Smart Marine Ecosystem Strategy

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Why is the industry transforming?

20 B EUR waste not addressable by conventional product development*

	Fuel efficiency	Time at Terminal
Offshore	0.2 B EUR	0.7 BEUR
Cruise	0.5 B EUR	-
Ferry	1.3 B EUR	-
Gas Carrier	0.3 B EUR	1.0 BEUR
Containership	14.5 B EUR	2.1 BEUR

* Identified in McKinsey Project Exploration study

Disruptive forces

Big data analytics

Smart ports

Intelligent vessels

New level of safety, efficiency and reliability

Intelligent vessels

AUGMENTED REALITY

SYSTEM INTEGRATION

CYBER SECURITY

PREDICTIVE ANALYTICS

SIMULATORS

CLOUD COMPUTING

A continuous development of modular solutions will make ships smarter adding advanced navigation capabilities, increased levels of automation, connected systems and insight driven value added services

- Advanced route planning
- Collision prevention
- Autodocking
- Remote and automated operations
- Holistic energy and emission management
- Fleet coordination

Beyond the vessels

Smart Ports

ADDITIVE MANUFACTURING

INTERNET OF THINGS

CYBER SECURITY

PREDICTIVE ANALYTICS

ADVANCED ROBOTICS

CLOUD COMPUTING

Ports focus on autonomous operations and automated information exchange between vessels, port authorities and logistic partners

- Reduction of waiting time
- Optimization of sailing times and berth price
- Increased reliability and speed of vessel-to-port communication
- Automation of piloting, tug and berthing operations

Insight-led value creation

Big data analytics

BIG DATA

INTERNET OF THINGS

ARTIFICIAL INTELLIGENCE

PREDICTIVE ANALYTICS

SIMULATORS

CLOUD COMPUTING

Combining system and product engineering know-how, data depth and advanced computing allows us to transform raw data in value creating insights

- De-risking of decision making
- Performance optimization
- Predictive maintenance
- Anomaly detection
- Fleet optimization

What is digital for us?

Convergence of evolving technologies
into new business models

Smart Marine Ecosystem

Connecting Smart Ship, Fleet Operating Centre and Smart Port

Through
- Innovative technologies
- Disruptive business models
- Strategic partnerships

To enable Sustainable Societies with Smart Technology

Connect Smart Ship to Fleet Operating Centre...

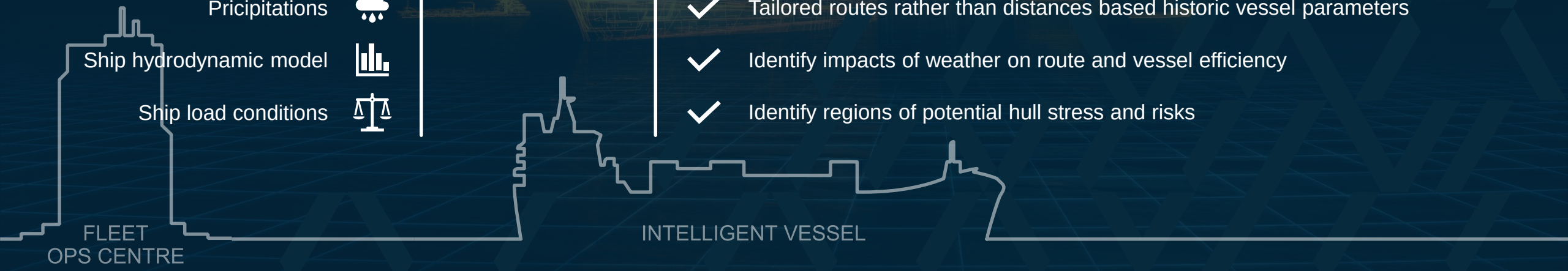
- TSS and routing schemes
- Historic AIS routes
- Draught and air draught
- Bathymetry
- HP and LP systems
- Ice forecasts
- Specific wave height
- Wind speed and direction
- Pricipitations
- Ship hydrodynamic model
- Ship load conditions

Smart Route

Seamless integrated route planning and execution process

Safest route + 5% reduced fuel consumption

- Comply with all TSS and avoid ColReg non compliance
- Optimise route through dense traffic areas to avoid over compensation
- Validate Noon Day Reported Weather
- Optimise speed to minimise changes and associated increased fuel usage
- Benchmarking (matching AIS average, shortest and optimized voyages)
- Allow weather to pass through rather than steam through heavy conditions
- Increase efficiency and safety to crew, cargo and vessel
- Tailored routes rather than distances based historic vessel parameters
- Identify impacts of weather on route and vessel efficiency
- Identify regions of potential hull stress and risks



