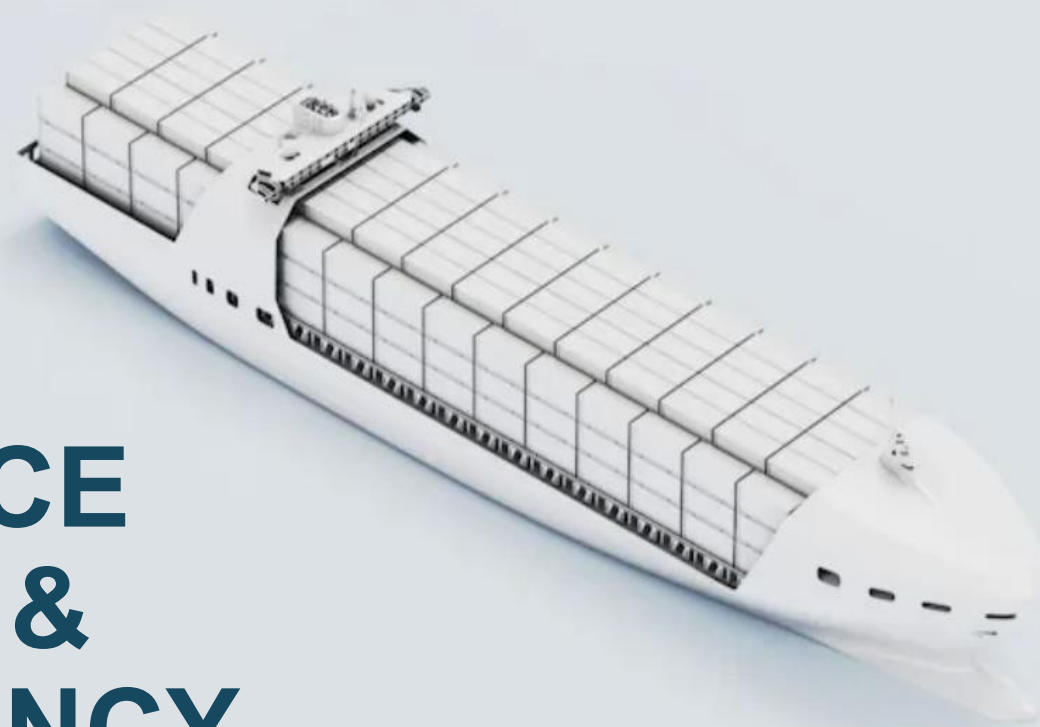


SMART ROUTING
VOYAGE PLANNING, JUST-IN-TIME ARRIVALS (PTA, RTA, ATA)

Smart routing and voyage planning Connecting Navigation and Automation to secure cloud

CONNECTED ECDIS

- Ship-to-shore connectivity
- Auto-routing and auto-voyage planning, wx optimizing
- Onshore tracking and awareness, fuel optimization,

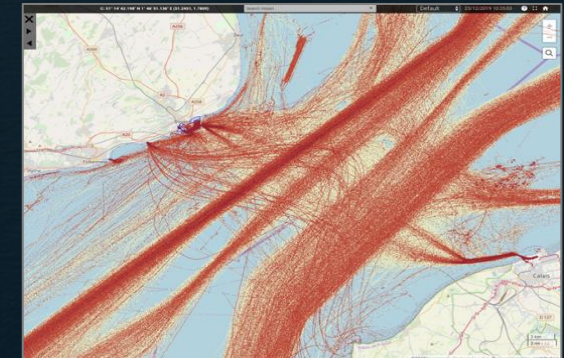
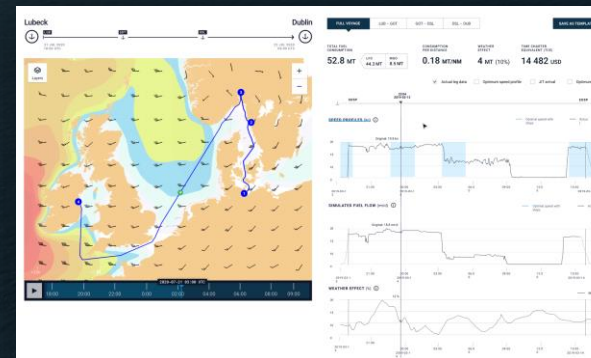
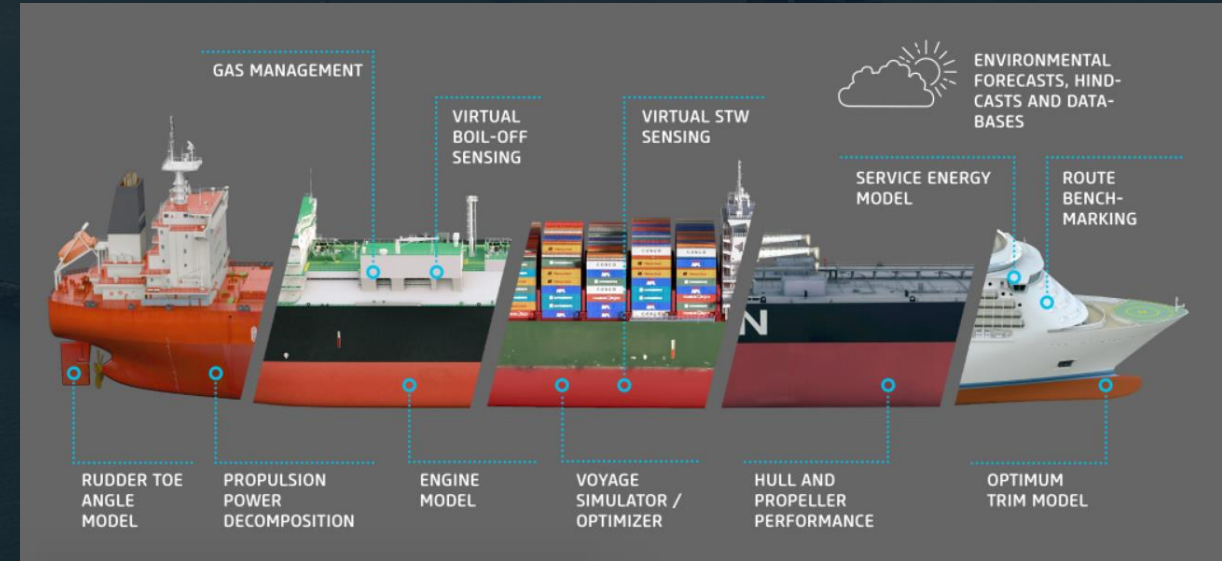


