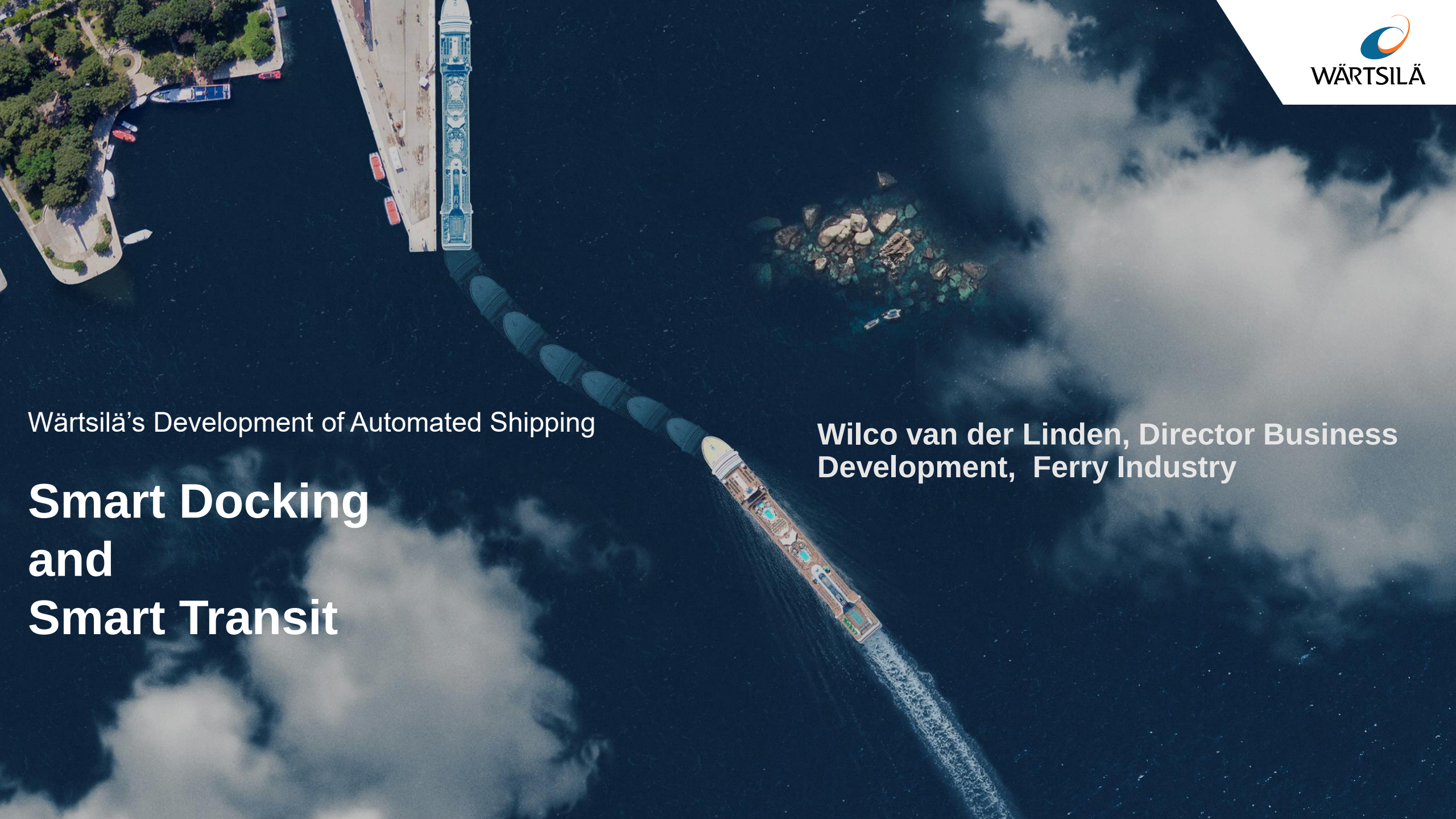


Wärtsilä’s Development of Automated Shipping

Smart Docking and Smart Transit

Wilco van der Linden, Director Business Development, Ferry Industry

THE DIGITALIZATION OF SHIPS

WÄRTSILÄ

FLEET OPERATIONS
Route optimizations
Trim, hull fouling

DIGITALIZATION
Fuel
Charter compliance
Decision support

CONVENTIONAL SHIP
Full manning
Traditional equipment

CREW ONBOARD

SMART ENABLED SHIP

- Full safety manning
- Traditional equipment
- Fully digitalized
- Auto Docking/Transit
- Advanced decision support
- Remote operations
- Deep analysis of
  - Nautical
  - technical and
  - commercial performance