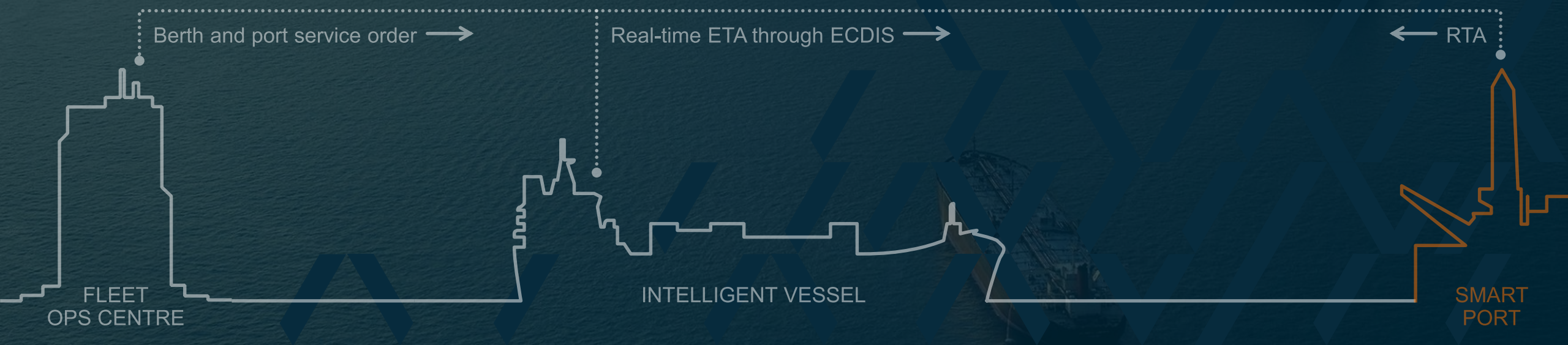
…and to Smart Ports: Portify

Smart Route

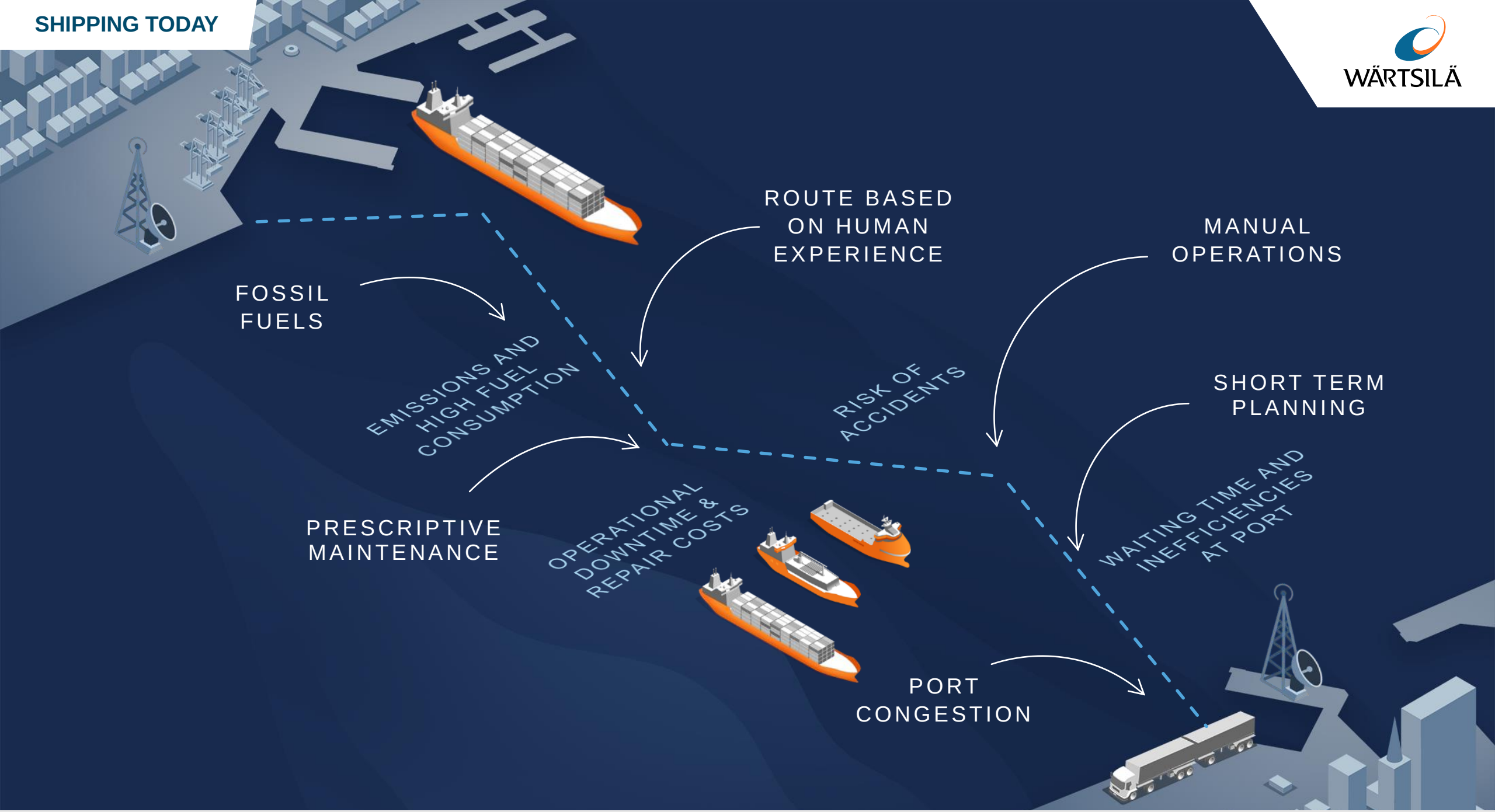
- Berth availability
- Pilot availability
- Tug availability
- Other service availability
- Agent & Fleet Ops Centre