**PERFORMANCE
MONITORING &
FUEL EFFICIENCY
REAL-TIME FLEET TRACKING**

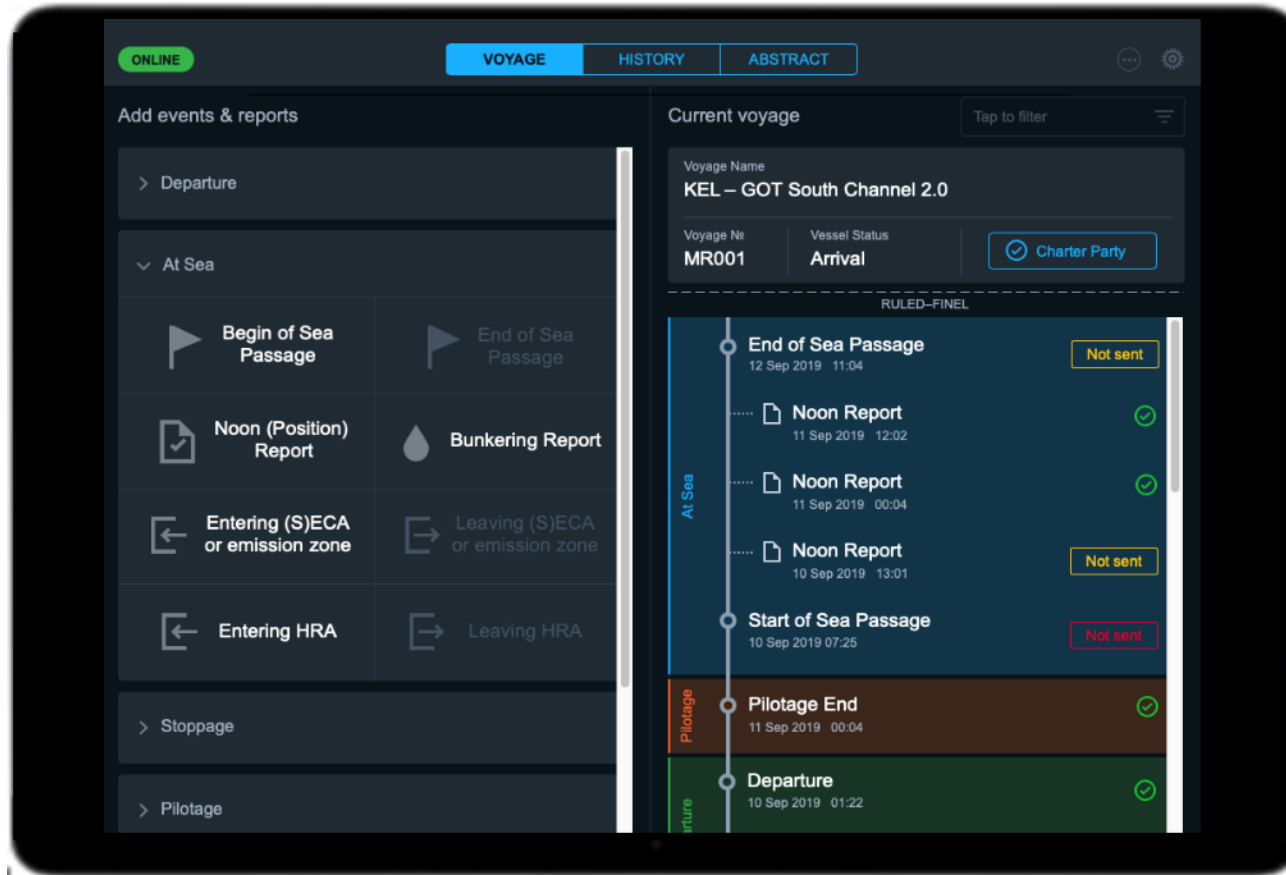
Performance Monitoring and Fuel Efficiency

BUSINESS INTELLIGENCE PLATFORM

- Collections of data across the platform
- Dashboard KPI on performances, congestion, traffic density, emissions, dues...
- Analytics for forecast, investment decisions and optimization of processes and infrastructure
- condition based and Predictive maintenance



FIRST MOBILE USE CASE: A CONNECTED BRIDGE ALLOWS FOR A NEW WAY OF SHIP-TO-SHORE REPORTING

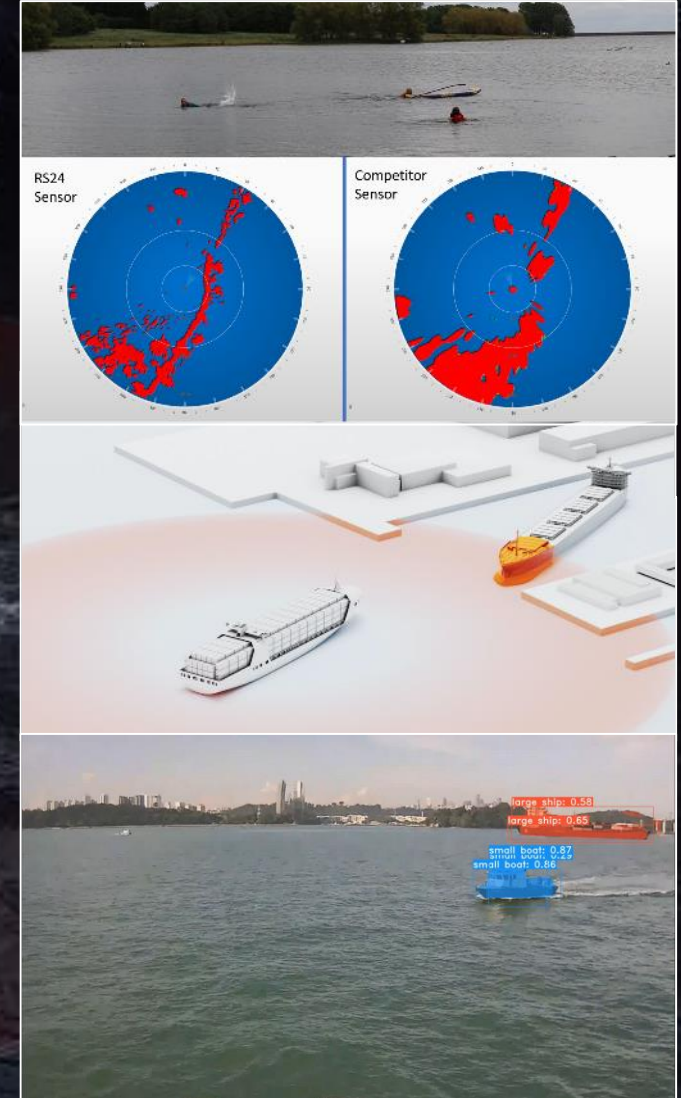


- Easy voyage time-stamp collection by push-button
- ECDIS data pre-filling
- Benchmarking data collection
- Plausibility checking
- Minimum manual data input

Situational awareness and collision avoidance

SENSOR FUSION

- Guard Circle
- Near field high resolution radar
- Maritime Video AI



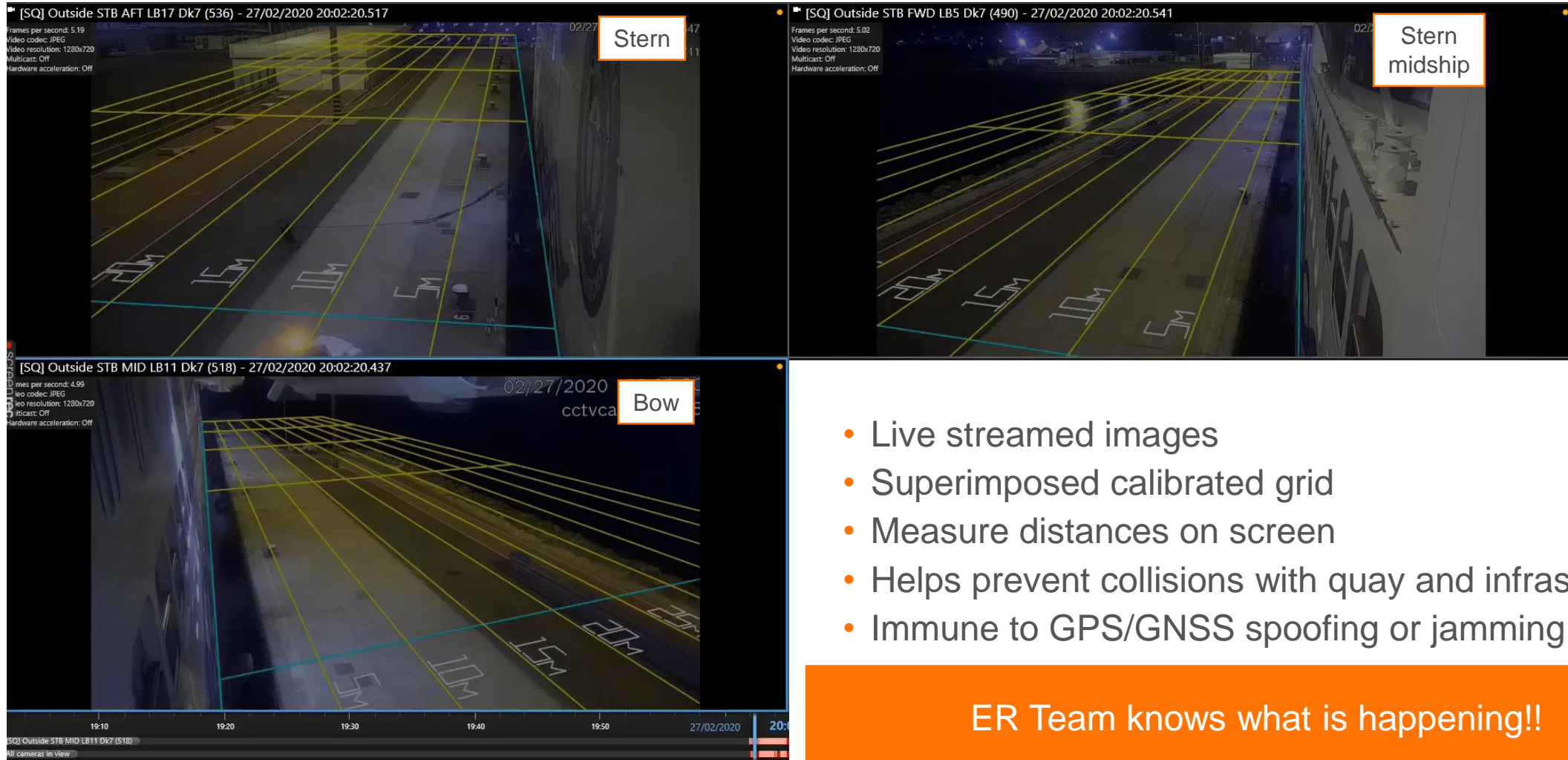
SMART PANORAMIC SENSOR SUITE

360 field of view

- Low maintenance cameras
- Calibrated for distance measurement
- AI hazard detection and object recognition
- Augmented reality user interface



SMARTQUAY (SQ) – FOR ASSISTANCE WITH DOCKING 入港輔助



- Live streamed images
- Superimposed calibrated grid
- Measure distances on screen
- Helps prevent collisions with quay and infrastructure
- Immune to GPS/GNSS spoofing or jamming

ER Team knows what is happening!!