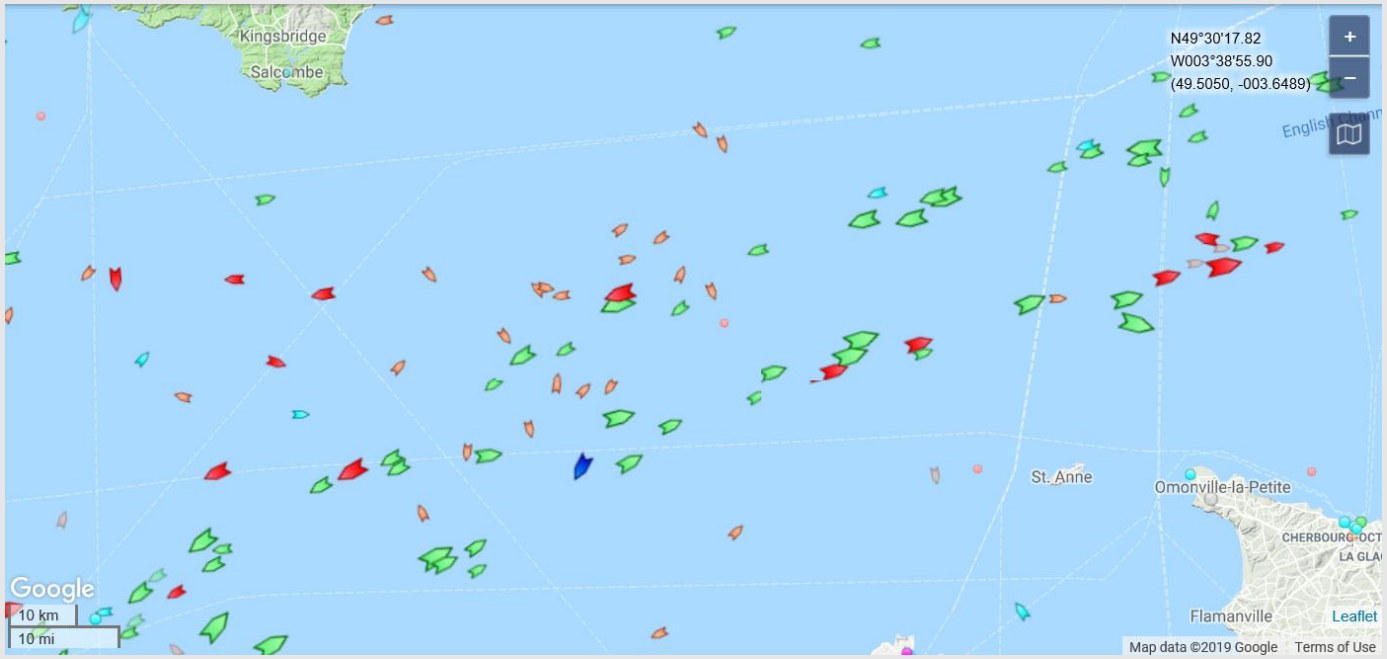
UNMANNED

UNMANNED SHIP

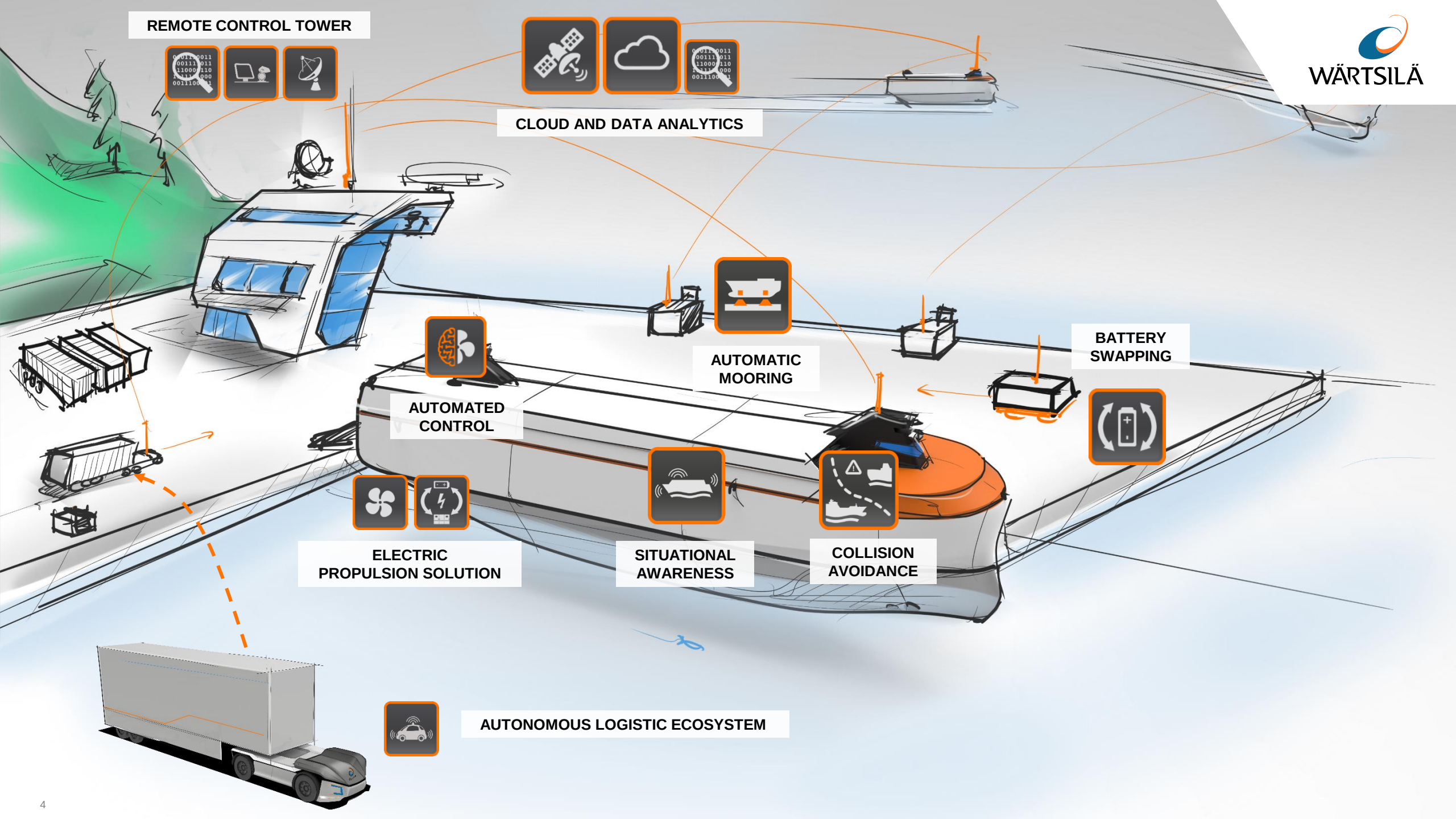
- Remote controlled
- Autonomous operation
- Maintenance and service in port

