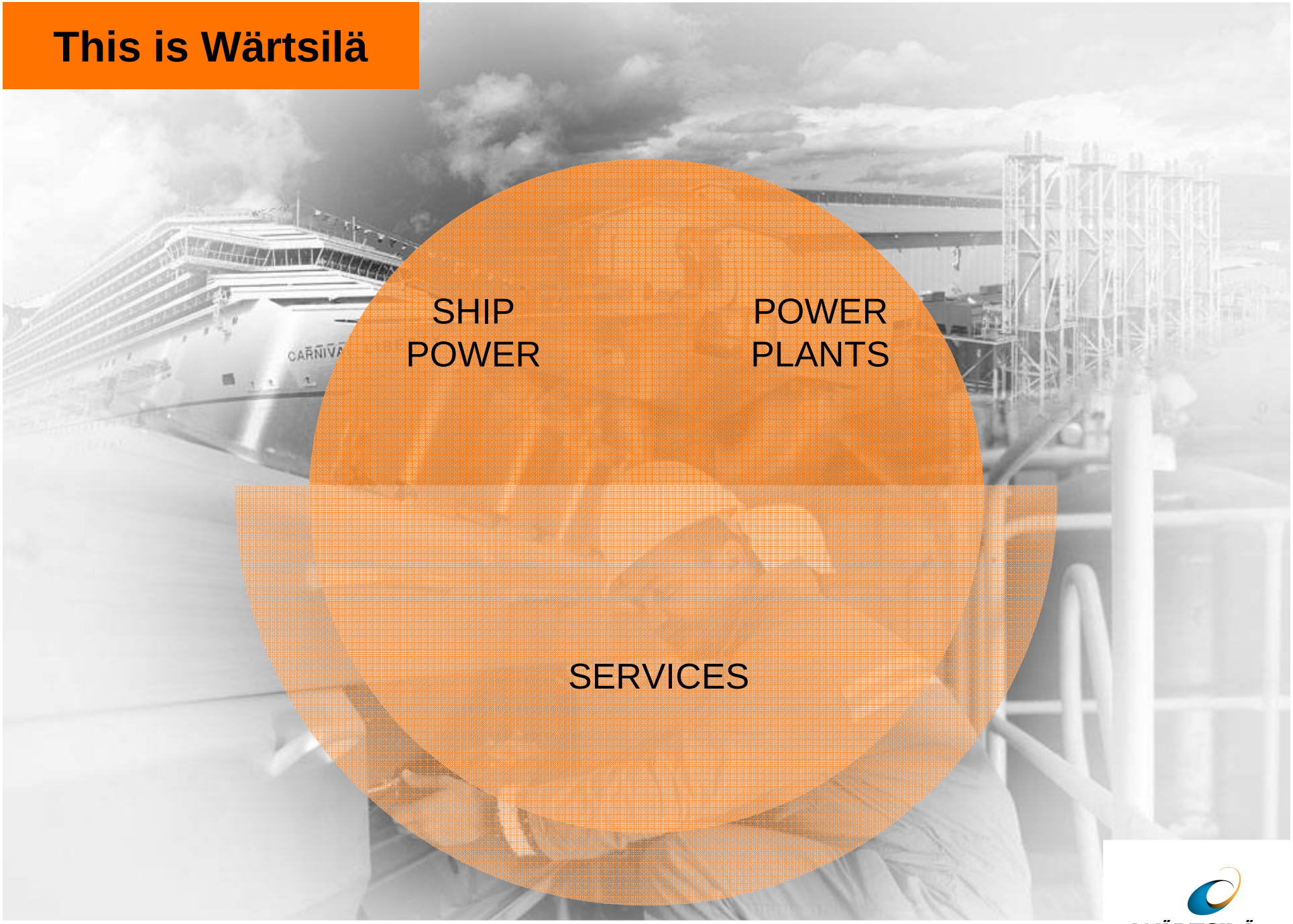
Ships designed by Wartsila, a ”powerful” proposition

Wilco van der Linden

Sales director

Wärtsilä Ship Design

This is Wärtsilä



Our mission and vision

Mission

We provide lifecycle power solutions to enhance the business of our customers, whilst creating better technologies that benefit both the customer and the environment.

Vision

We will be the most valued business partner of all our customers.

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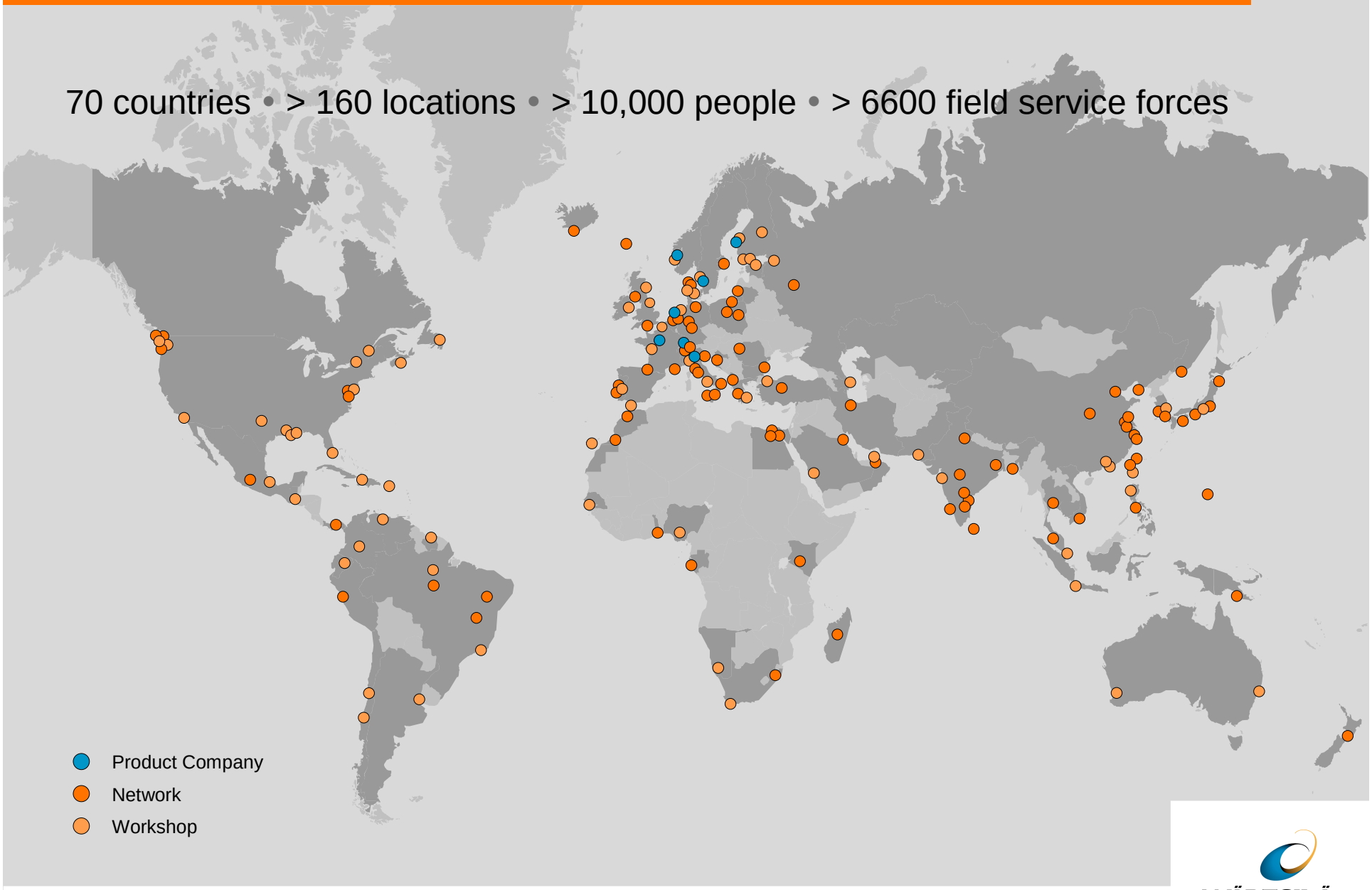
We are continuously developing our service network