→ **JIT arrival** →

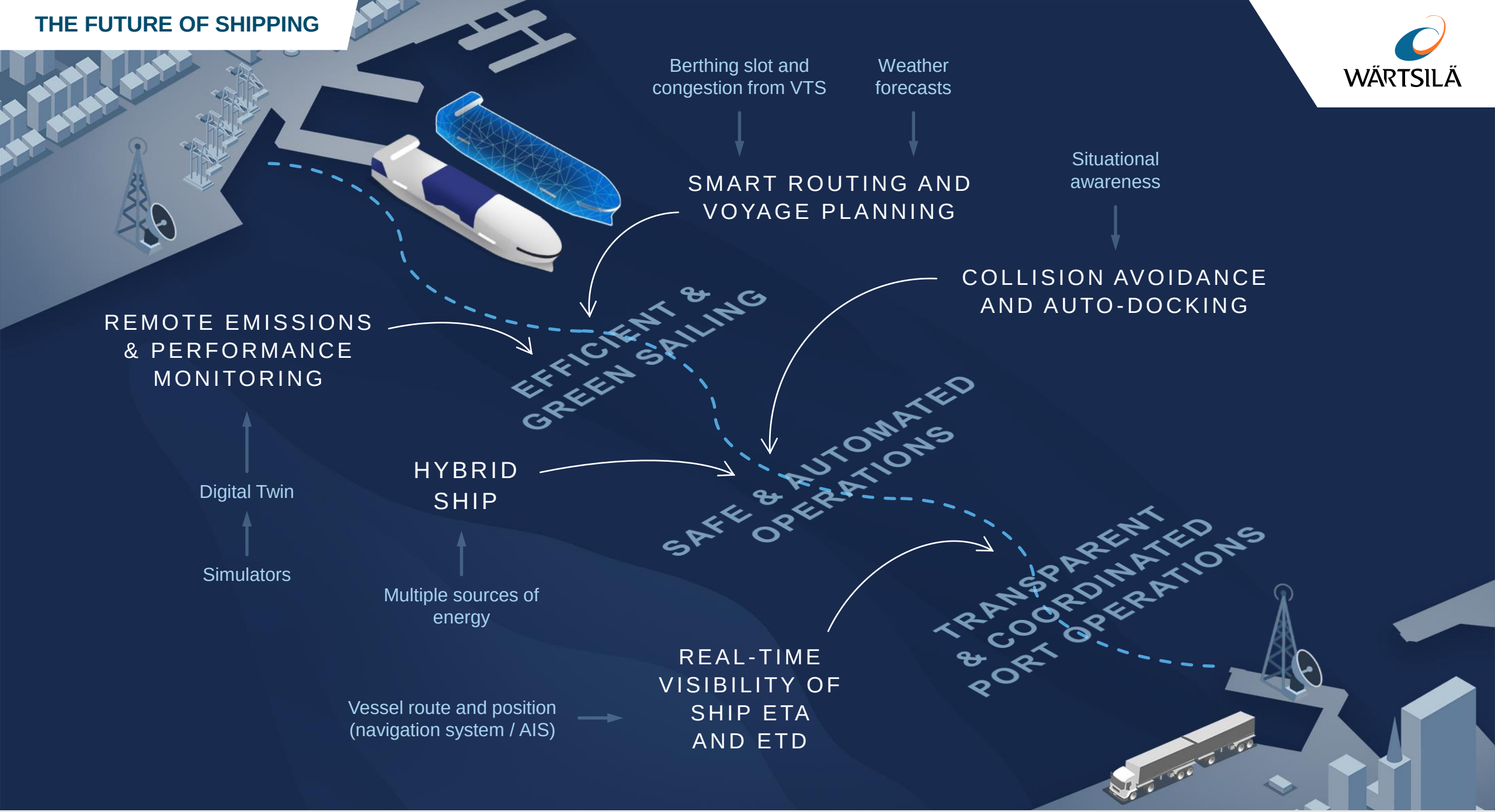
- **Safest route + 10% reduced fuel consumption**
- No waiting time at anchor
- Service availability ship arrival
- Better coordination of port activities
- Reduced port congestion and increased safety
- Streamlined communication