Impact on Safety

- Operator to focus where it matters
- Near miss reporting/operator assessment
- Remote piloting
- Virtual crew training



More than 100 vessels in the area.
Advanced decision support can help with suggested handling of traffic and highlight vessels not behaving as planned


REMOTE CONTROL TOWER
CLOUD AND DATA ANALYTICS
AUTOMATIC MOORING
BATTERY SWAPPING
AUTOMATED CONTROL
ELECTRIC PROPULSION SOLUTION
SITUATIONAL AWARENESS
COLLISION AVOIDANCE
AUTONOMOUS LOGISTIC ECOSYSTEM

REASONS FOR AUTOMATED SHIPPING

- Advanced **decision support** systems will support captains and operators
- Automated solutions will improve **safety** by taking out the **human error** factor

Navigation decision support

"Parking sensors"

Auto-docking

Reduced human error

Auto-crossing

- Automation can cut maneuvering time, reducing **energy consumption** in transit
- Capability to copy "the **best captain's performance** on a good day"

REASONS FOR AUTOMATED SHIPPING

- Operations will be less sensitive to crew changes
- Enable virtual crew training
- Attracts a young generation to the maritime industry

Reduced OPEX

Smaller ships

Changes in the Eco-System

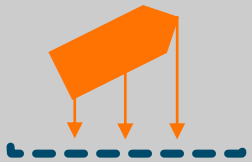
Gami-fication

Cool technology

- Enables the business case for smaller ships
- Allows balanced cargo flows at terminals
- Potential synergies with autonomous cars, and trucks

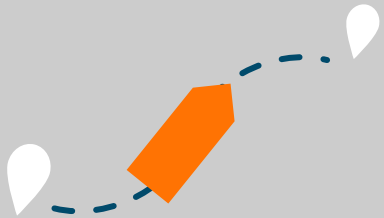
SmartDock:

Autonomous dock to dock capability, including seamless transition between **Undocking - Transit - Docking**



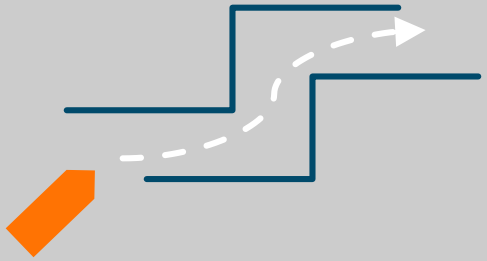
SmartTransit :

Quay to Quay track control and offers **Automated Transit** along a specified route.



SmartEntry :

Assistance for a vessel entering a lock or harbour



Full maneuvering of the vessel is automatically controlled by the software.

However, manual intervention and control is possible at any time.