Action and Control

SMARTMOVE SUITE

- The world's first commercially available auto-docking system
- Performs port-to-port operations and auto-docking maneuvering for safer and more efficient operations
- Mitigates potential human errors in tight docking spaces

CYSCAN WITH SMARTDOCK – FOLGEFONN FERRY

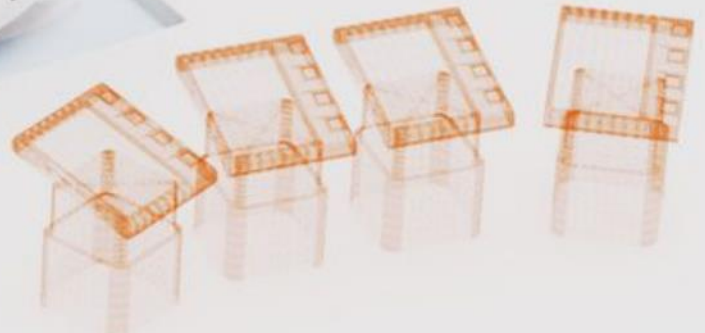
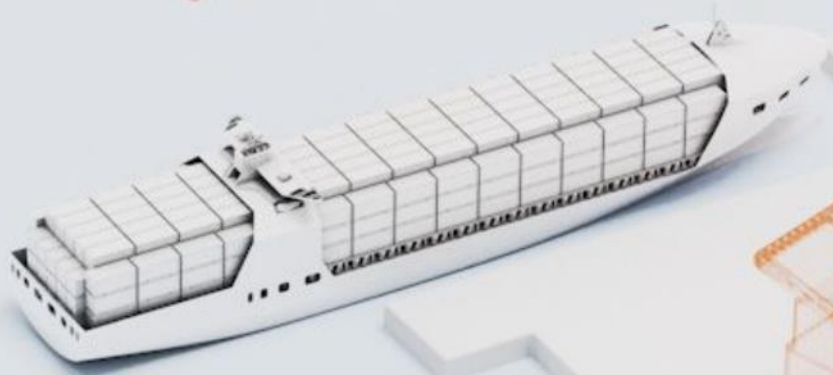
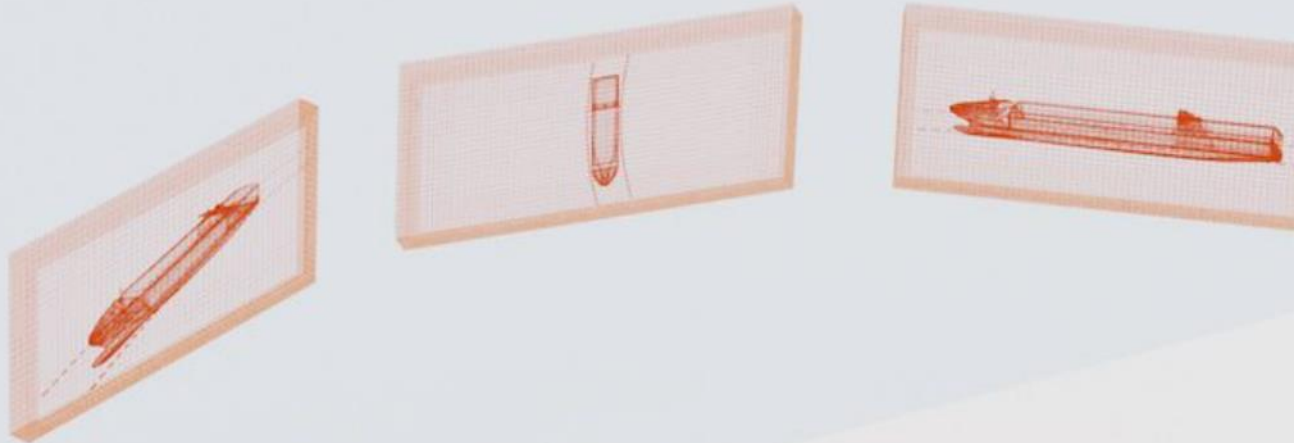


SmartDock

- **The world's first** commercially available auto-docking system
世界上第一个商业上可用的自动对接系统
- Performs port-to-port operations and auto-docking maneuvering for safer and more efficient operations
行港口到港口操作和自动对接操作，使操作更安全、更高效
- Mitigates potential human errors in tight docking spaces
减少紧密对接空间中的潜在人为错误