SHIPPING TODAY



THE FUTURE OF SHIPPING

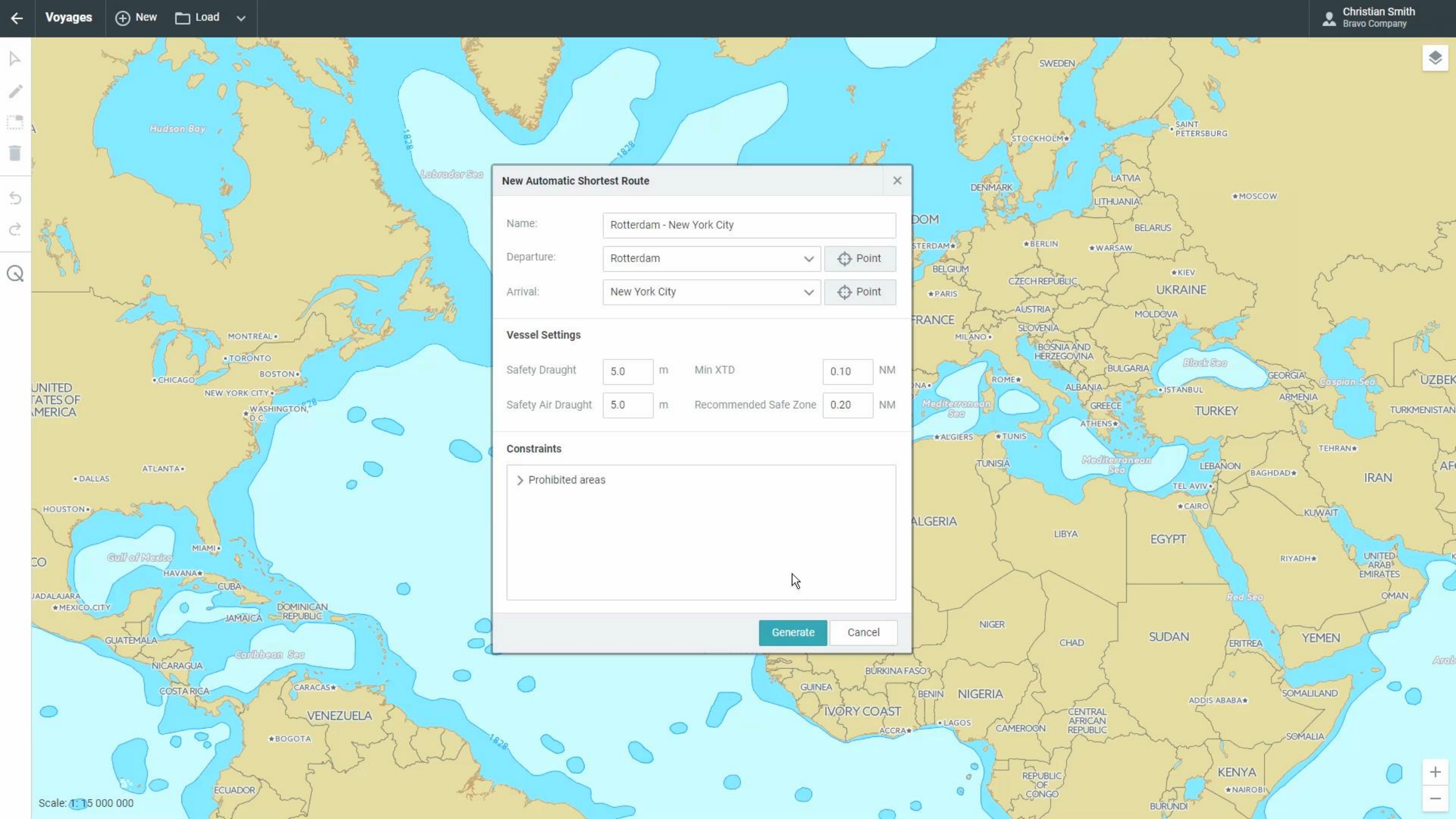


FROM CAPTAIN EXPERIENCE

Route planning based on personal