70 countries • > 160 locations • > 10,000 people • > 6600 field service forces



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Wärtsilä is present in all key shipping segments

Merchant	Offshore	Cruise and Ferry	Navy	Special Vessels
				

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Our technology strategy

Wärtsilä technology strategy is based on strong technology leadership and innovative technology investments.

Our technology focuses on areas that are crucial for both current and future operations.

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A ship’s lifecycle

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Ship Design – Trends and Market drivers

Role of Ship Design increasingly important in any ship's life cycle due to:

- Higher integration and more sophisticated systems onboard most vessels
- New, stricter environmental regulations (Fuel efficiency, SO_x, CO_2, NO_x)

- Owner's seeking 3rd party expertise in:
  - Fleet planning
  - Conceptual thinking
  - Vessel definition and feasibility study
  - Design and engineering
  - Yard selection and supervision
  - Optimization & modification requests

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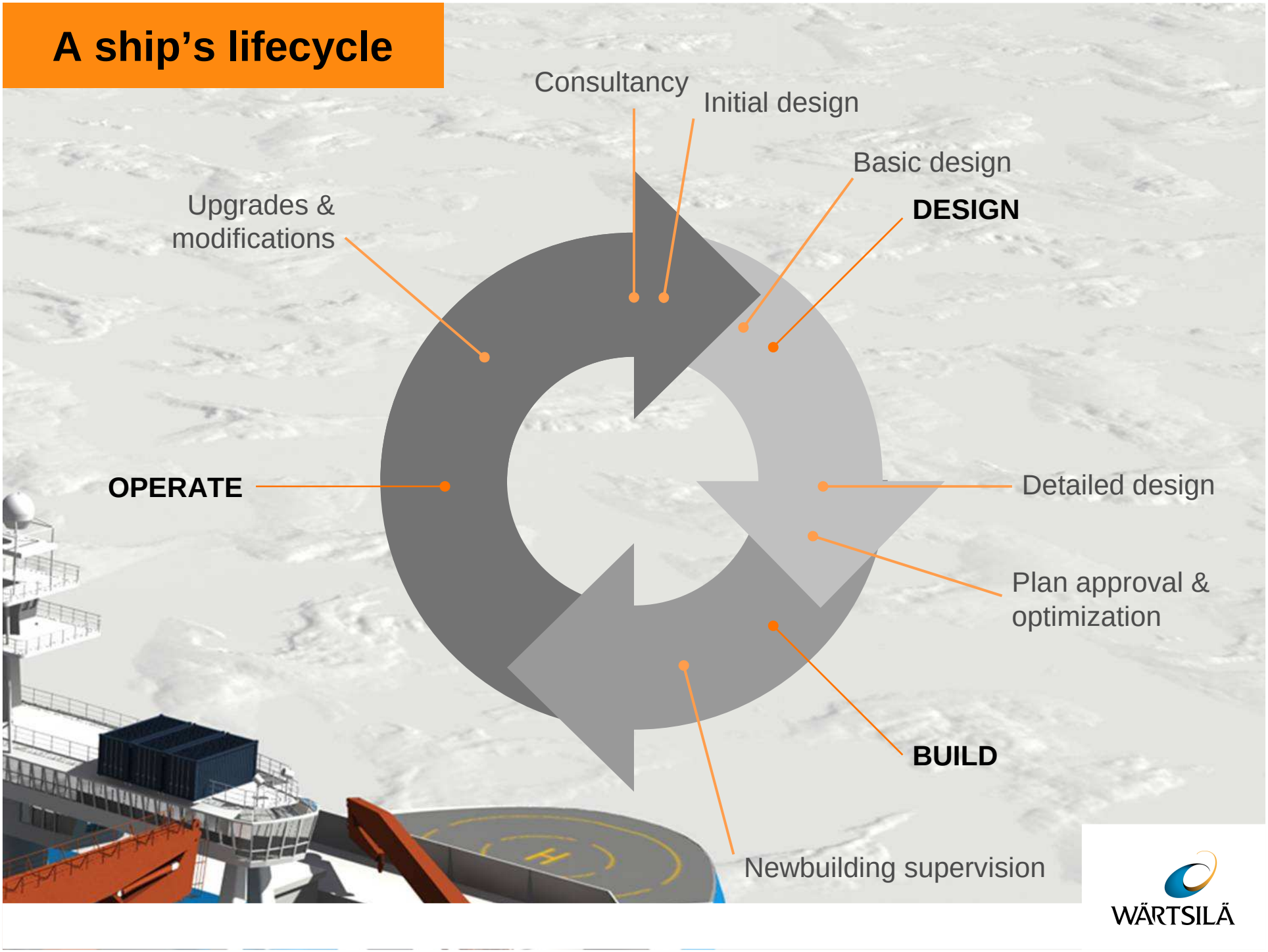
A ship’s lifecycle