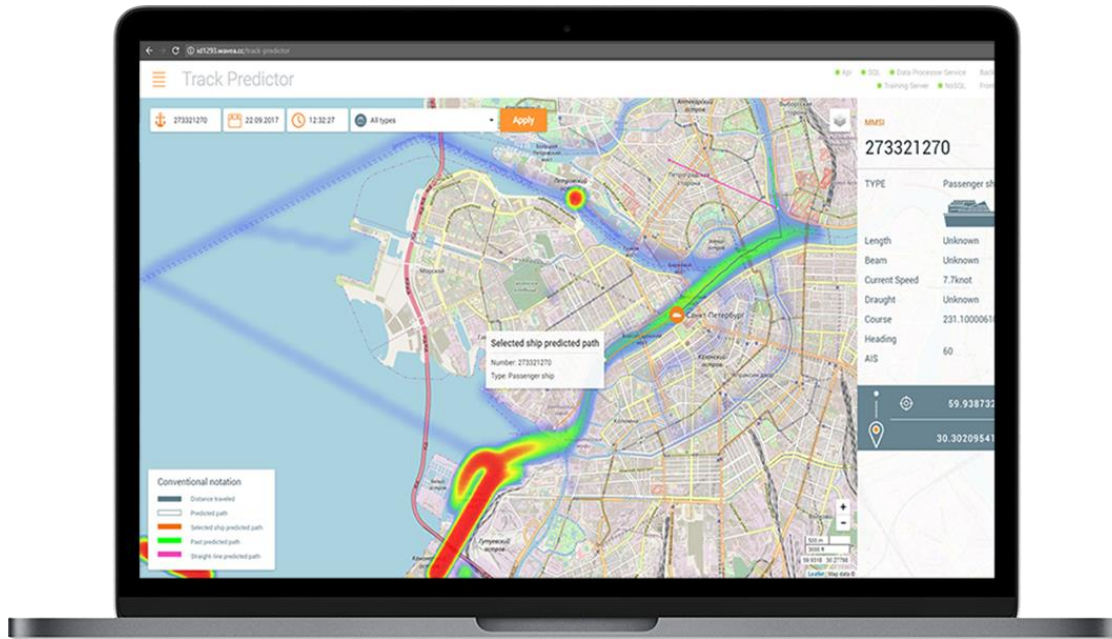


DECISION & LOGIC



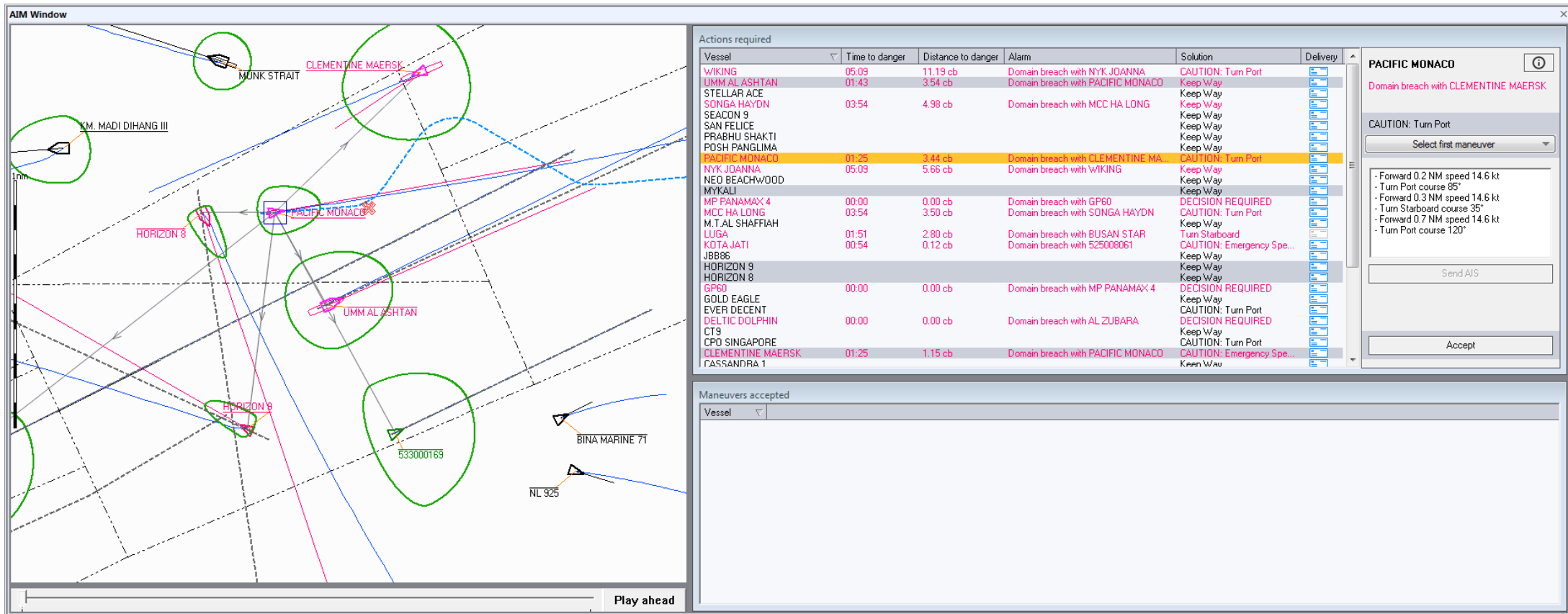
AIM – ADVANCED INTELLIGENT MANEUVERING

AIM is a path planning & track prediction AI designed to calculate the optimal route while accounting for collision risks detected by the situational awareness system



- 15-20 minutes reliable ship trajectory prediction for the area (98.5% accuracy)
- Recommendations of safe & efficient maneuvers to avoid collisions
- Prediction of potential collision and grounding events
- Identification of safety distance parameters applicable for the area

AIM – PATH PLANNING, COLREGS COMPLIANCE



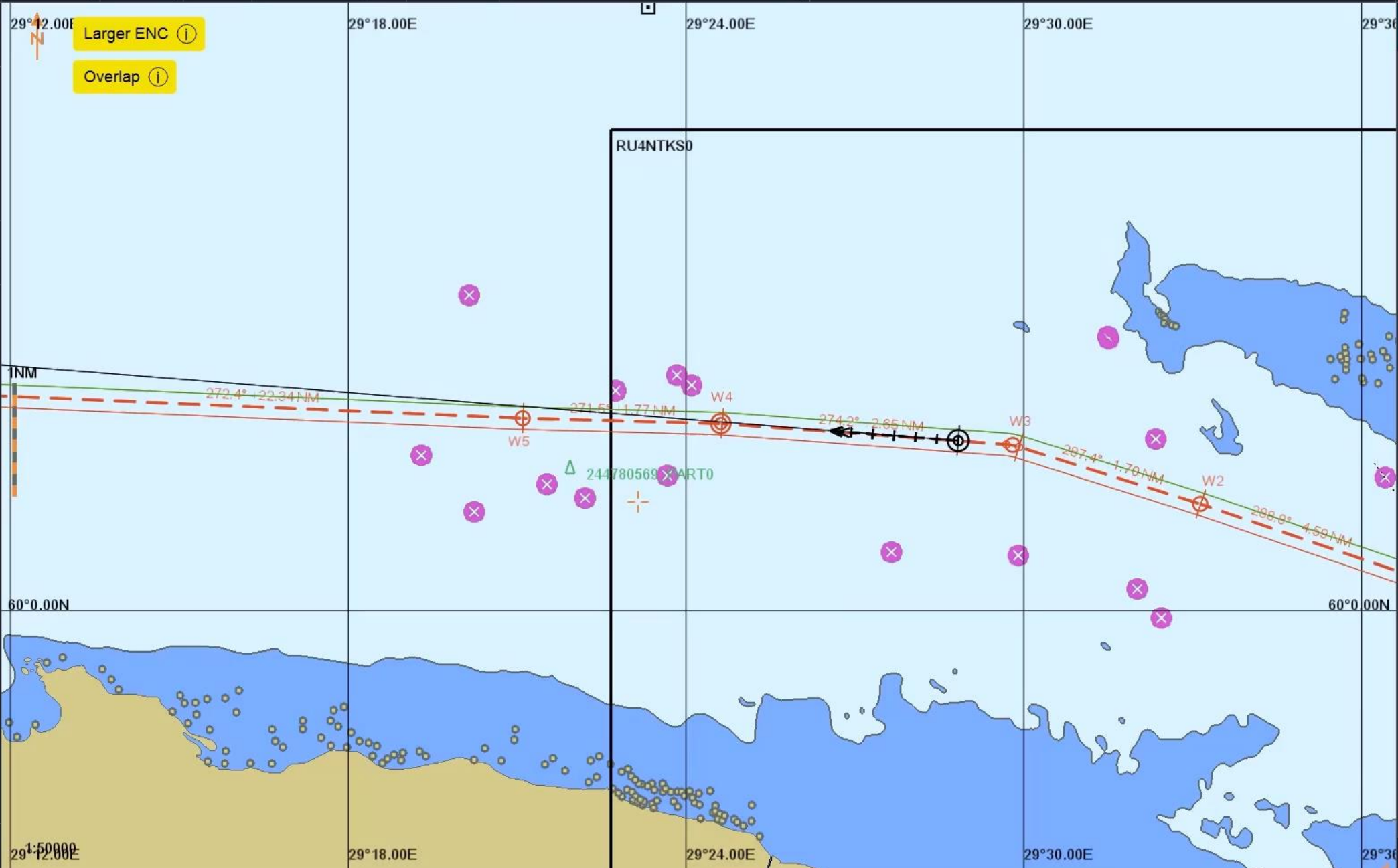
The screenshot displays the AIM Window interface, which includes a map view on the left and a data table on the right. The map shows several vessels with their predicted paths and safety zones. The table lists the actions required for each vessel, including time to danger, distance to danger, alarm type, and the recommended solution.

Vessel	Time to danger	Distance to danger	Alarm	Solution	Delivery
WIKING	05:09	11.19 cb	Domain breach with NYK JOANNA	CAUTION: Turn Port	
UMM AL ASHTAN	01:43	3.54 cb	Domain breach with PACIFIC MONACO	Keep Way	
STELLAR ACE				Keep Way	
SONGA HAYDN	03:54	4.98 cb	Domain breach with MCC HA LONG	Keep Way	
SEACON 9				Keep Way	
SAN FELICE				Keep Way	
PRABHU SHAKTI				Keep Way	
POSH PANGLIMA				Keep Way	
PACIFIC MONACO	01:25	3.44 cb	Domain breach with CLEMENTINE MAERSK	CAUTION: Turn Port	
NYK JOANNA	05:09	5.66 cb	Domain breach with WIKING	Keep Way	
NEO BEACHWOOD				Keep Way	
MYKALI				Keep Way	
MP PANAMAX 4	00:00	0.00 cb	Domain breach with GP60	DECISION REQUIRED	
MCC HA LONG	03:54	3.50 cb	Domain breach with SONGA HAYDN	CAUTION: Turn Port	
M.T.AL SHAFFIAH				Keep Way	
LUGA	01:51	2.80 cb	Domain breach with BUSAN STAR	Turn Starboard	
KOTA JATI	00:54	0.12 cb	Domain breach with 525008061	CAUTION: Emergency Spe...	
JBB86				Keep Way	
HORIZON 9				Keep Way	
HORIZON 8				Keep Way	
GP60	00:00	0.00 cb	Domain breach with MP PANAMAX 4	DECISION REQUIRED	
GOLD EAGLE				Keep Way	
EVER DECENT				CAUTION: Turn Port	
DELTA DOLPHIN	00:00	0.00 cb	Domain breach with AL ZUBARA	DECISION REQUIRED	
CTS				Keep Way	
CPO SINGAPORE				CAUTION: Turn Port	
CLEMENTINE MAERSK	01:25	1.15 cb	Domain breach with PACIFIC MONACO	CAUTION: Emergency Spe...	
CASSANDRA 1				Keep Way	