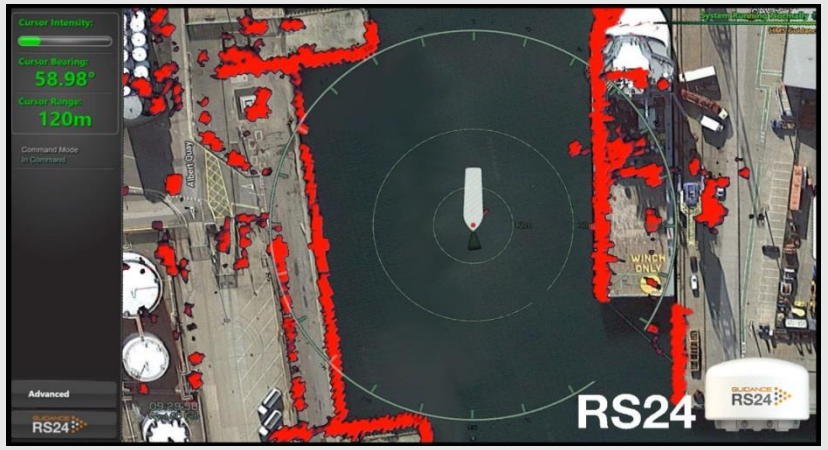

WÄRTSILÄ
12
SPU1-R1: IO Definition Fault
BOW TERMINAL (Master)
AUTONOMOUS
SmartDock
Hodnanes
17:08
20 min
B
16 min
A
11 min
17:08
20 min
From Huglo
To Hodnanes
System
Ready
ETA
Speed
Heading
Note
B 17:04 16 min 1.0 kt 29.0°
A 16:59 11 min 3.0 kt 27.0° Rotation possible
Target 5.0 kt 359.0°
Difference +000.1 kt 238.5°
OFF LIMITS
Speed offset
+0 kt
Time
16:48
Speed
4.9 kt
Heading
321.5°
To dock
245.5 m
Rotate 180°
Rot / min
-19°
Track error
-12.1 m
15
50 %
2.1 kt
81%
2.3 m
55 %
1.4 m
0.2 kt
Route offset
10 m
Draft
2.3 m
Docking transition
Automatic
Stop vessel

Sensor technologies based on capabilities in:

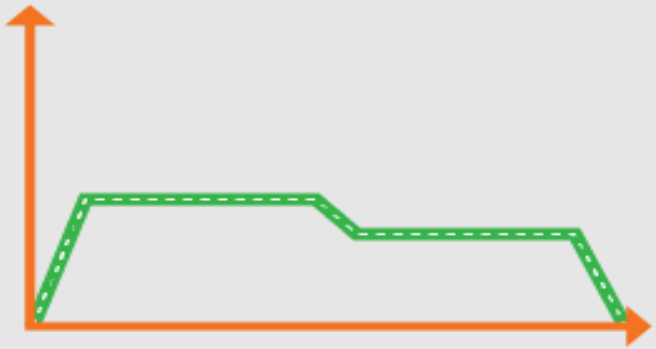
- Laser
- Microwave (K band radar)
- Vision processing
- GNSS

Near field collision avoidance

- Solutions similar to what you see in a new car today
  - Adaptive speed pilot
  - Collision warning
  - Parking sensors



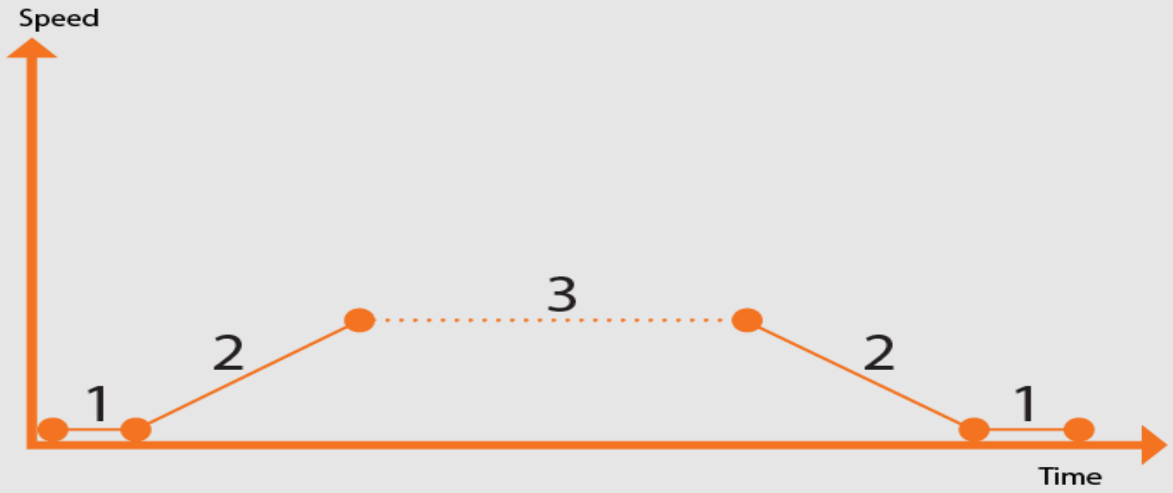
Three potential savings sources



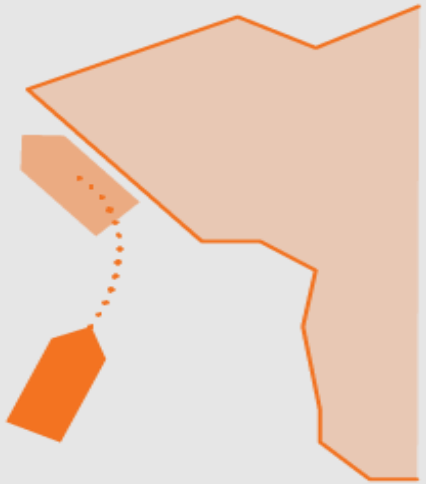
The optimum speed profile of a ship is given by many parameters, including:

1. Speed limits (e.g. in port areas)
2. Squat effects
3. Passenger comfort
4. Traffic circumstances

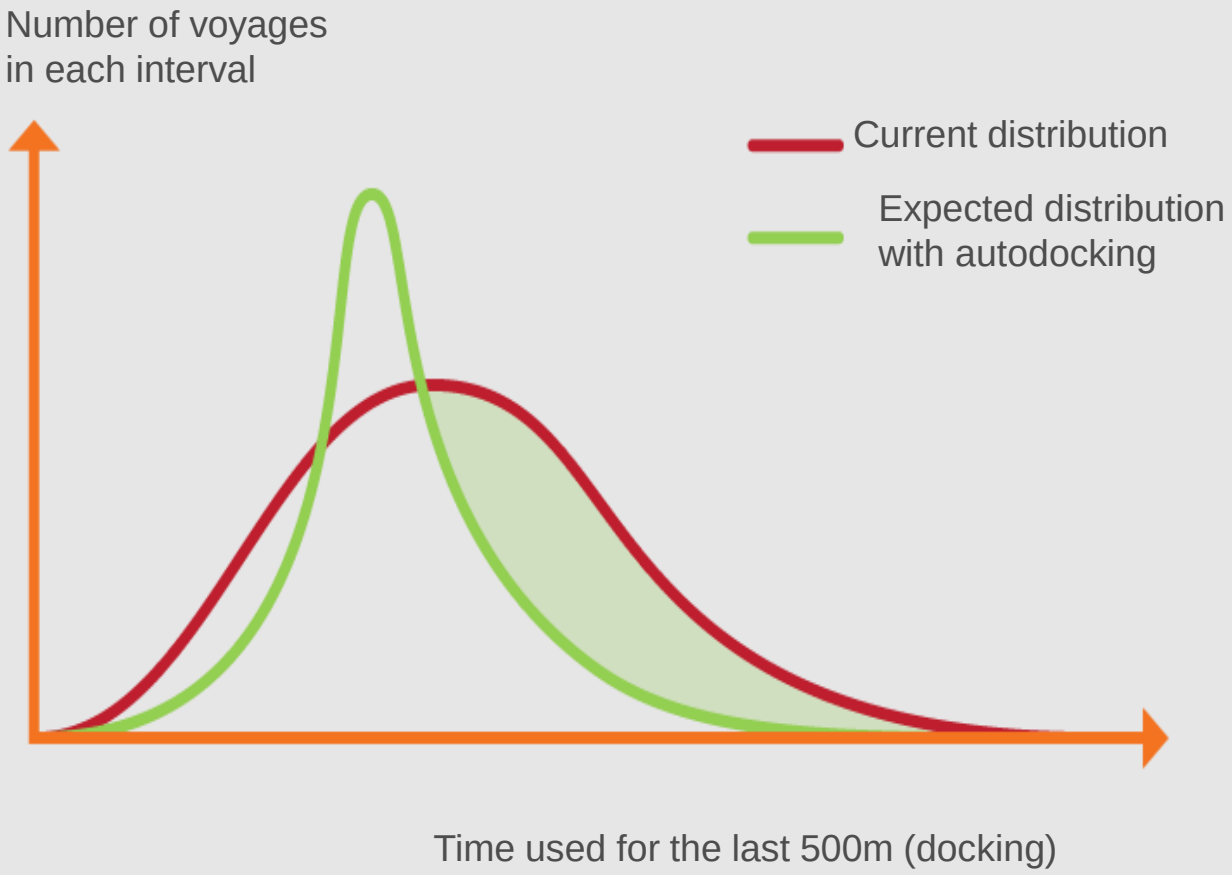
1 Optimized and repeatable speed profiles throughout the transit