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Wärtsilä in Ship Design

Among top three in:

Offshore Service • Tugs and Workboats • Special Vessels • Targeted sub-segment within Merchant

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Wärtsilä Ship Design

WÄRTSILÄ Ship Design

Wärtsilä Ship Design Germany	Vik-Sandvik	Skipskonsulent	Conan Wu & Associates
• Germany	• Brazil • Bulgaria • India • Norway • Poland • Russia • Serbia • Slovakia	• China • Norway	• Singapore • Malaysia • China
			

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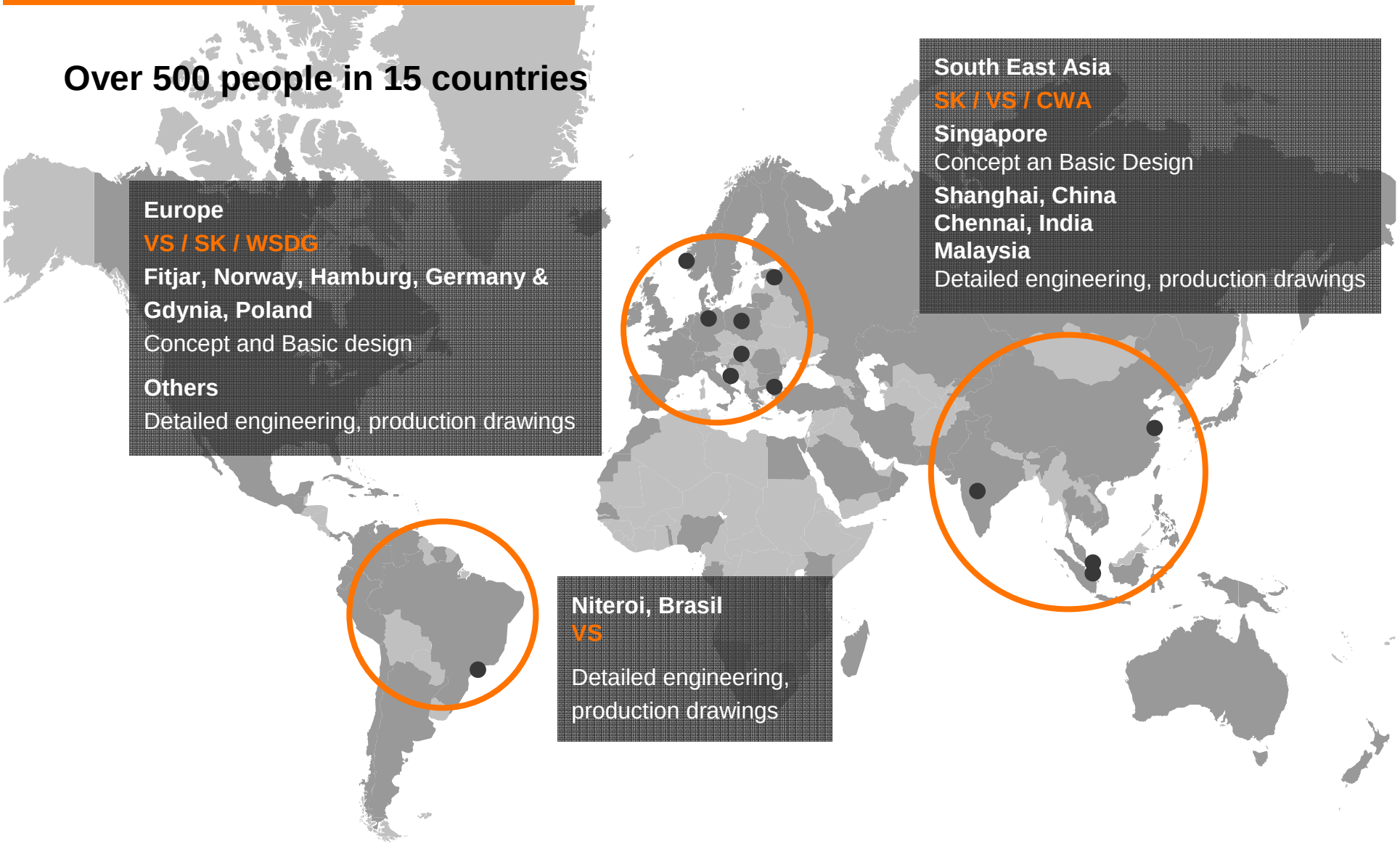
Wärtsilä Ship Design

Over 500 people in 15 countries



Europe
VS / SK / WSDG
Fitjar, Norway, Hamburg, Germany &
Gdynia, Poland
Concept and Basic design

Others
Detailed engineering, production drawings

South East Asia
SK / VS / CWA
Singapore
Concept an Basic Design
Shanghai, China
Chennai, India
Malaysia
Detailed engineering, production drawings

Niteroi, Brasil
VS
Detailed engineering, production drawings

VS (Vik-Sandvik), SK (Skipskonsulent), WSDG (Wärtsilä Ship Design Germany), CWA (Conan Wu Associated)

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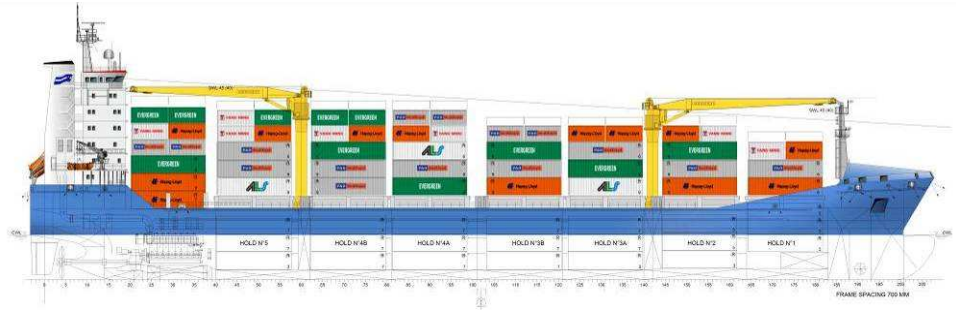
Design example



SCHIFFKO CV 1100 PLUS

Ship type:
Container vessel, geared.