expertise and past voyages or standard industry tools

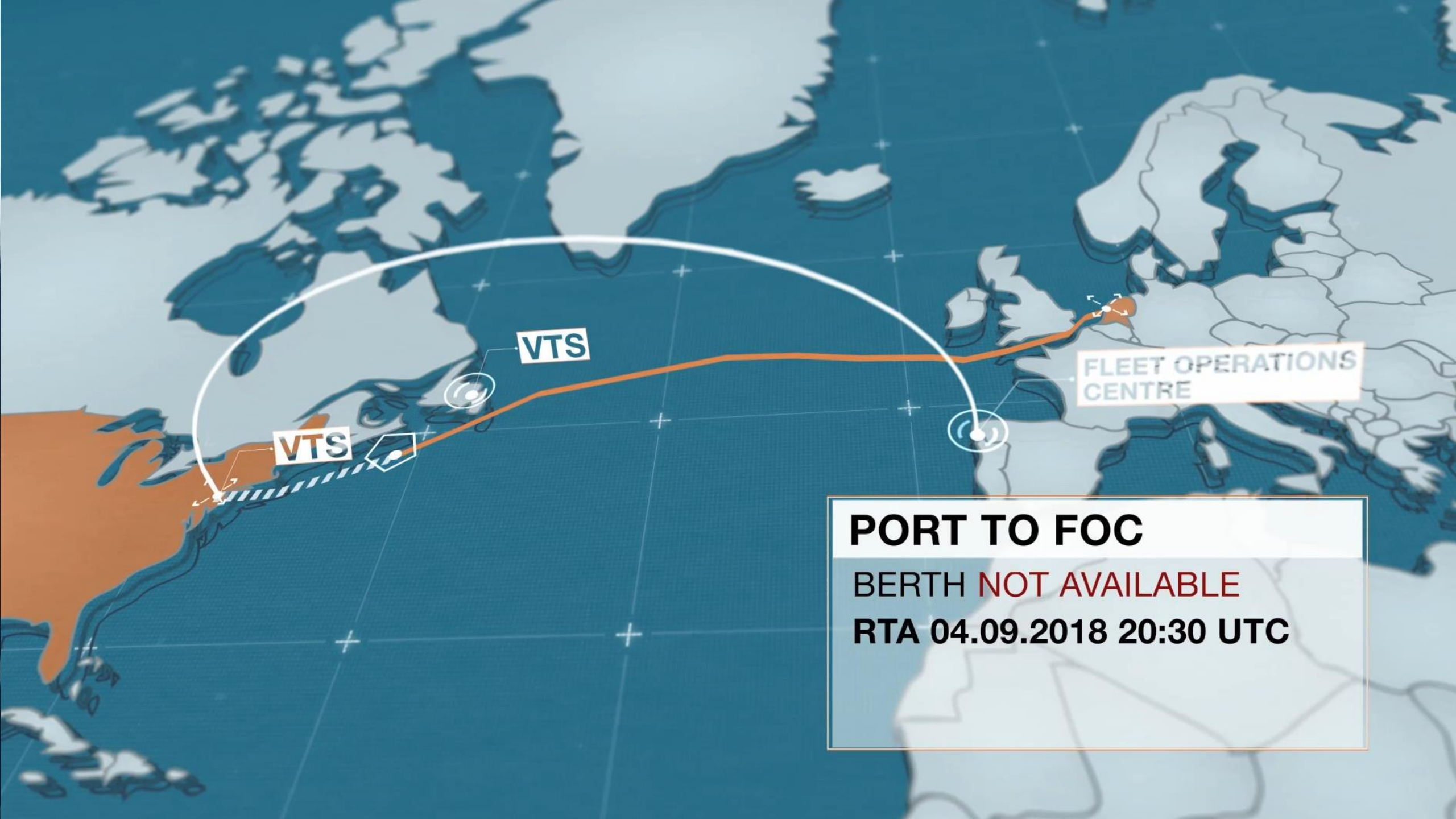
TO ADVANCED INTELLIGENT ROUTING (AIR)