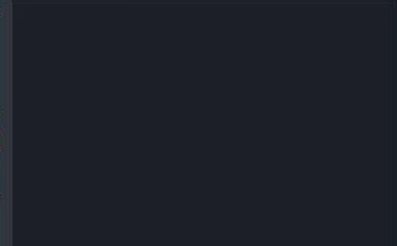
The right-hand panel shows a detailed view for the vessel PACIFIC MONACO, including a list of maneuvers and a 'Send AIS' button. The bottom of the interface features a 'Play ahead' button.

COLREGs does not work by itself:

- System should identify safe distance based on statistical analysis for each navigation area.
- The system should raise an alert only when ships will soon be in dangerous situation according to their predicted tracks/planned routes and local maneuvering limits.
- Analysis and track calculation should include other dangers such as wave/wind dangers etc.
- That's significant step ahead compared to traditional "dead reckoning" and CPA/TCPA technique



CPA 1.4 NM
TCPA 35 min
ASSN AIS
T VECT 6 min



Accept maneuver
Reset to user route

Icecream
Settings

CHART DISPLAY BASE
SENC: RU4NTKQ0 FIX SHOW

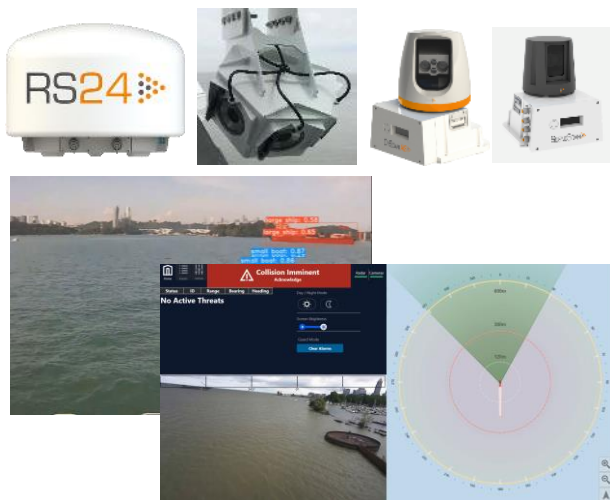
11:20:17
27-08-20
APPS

BUILDING BLOCKS OF AUTONOMY

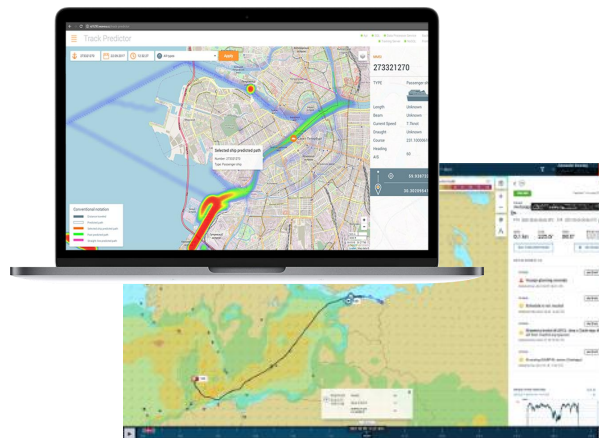
APPLICATIONS



SITUATIONAL AWARENESS

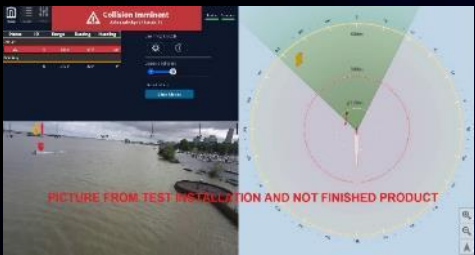


DECISION & LOGIC



ACTION & CONTROL





AutoLookout detects and tracks small watercraft by two modalities

SmartMove automatically drives the ship precisely along a route

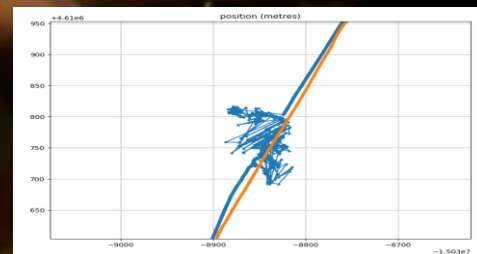


AUTOMATED ✓



SmartDock automatically docks your vessel – and undocks it once ready

SceneScan SLAM provides GNSS independent position in urban canyon

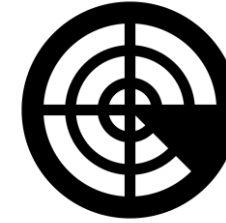


PULLING TOGETHER DIVERSE TECHNOLOGIES

Terminal
Transparent control
of logistical process

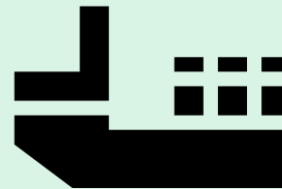


5G network



Vessel Traffic Service
Closes the loop from monitoring
to controlling unmanned ships

UNMANNED



EMISSION FREE

SPECS
(optical)



Multi-modal near-field
object detection

RS24
(high-res radar)

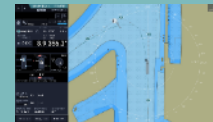


CyScan AS
(targeted laser)

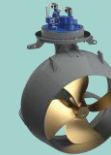


GNSS independent
positioning

SmartMove
(trajectory control)



Electric propulsion

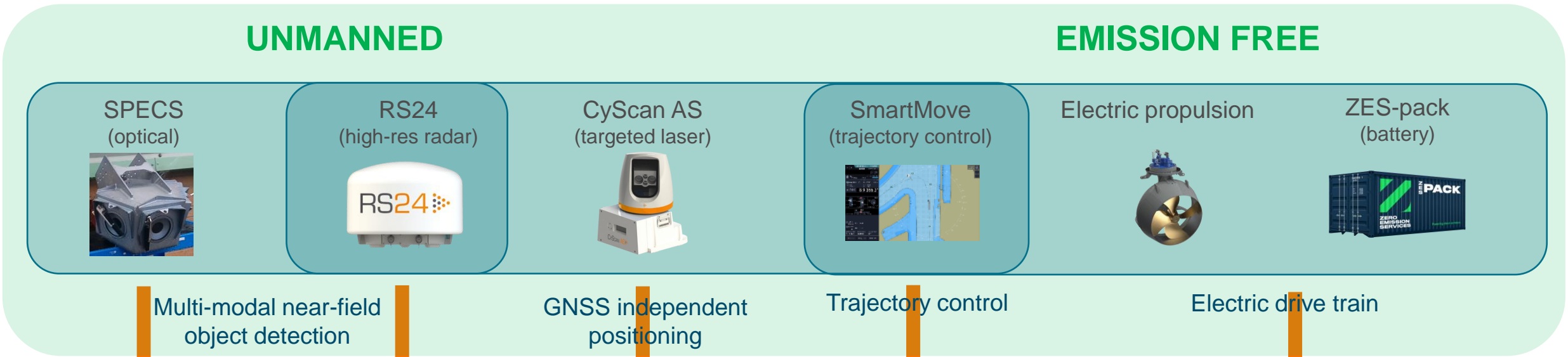


Electric drive train

ZES-pack
(battery)



TO BE BUILT ON PROVEN GROUND



Summer 2021
Bird's Eye View function on ULCS delivered by SPECS



2019
IntelliTug pioneers near-field situational awareness



2018
Ferry "Folgefonn" conducts world's first auto-docking in Norway



2020
Laker "American Courage" automatically negotiates the "Crooked River"



September 2021
First shipment of Heineken beer being delivered on an electric inland barge with modular and containerized battery