Our offering:
Initial, basic design and detail design.

Ship details:

Length over all	148.00 m
Breadth	23.25 m
Draught	8.50 m
Speed	19.6 kt
Container capacity	1’100 TEU
Installed main engine power	~ 9.7 MW
Main engine proposal	8L46F or 6RT-flex50

Note:
More than 160 ships in operation, under construction, or on order.

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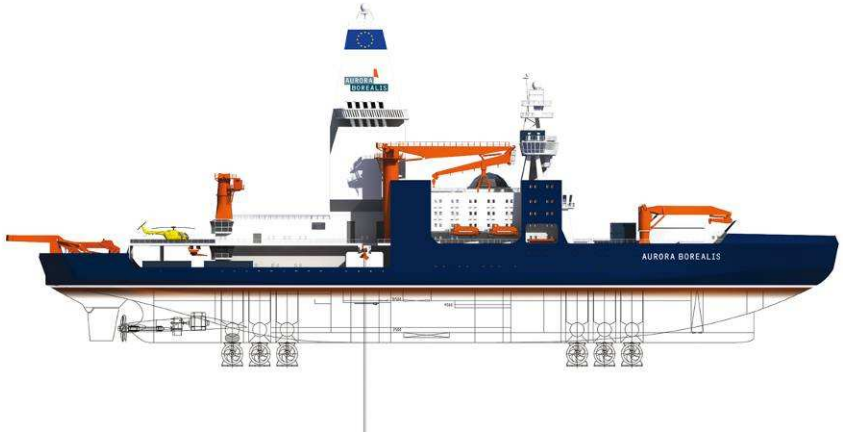
Design example



“AURORA BOREALIS”

Ship type:
Multi-purpose research vessel, dynamically-positioned (in drifting ice) scientific drill ship, heaviest icebreaker.

Customer:
Alfred Wegener Institut (Germany).

Our offering:
Initial design and full tender documentation.

Ship details:

Length over all	199.85 m
Breadth	49.00 m
Draught	13.00 m
Speed	15.5 kt
Maximum water depth drilling	5’000 m
Maximum penetration drilling	1’000 m
Installed power	~ 94 MW
Crew	120

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Design and consultancy example

Ship type:
Dynamically-positioned multi-purpose offshore construction and pipe-lay vessel.

Customer:
Saipem SpA (Italy).

Our offering:
Initial and basic design, plan approval and newbuilding supervision.

Tailored conversion design for specific missions.

Ship details:

Length over all	163.50 m
Breadth	30.00 m
Speed	12.5 kt
Lifting capacity	600 t
Pipe laying concept	J-and Flex-lay
Dynamic positioning	DP3

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Design example

SCHIFFKO SEP 10040

Ship type:
Non-self-propelled self-elevating platform for the erection of offshore wind turbine parks.

Customer:
F+Z Baugesellschaft mbH (Germany).

Project partner:
IMS Ingenieurgesellschaft mbH.

Our offering:
Initial and basic design, potentially to be extended with detail design.

Ship details:

Length over all	109 m
Breadth	40 m
Deadweight	5’200 t
Lifting capacity	800 t
Maximum water depth	45 m
Dynamic positioning	DP1
Crew	60

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Ship Design – Market trends – Customer demand

- Ship design as a part of the total solution creates outstanding possibilities
  - From DWT focus to a more efficient transport of cargo from A to B
    - By reducing DWT, or larger ship at same DWT significant improvements can be achieved.
- Significant reductions in daily fuel consumption to be achieved by optimizing a vessel's design with a view on all operating processes of the vessel
  - Reductions up to 25% are possible
  - Minimizing wave resistance , also in sea states

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Fuel reduction on fishing vessels

2500 DWT, 14 KNOTS.

Fuel consuption reduced
from 15 to 6 tonn /24 hrs

Longer, slimmer hull.
Two propeller speeds

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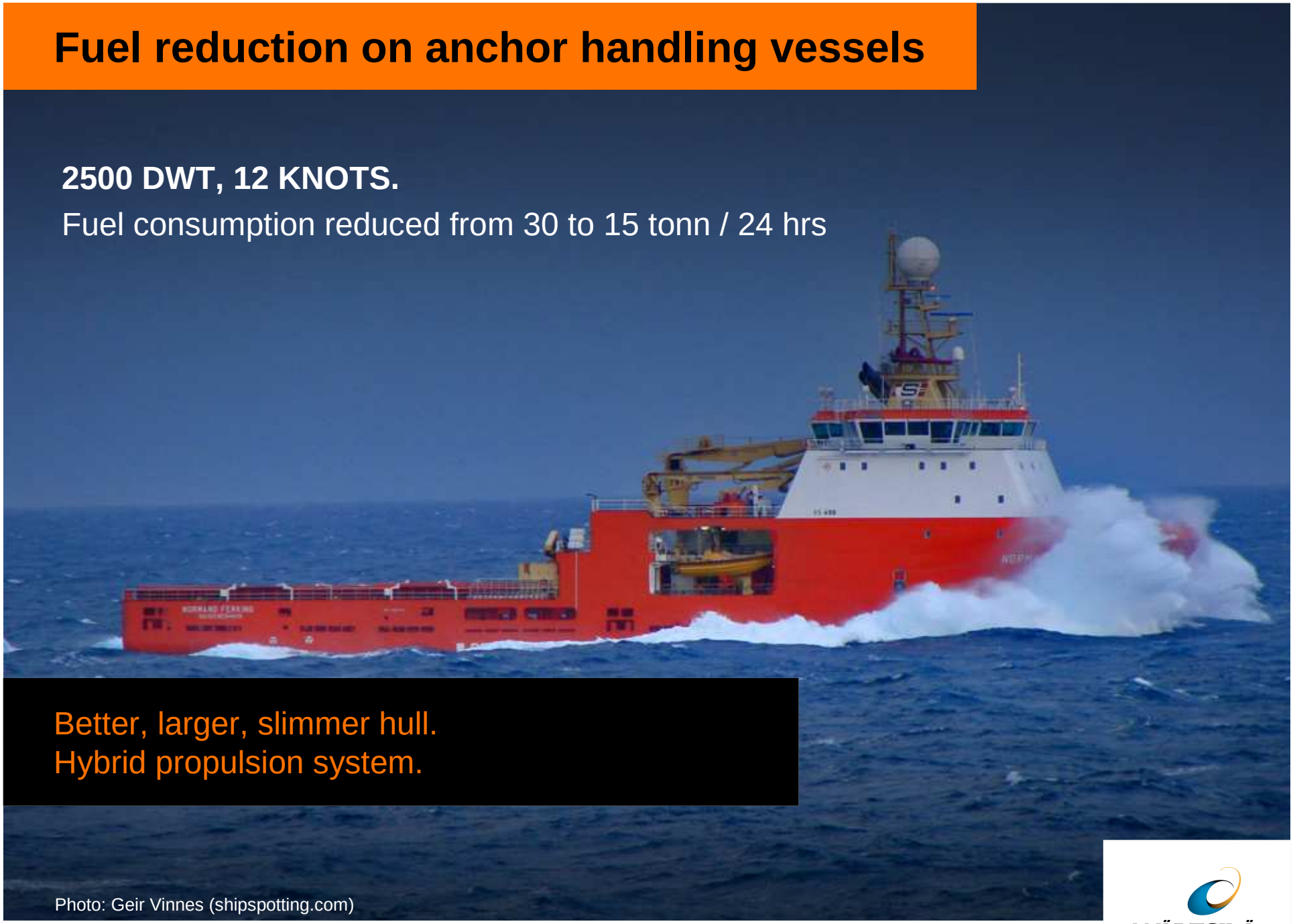
Fuel reduction on anchor handling vessels