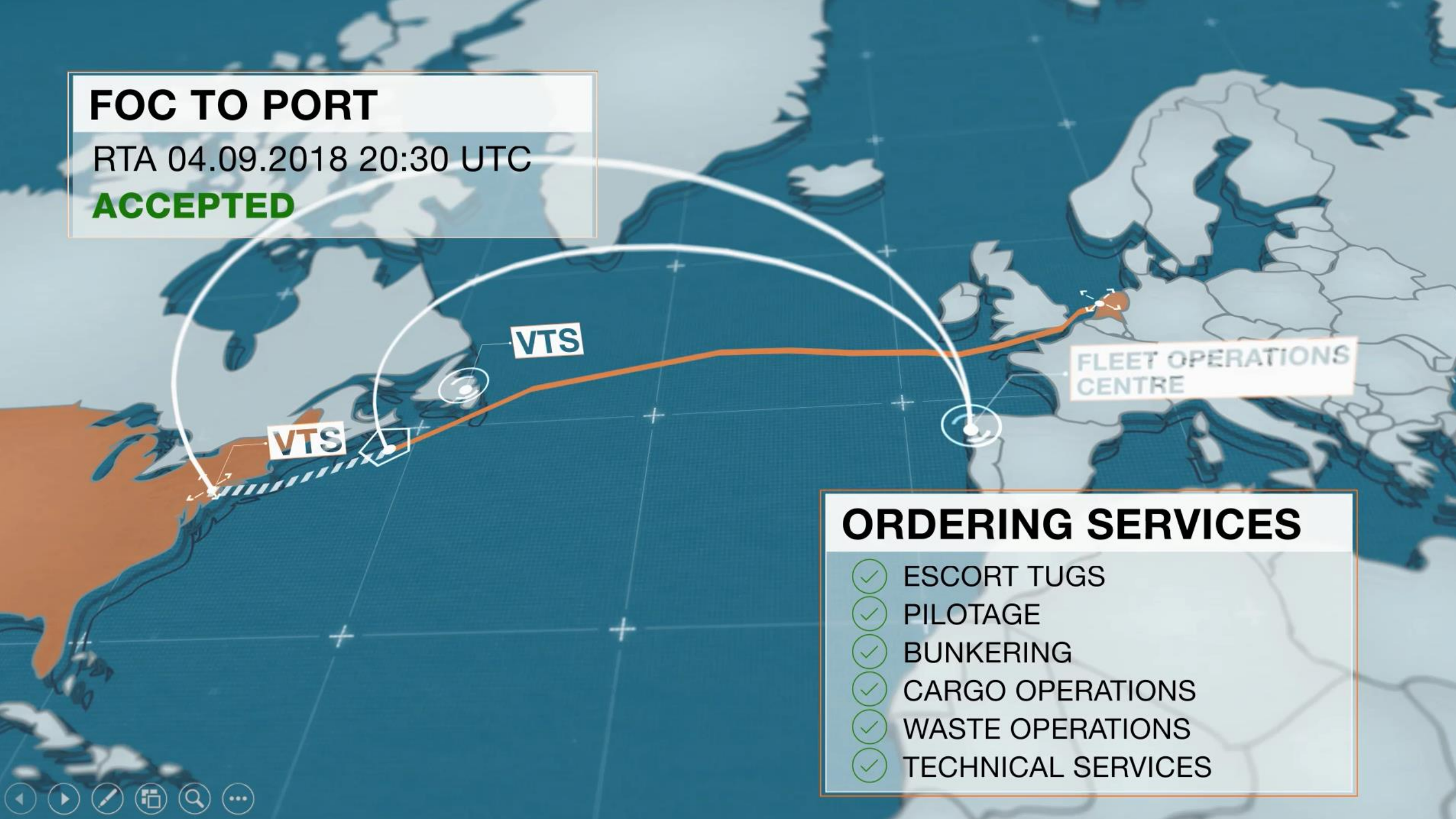
Automatic route planning based on meteocean data, traffic schemes and regulations