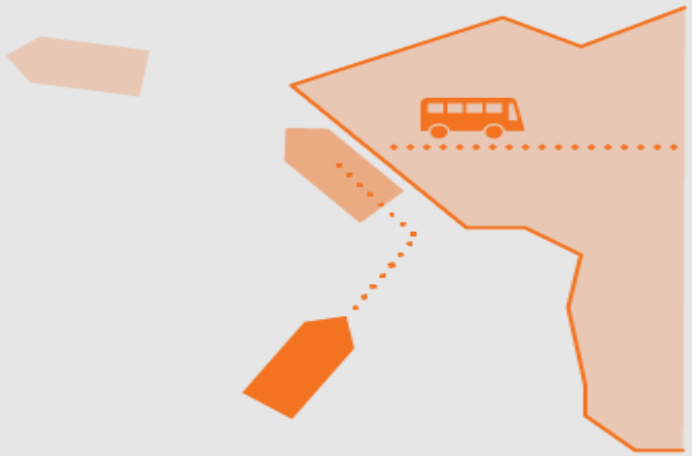
Three potential savings sources



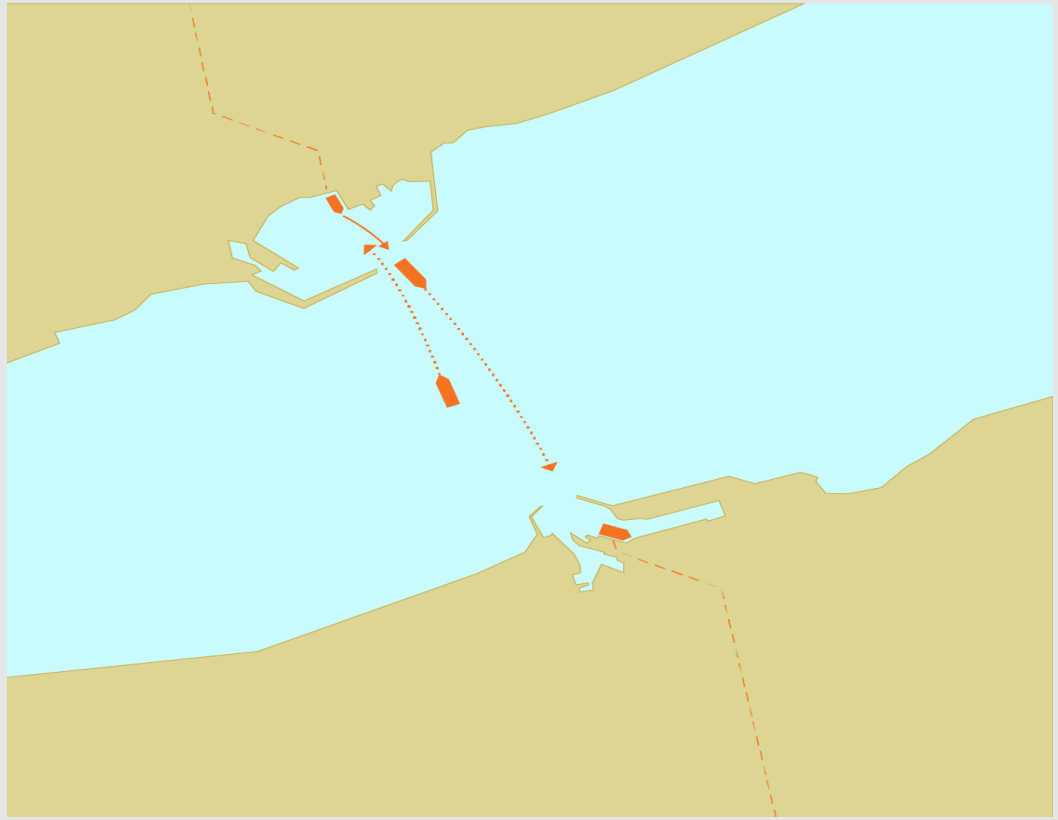
2 Reduced and standardized time for the docking maneuver will result in additional time for transit