2500 DWT, 12 KNOTS.

Fuel consumption reduced from 30 to 15 tonn / 24 hrs

Better, larger, slimmer hull.
Hybrid propulsion system.

Photo: Geir Vinnes (shipspotting.com)

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Platform supply vessels

3000 DWT, 12 KNOTS.

Fuel consumption reduced from 15 to 7 tonn / 24 hrs

Better, slimmer hull. One mechanical main propeller for steaming, and three diesel electrical driven drop down azimuths for DP mode.

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Skipskonsulent, SK 7103 ETV

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Latest orders and innovations

Major offshore vessel orders for Wärtsilä

- New contracts from China and India
- They represent a breakthrough for modern high-end offshore vessels in a region that we all believe will be an important market

What's next?

- Wärtsilä Ship Design will continue to focus on LNG fuelled vessels
- First four offshore vessels in operation are with VS design and Wärtsilä engines
- First three coastguard vessels with LNG are VS design
- The time has come for fuel cells? Fellowship plan to have the first fuel cell onboard an offshore vessel within a year

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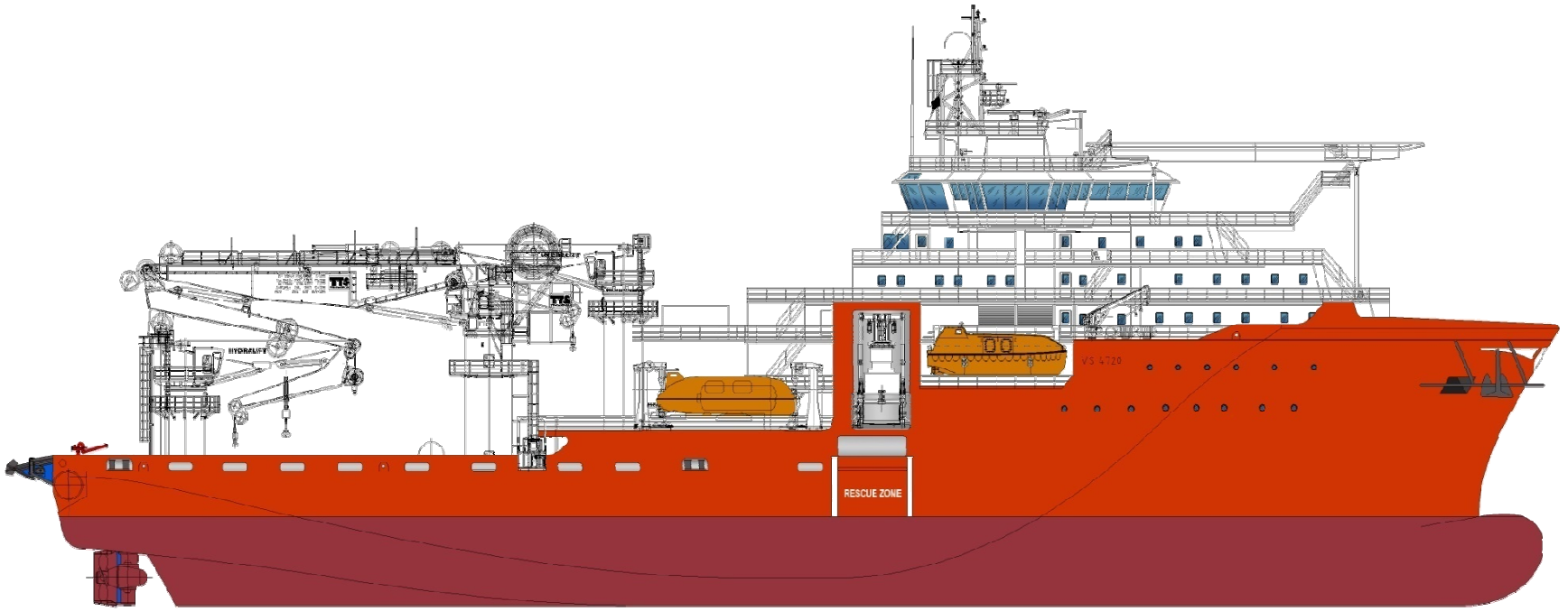
VS 4720 DSV for ONGC

110 x 23,40 meter



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Research Vessel - ORV Sagar Kanya

- India's first modern research vessel – built in 1983 – 100 m LOA.
- Modernised in 2006.
- Upgraded with DP 1, and new Diesel Electric propulsion.
- Choice of power plant - Wartsila 5 X 6L20 – 1140 KW, 1000 RPM
- Shelf, Deep sea Multidisciplinary research,

Research Vessel - ORV Sagar Nidhi

- State of art Ocean Research Vessel ORV Sagar Nidhi. – DP II, Ice class Diesel Electric propulsion – 103 m LOA
- Designed by Wartsila Ship Design – VS 7104
- Powered by Wartsila 4 X 8L20 – 1440 KW, 1000 RPM
- Offshore construction, deep sea research, ROV, Manned submersibles and for mineral research.