Voyages
New
Load
Christian Smith
Bravo Company
New Automatic Shortest Route
Name:
Rotterdam - New York City
Departure:
Rotterdam
Point
Arrival:
New York City
Point
Vessel Settings
Safety Draught
5.0
m
Min XTD
0.10
NM
Safety Air Draught
5.0
m
Recommended Safe Zone
0.20
NM
Constraints
Prohibited areas
Generate
Cancel
Scale: 1: 15 000 000

FROM UNCOORDINATED NAVIGATION TO COLLABORATIVE ECOSYSTEM

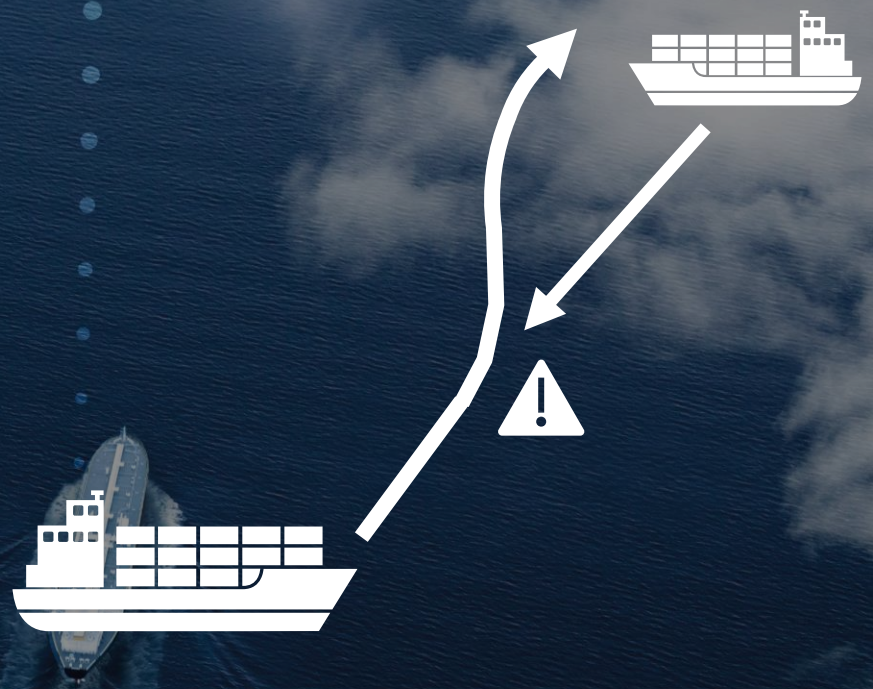
Inefficient information sharing leading to
non-optimal speed and waiting time at anchor


VTS
VTS
FLEET OPERATIONS CENTRE
PORT TO FOC
BERTH NOT AVAILABLE
RTA 04.09.2018 20:30 UTC

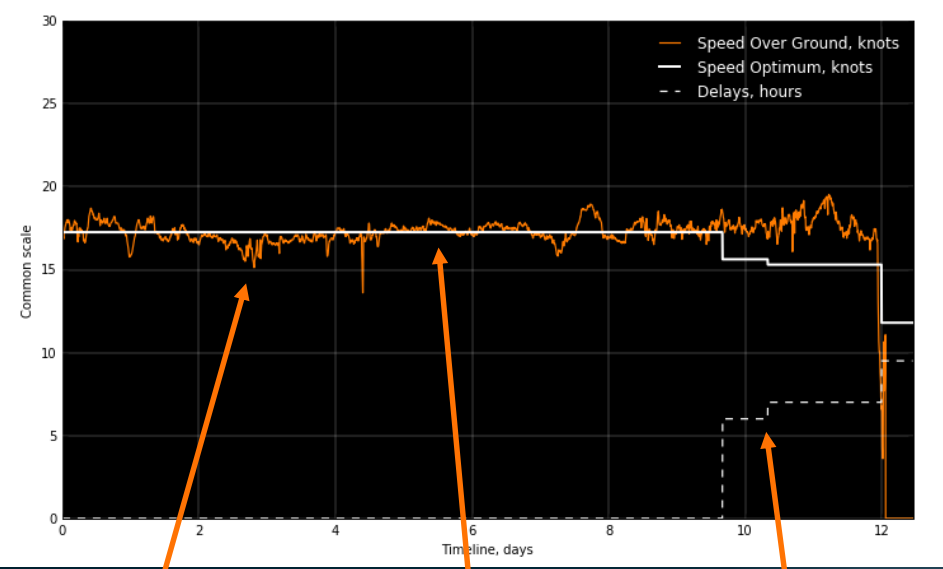

FOC TO PORT
RTA 04.09.2018 20:30 UTC
ACCEPTED
VTS
VTS
FLEET OPERATIONS CENTRE
ORDERING SERVICES
ESCORT TUGS
PILOTAGE
BUNKERING
CARGO OPERATIONS
WASTE OPERATIONS
TECHNICAL SERVICES