Three potential savings sources

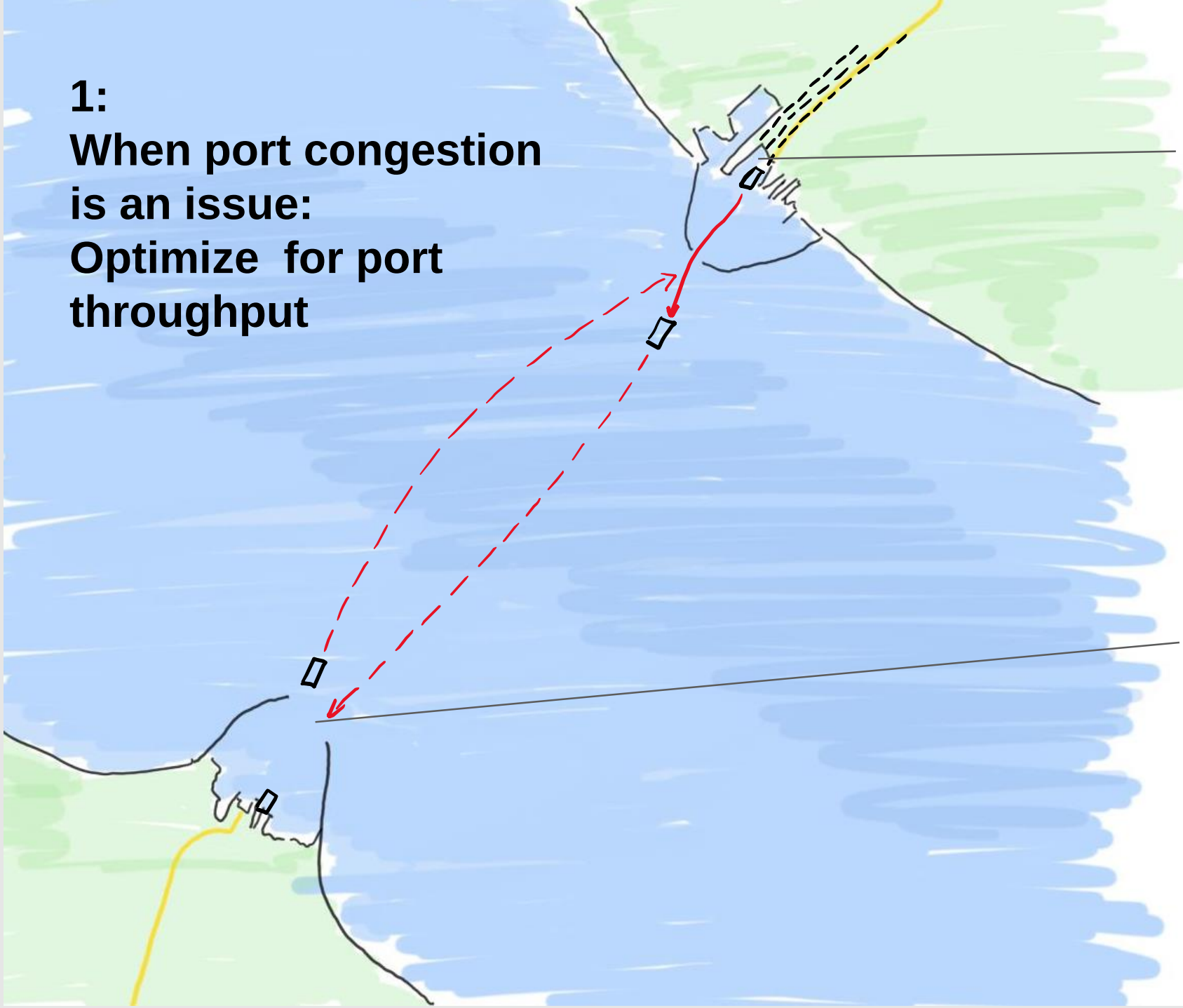


3 Ability to optimize the transit speed to match the actual time needed in ports



Two cases of an estuary crossing
1: Port Congestion
2: Low traffic

1:
When port congestion is an issue:
Optimize for port throughput



With congestion in one port, we want to make sure that a ferry is unloading and loading as much of the time as possible, to maximize the throughput.

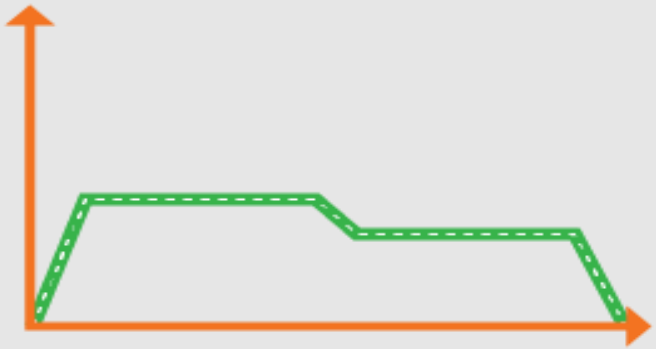
Estimated best arrival time is sent as early as possible to the next arriving vessel, allowing it to adapt its transit speed to the optimum arrival time

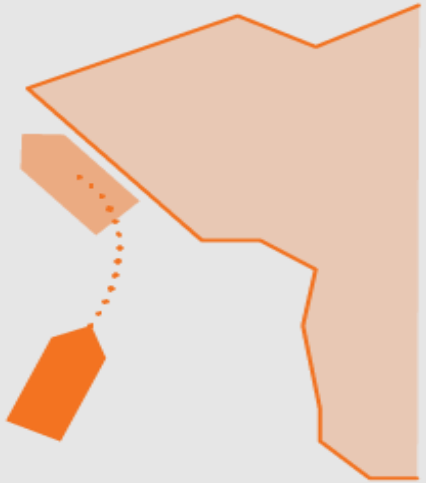
2:
When traffic is low: Optimize for lower transit speed

With low traffic in the ports, port time can be reduced and additional time used for the voyage

Estimated best arrival time is sent as early as possible to the next arriving vessel, allowing to reduce the transit speed to the optimum solution

POTENTIAL SAVINGS FROM SMART DOCK AND SMART TRANSIT





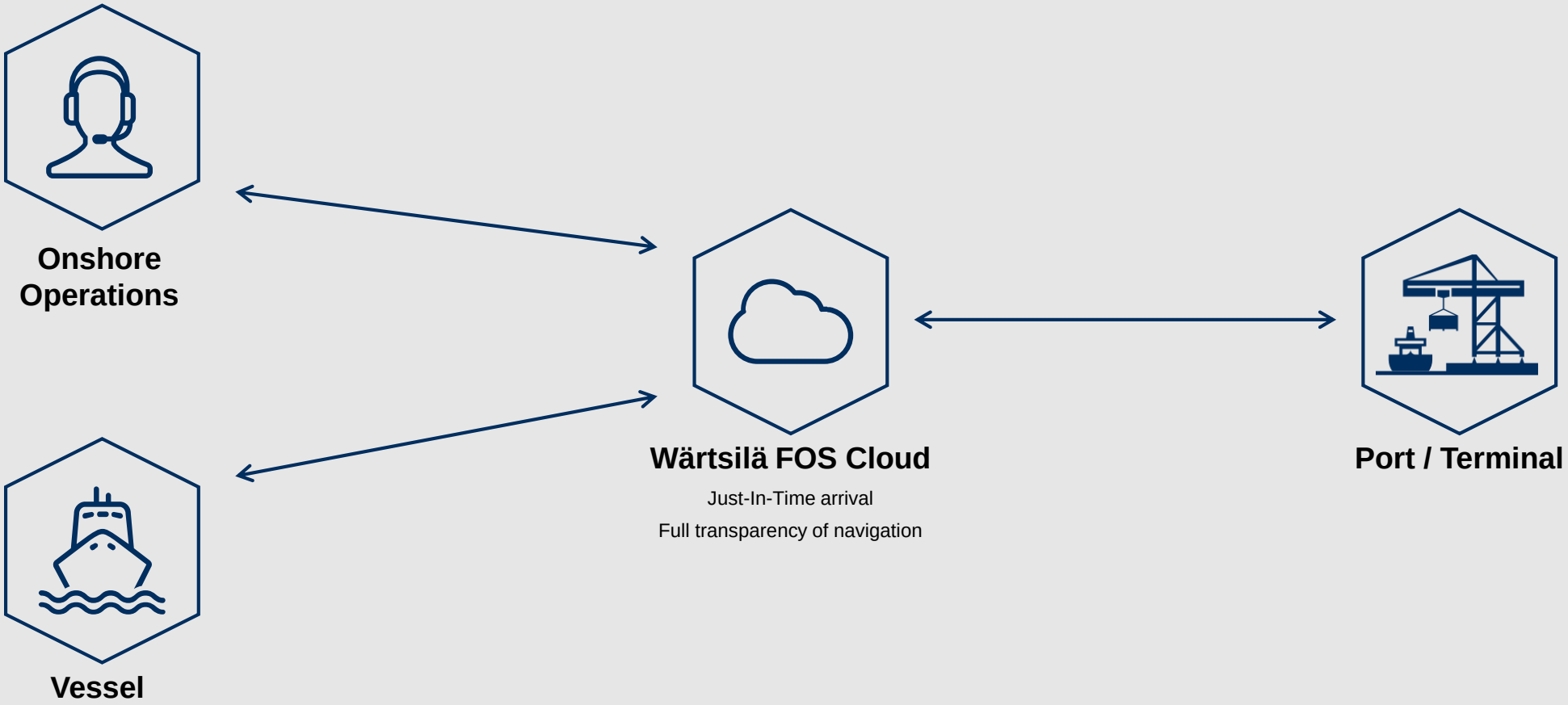
1 Optimized and repeatable speed profiles throughout the transit