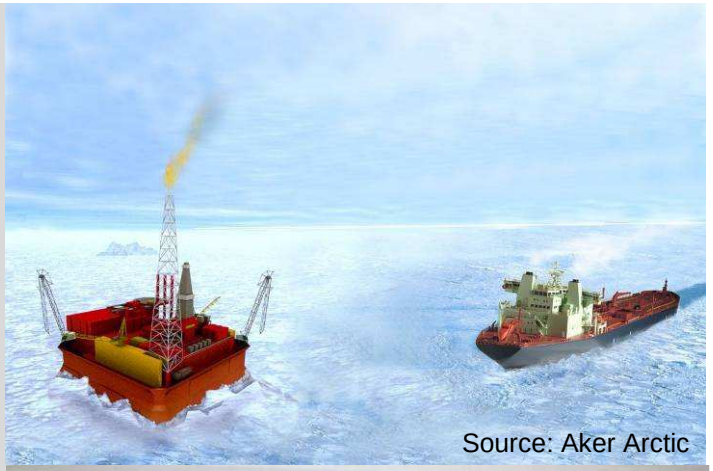
Research Vessel - ORV TBN

- Latest Research vessel from WSD staple.
- VS 780 ORV – 80 m LOA
- Under construction in India – ABG shipyard.
- DP 1, Diesel Electric propulsion.
- Shelf, Deep sea Multidisciplinary research,

Conceptual Design: Case study – Artic shipping

There is a gowing demand for artic shipping

- The high oil prices have increased the interest to exploit artic oil and gas reserves the Barents Sea and Okhotsk Sea
- Artic ice class ships are needed
  - Tankers
  - LNG carriers
  - Supply vessels



Source: Aker Arctic

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Background – DAS

- **DAS - Double Acting Ship***, a ship that operates with the stern first when operating in ice.
- This saves in installed power, and fuel, and makes it possible to optimize the bow of the ship for open water performance. A bulbous bow can be used, which is not otherwise suitable for ice operation.
- The flushing of the propellers reduces ice friction against the hull

* developed and patented by Aker Arctic

Source: Aker Arctic

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Operation

The new idea is to use a pusher at open sea and switch to pulling tug when approaching the ice:

- The arctic vessel often operate only a short distance in ice. Most time is at open sea
  - ➔ The expensive ice design is not utilised for more than part time of the operation

- There are many identical barges with the bow optimised for open sea use.

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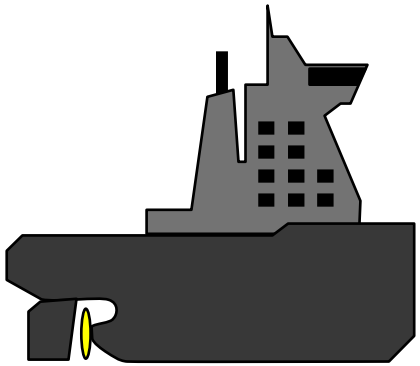
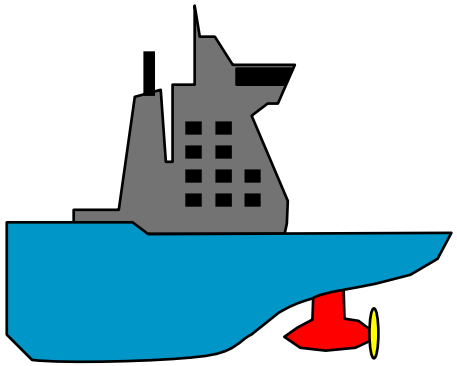
Double acting pusher-puller barge concept