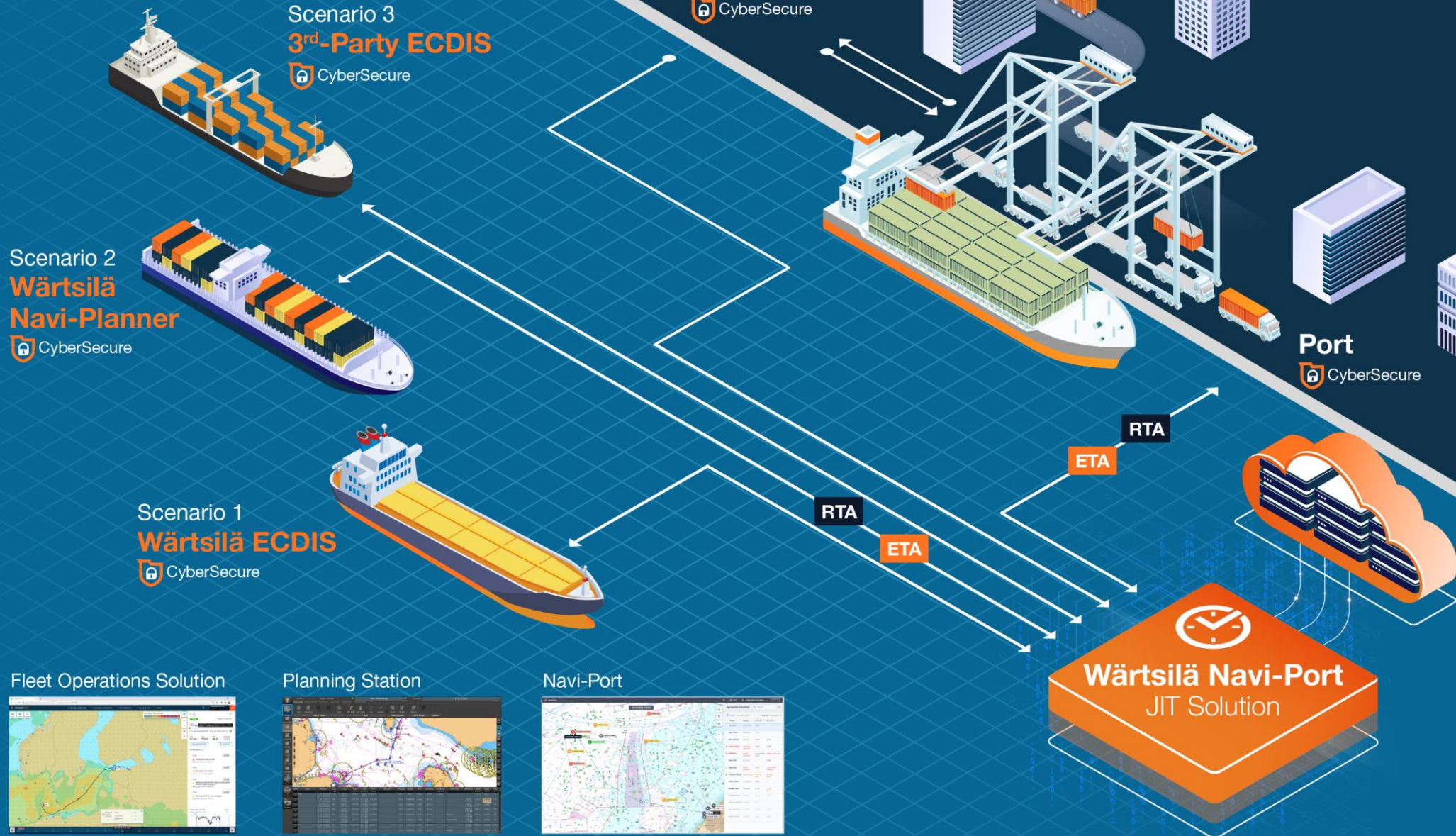
CO2 still left in here...

ONSHORE SOLUTIONS

FLEET OPERATIONS,
SIMULATION & TRAINING,
SHIP TRAFFIC CONTROL



HOW IT WORKS

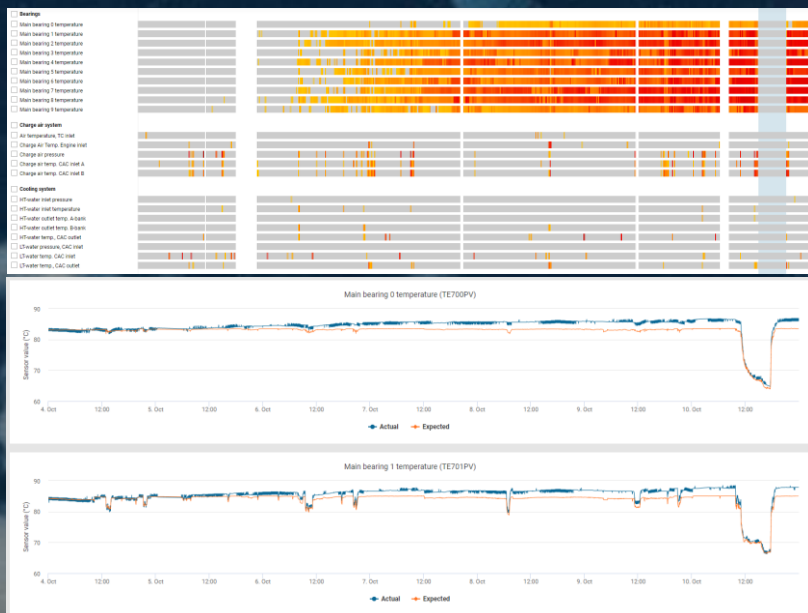
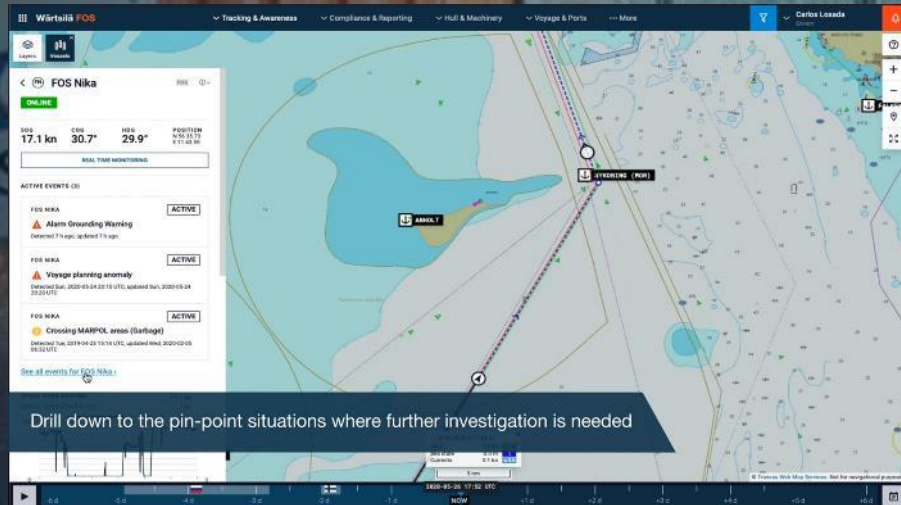
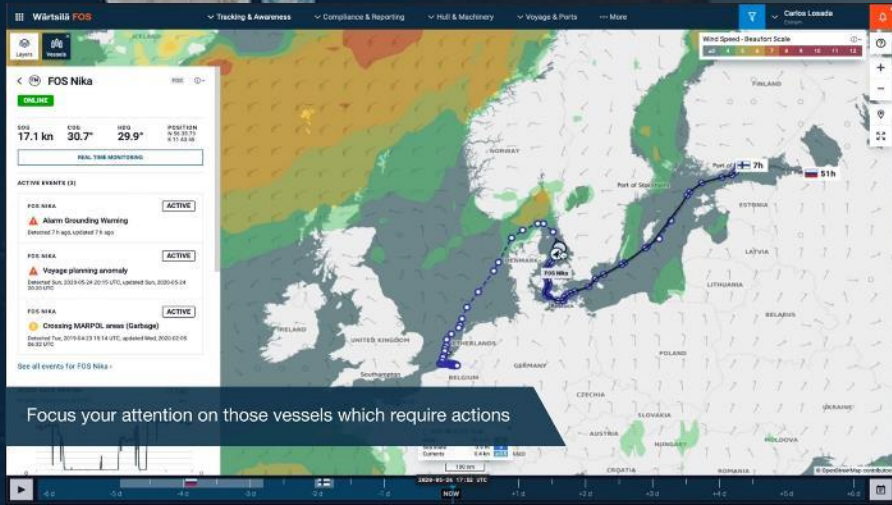