2 Reduced and standardized time for the docking maneuver

3 Ability to optimize the transit time to match the actual time needed in ports

Just-In-Time by Wärtsilä

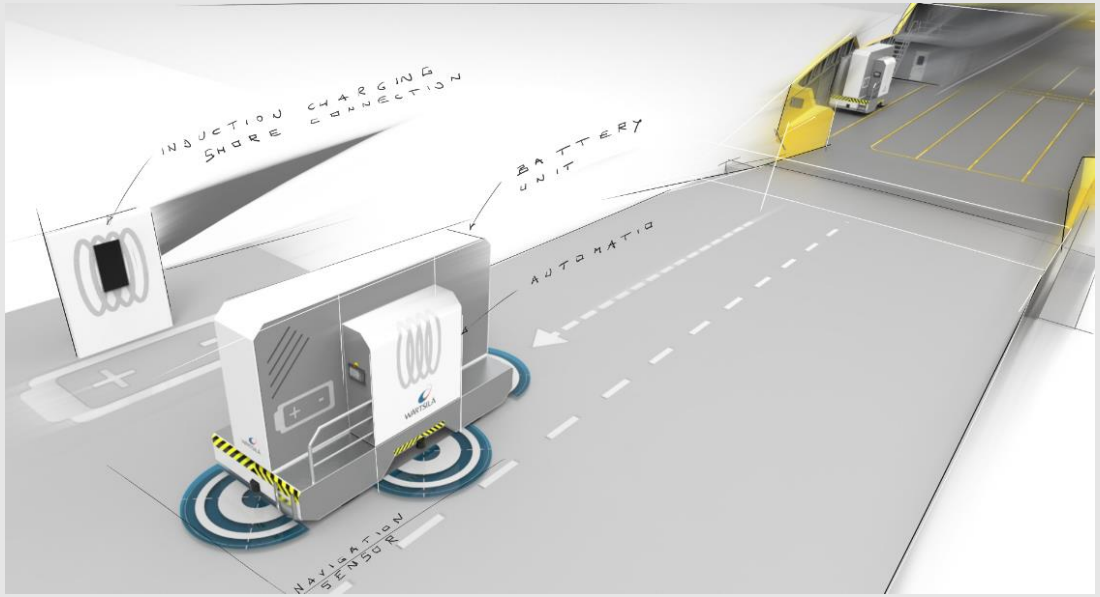
A single platform connecting vessels, onshore operations and ports



Across a voyage, the vessel and shore exchange information in a secure environment about the optimum time to arrive at port, maximising fuel saving opportunities and reducing time at anchorage

ELECTRIC CHARGING SOLUTIONS

Inductive and plug charging solutions developed and tested onboard Folgefonn



Slow charging self driving battery design concept

Road to the Smart Vessel

Voyage Management

- Automated speed and route planning and dynamic optimisation
- Ship-to-port data exchange
- Remote and automated operations
- Situational awareness
- Fleet coordination

Energy Management

- Holistic energy management tailored to specific operations
- Integrated hybrid solutions combining multiple power sources and energy storage

Asset Management

- Remote asset diagnostics and performance optimisation
- Condition-based maintenance
- Anomaly detection
- PBL agreements
- Digital Twin

WARTSILA'S DRIVE TOWARDS A SMART MARINE ECOSYSTEM

THANK YOU

Wilco van der Linden, Director Business Development
Ferry industry Wartsila Marine Solutions

wilco.vanderlinden@wartsila.com