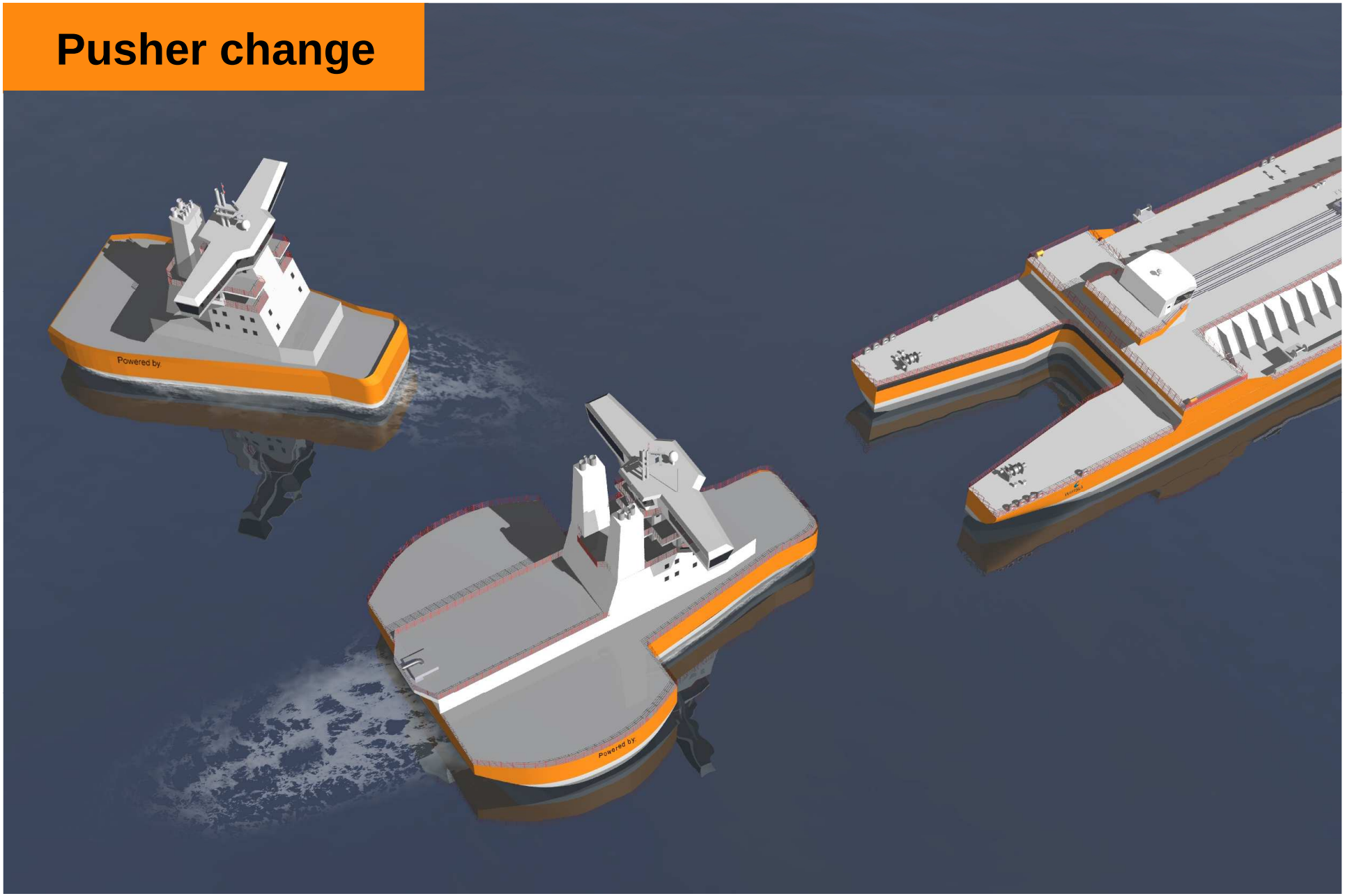
Pusher



Pulling ice breaker tug

Barge

Pusher change



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Barge with Pusher

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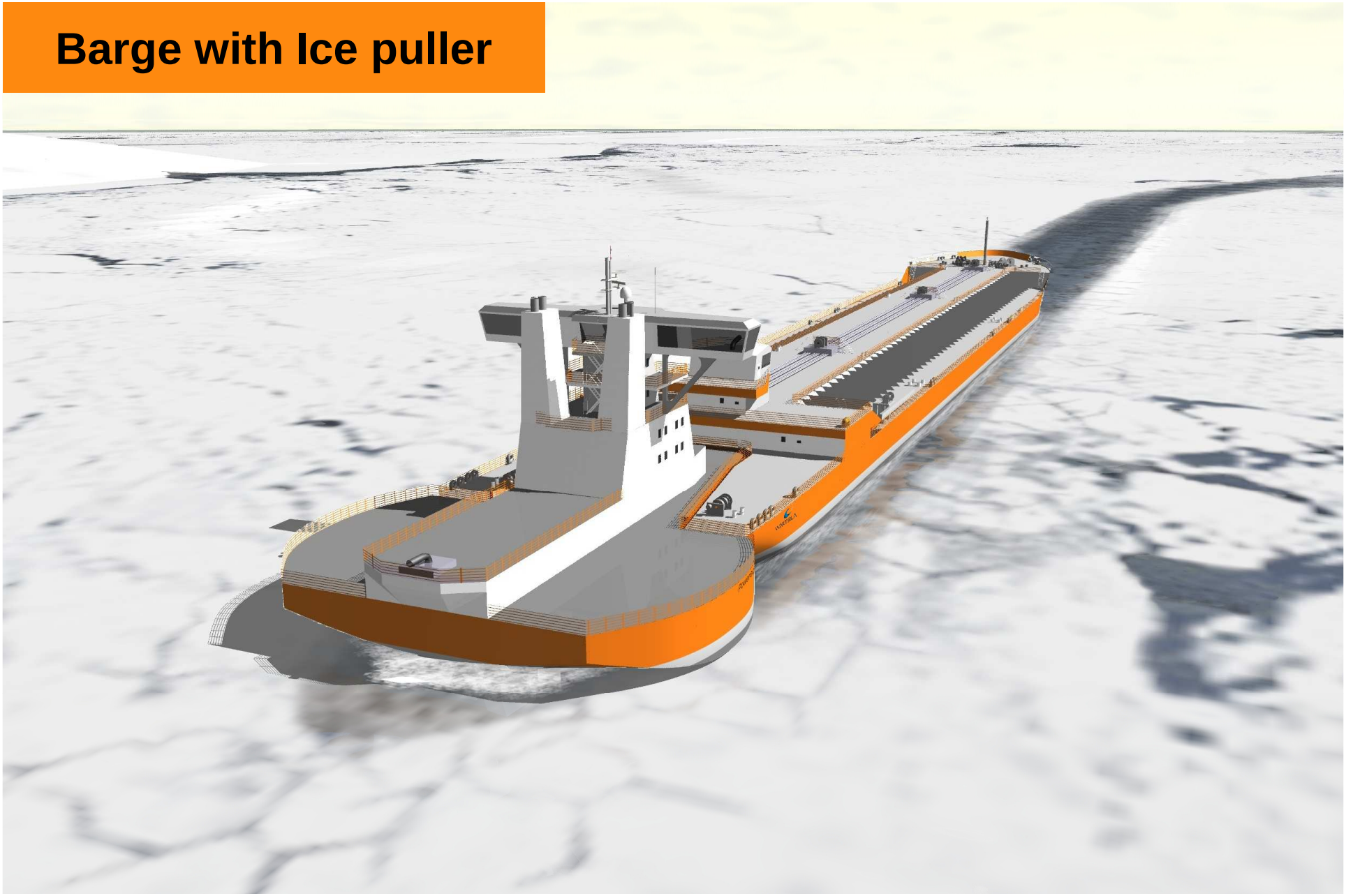
Barge with Ice puller