ADVANCED INTELLIGENT MANOEUVRING (AIM)

Intelligent trajectory prediction and recommendation for collision avoidance



18000 TEU containership | Suez - SG



Original speedlog (crew does not know that the ETA is wrong)

Optimal speed suggested by Eniram, based on current ETA

Information about the accumulated delay at terminal through Protify

230 T CO2

22 000 €

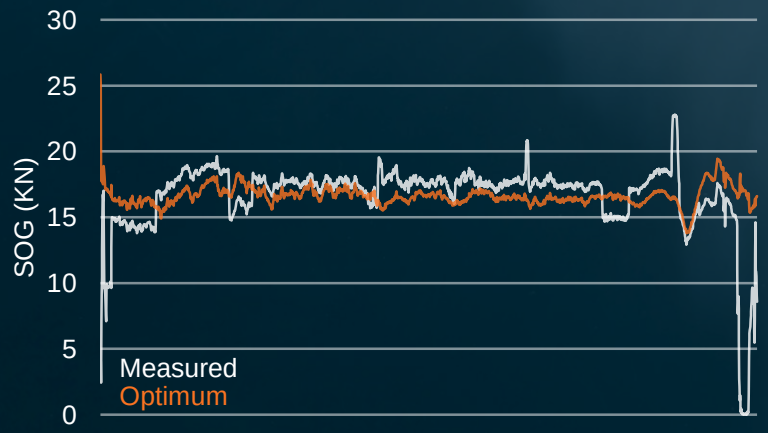
75 T fuel

Real measurement by eniram

5900 TEU containership | Rotterdam - NY

Duration: 206 h | DOG: 3 439 nmi | Total fuel: 894 tons | Fuel cost: 435 430 USD | Time at anchor: 3h 40m | Emissions: 2 784 tons

Route optimization: -2.7%



Speed optimization for JIT arrival: -7.1%

280 T CO2
Annual 7 600 t

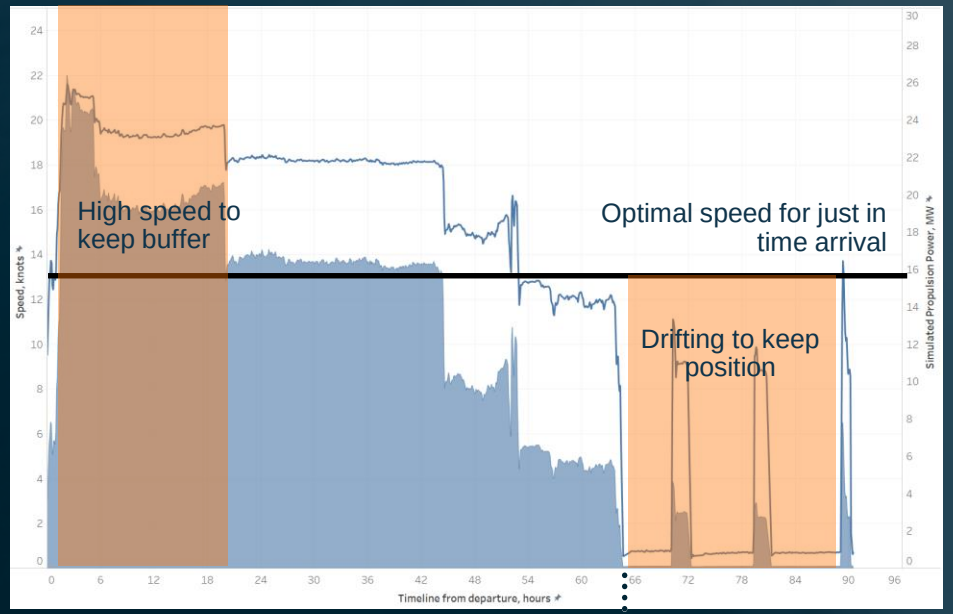
43 000 €
Annual 1 200 000 €

90 T fuel
Annual 2 450 t

Real measurement by eniram

5500 TEU containership | Suez - Salerno

Duration: 90 h | Total energy consumption: 964 MWh | Time at anchor: 24h



340 T CO2

44 000 €

110 T fuel

Real measurement by eniram