FLEET OPERATIONS AND MONITORING

- Fleet Operation Solution
- Connected Automation & condition-based monitoring
- Digital twinning

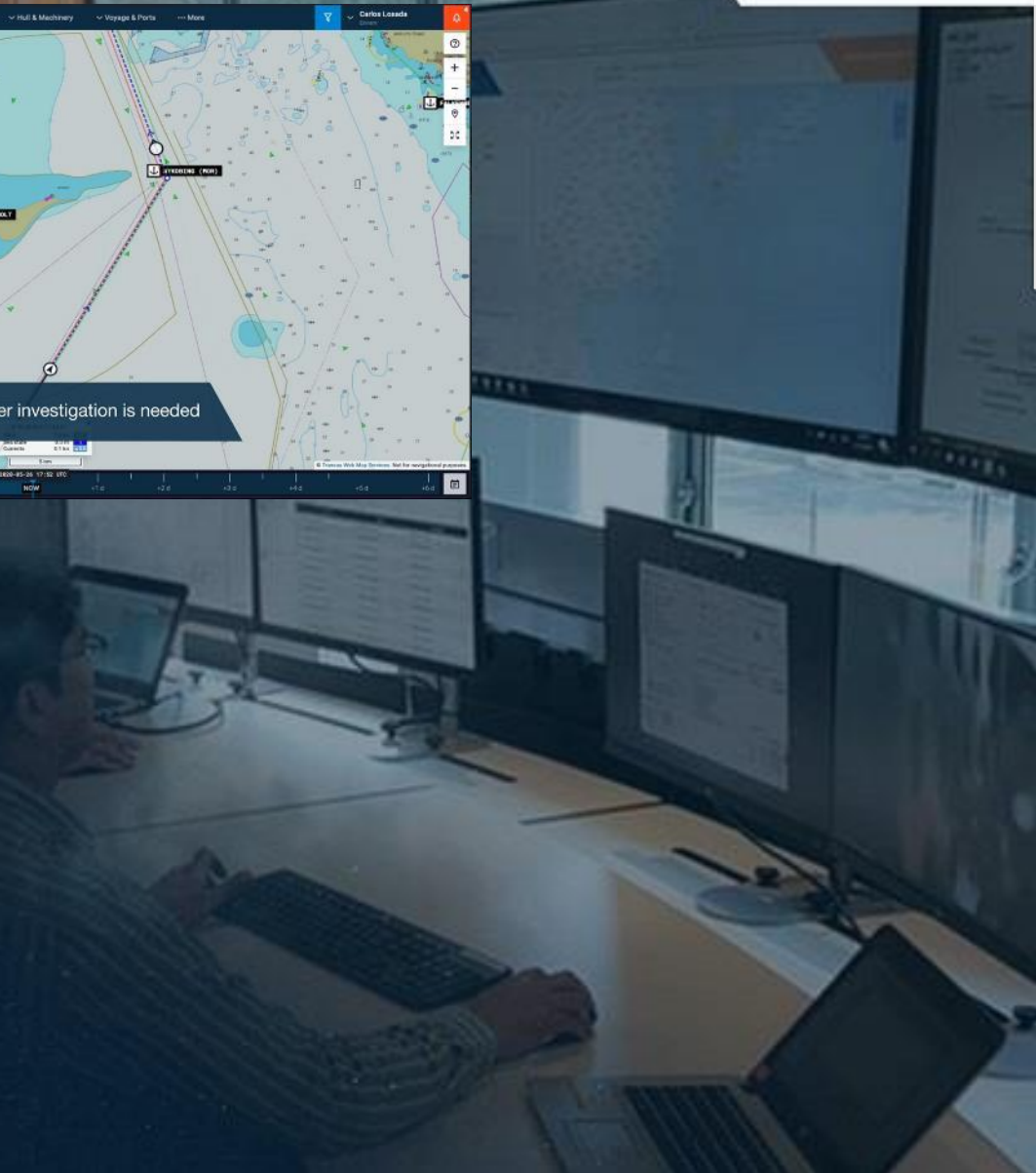


FLEET OPERATIONS AND MONITORING



Main bearing temperature increase

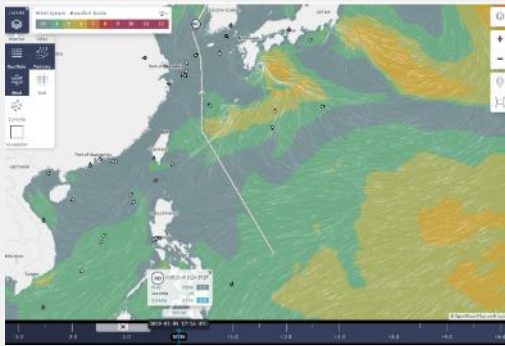
- DJ** **Opened case**
- PP** **Added fragment**
7 Oct, 10:42
Seemingly the temperature gradually increasing in all units. Please check the condition of oil (that it not contaminated by HFO). Or alternatively the LT valve adjustments slightly changed.
- DJ** **Added fragment**
7 Oct, 14:24
still high main bearing temperatures
- PP** **Added fragment**
14 Oct, 16:05
- 1E**
1 Nov, 15:25
After injector tightness test, 3 sealing sets replaced due to leak of HFO, LO refreshed we are monitoring
- PP**
7 Nov, 02:00
Thanks for the info. Could You also check and comment to the situation on DG#2?
- CE** **Closed case**
8 Nov, 13:53
26 Nov, 23:25



WÄRTSILÄ FLEET OPTIMISATION SOLUTION (FOS) FOR REMOTE MONITORING

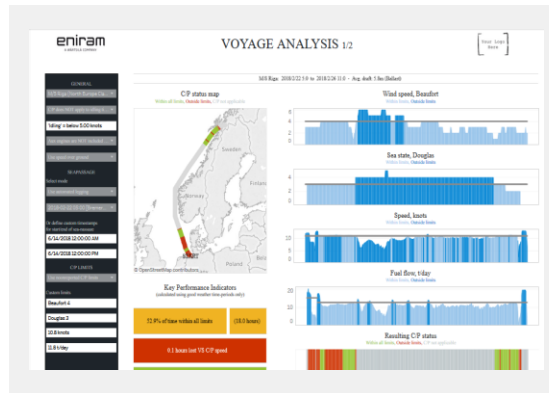
Tracking & Awareness

Full transparency of navigation, i.e. for emergency response. Real time and predictive situation awareness



Compliance & Reporting

Ensuring Charter Party and Environmental compliance (e.g. MRV)



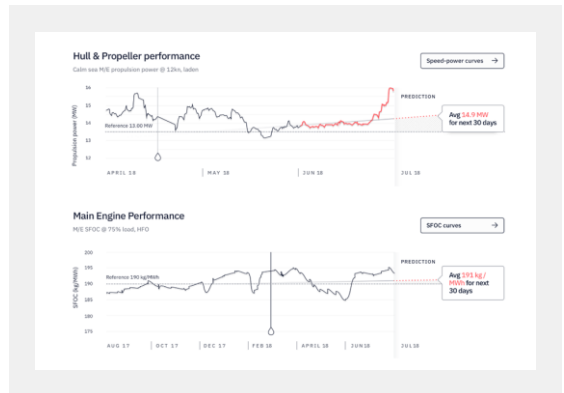
Voyage & Ports

Optimize voyage and speed behaviour as well as port stays



Engine & Hull

Optimize hull, propeller and engine condition as well as engine usage



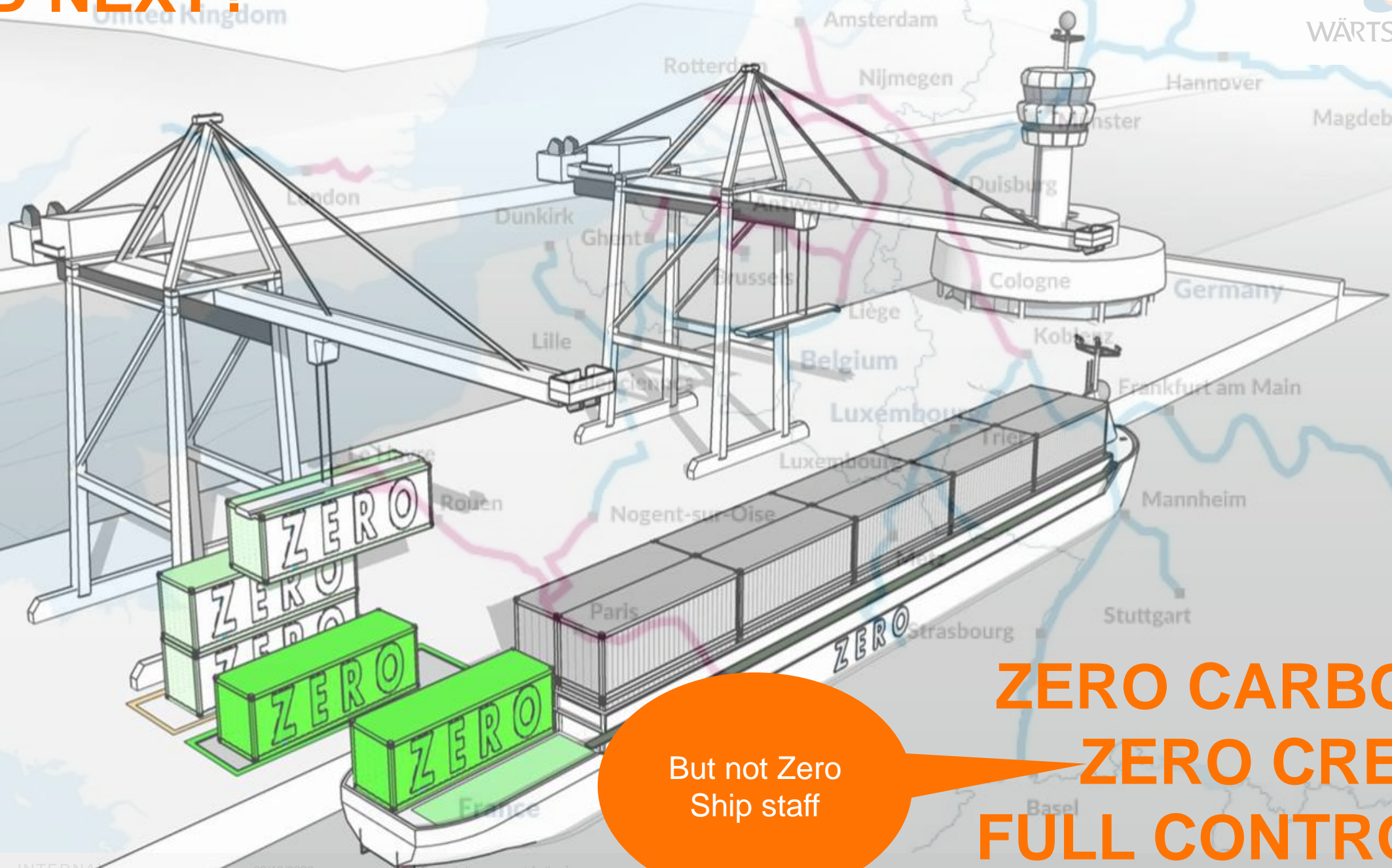
Onshore solutions and training

REMOTE PILOTAGE AND DIGITAL TWINNING

- Ship to shore connectivity
- Intelligent Fairway
- 3D environment and VR for situational awareness



....AND NEXT?

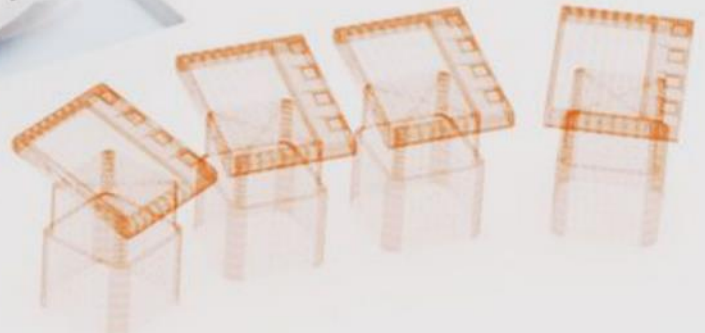
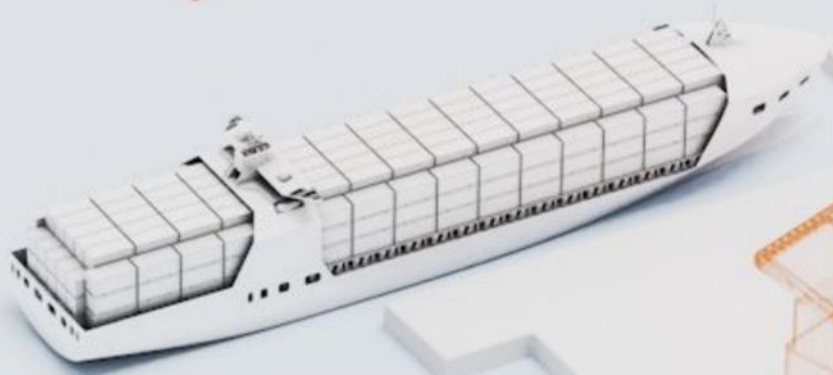
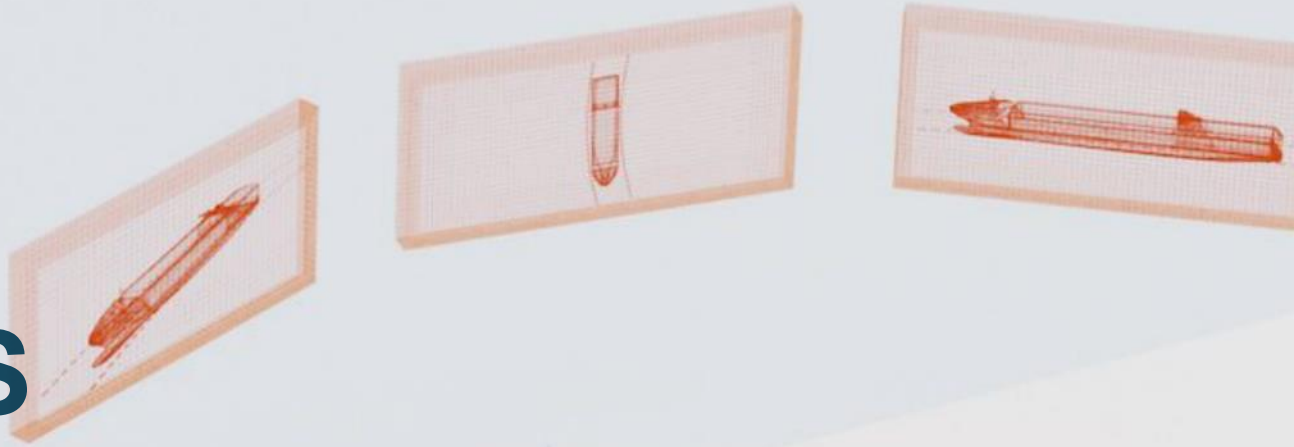


But not Zero
Ship staff

**ZERO CARBON
ZERO CREW
FULL CONTROL**



TRAINING & SIMULATIONS





TOMORROWS SEAFARER LEARNS IN A DIFFERENT WAY

- Digital Natives
- Expect technology in learning
- Graphical and bite-sized
- Crave autonomy in learning
 - Self paced
 - Self directed
 - With freedom of how the learn
 - Interactive (not passive)
- We must allow our user to utilize modern blended learning techniques that appeal to generation Z

SMART REALITIES – SR/XR/VR/AR

SMART REALITIES

are an important extension of the Wärtsilä Smart Simulation platform, with several Extended Realities Proof of Concept projects in progress

TECHNOLOGY

will drive future immersive applications and regulations will have to adapt

REALISM

Core mathematical, physical and hydrodynamic modelling will still be critical

CLOUD SIMULATION

- Training solutions through cloud based simulation
- Instructor led classes or student led instruction at their preferred pace
- Training anywhere, anytime, and 'on demand' via a browser
- Connection to Learning Management System/s



***Bring in Transparency (stake holders see same information),
Integrated Decisions (stake holders including shipstaff),
Break Silos - Integrated Systems
Synergize Ecosystem,***

LET US HARNESS THE DIGITAL TRANSFORMATION AND MOVE WITH THE CHANGE

THANK YOU!