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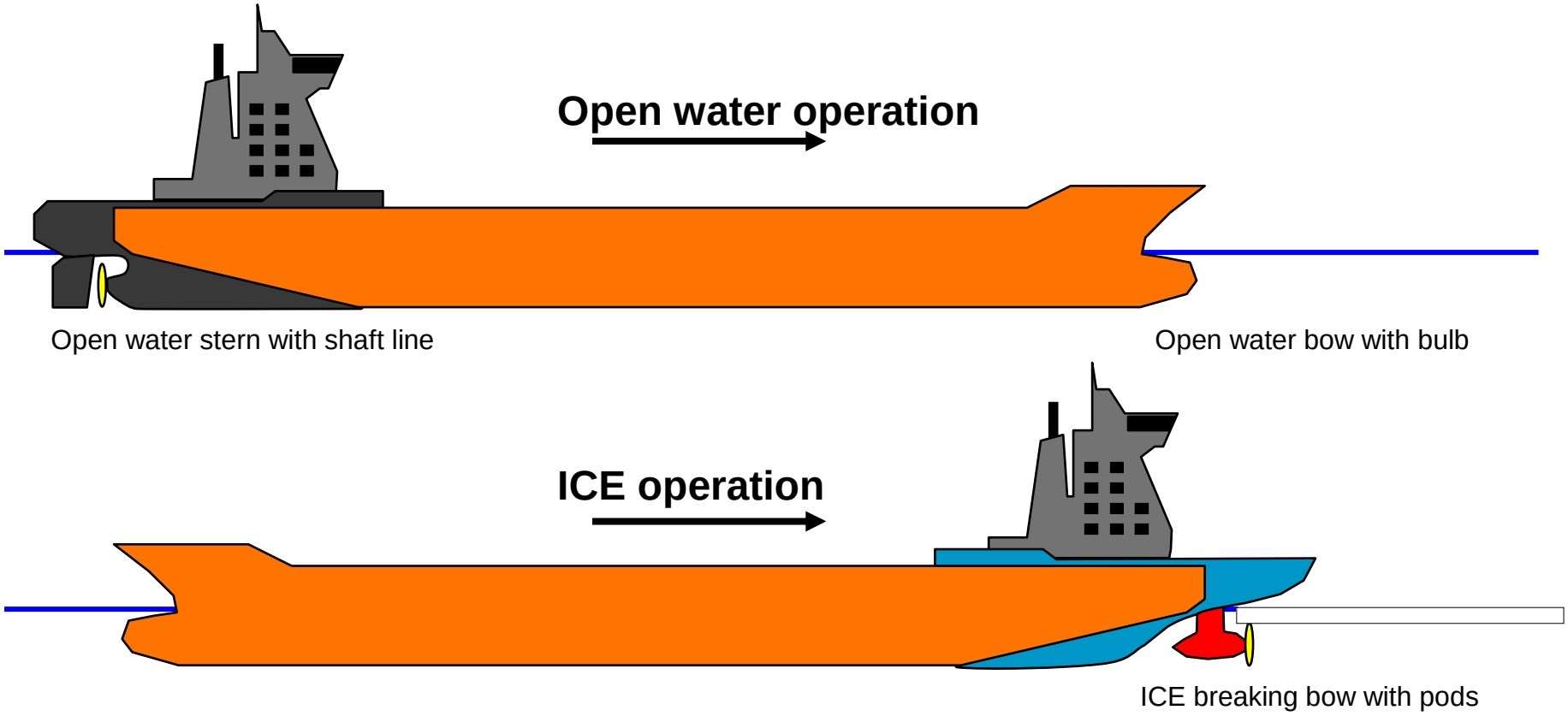
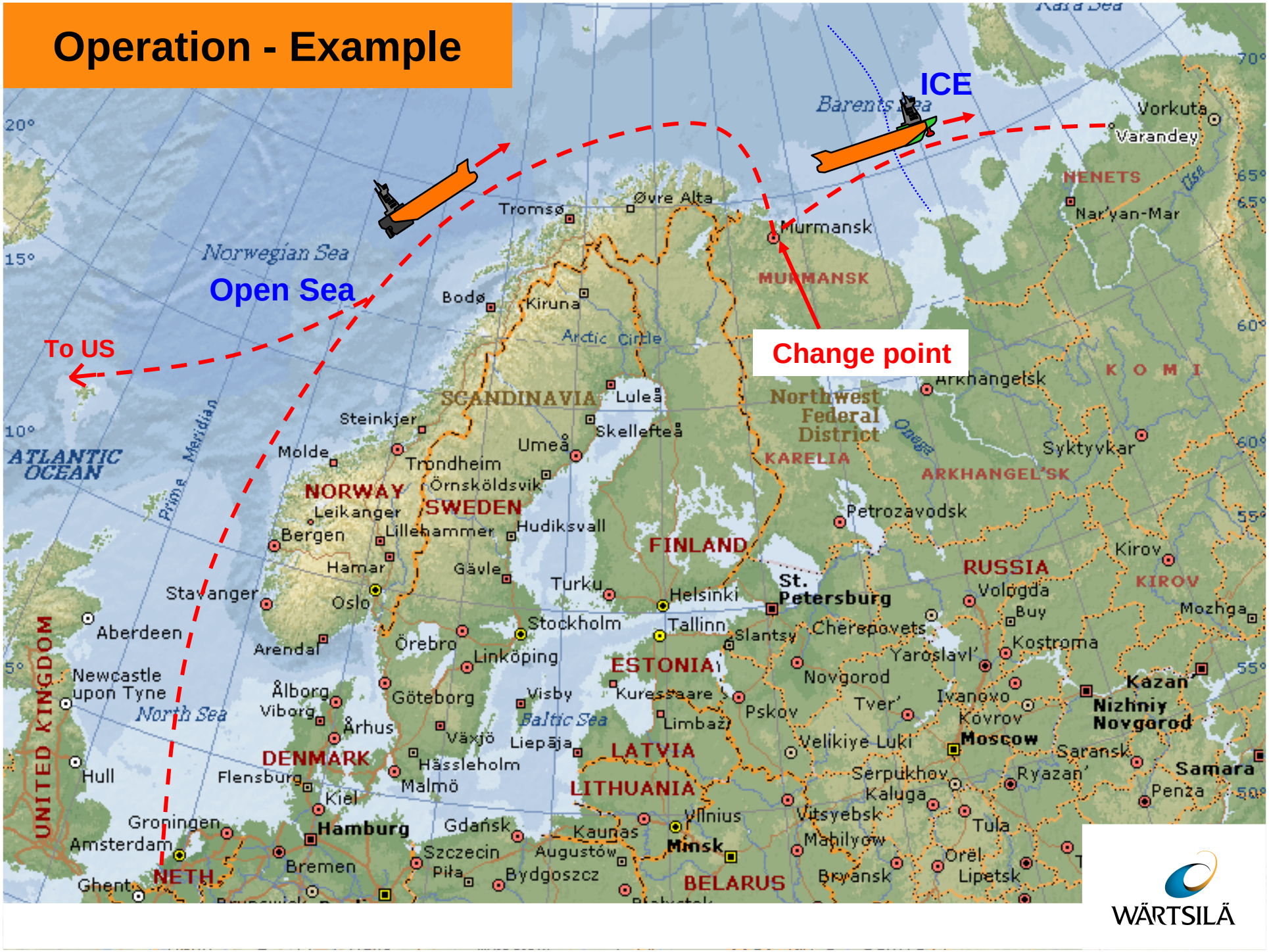
Double acting pusher-puller barge concept



Operation - Example



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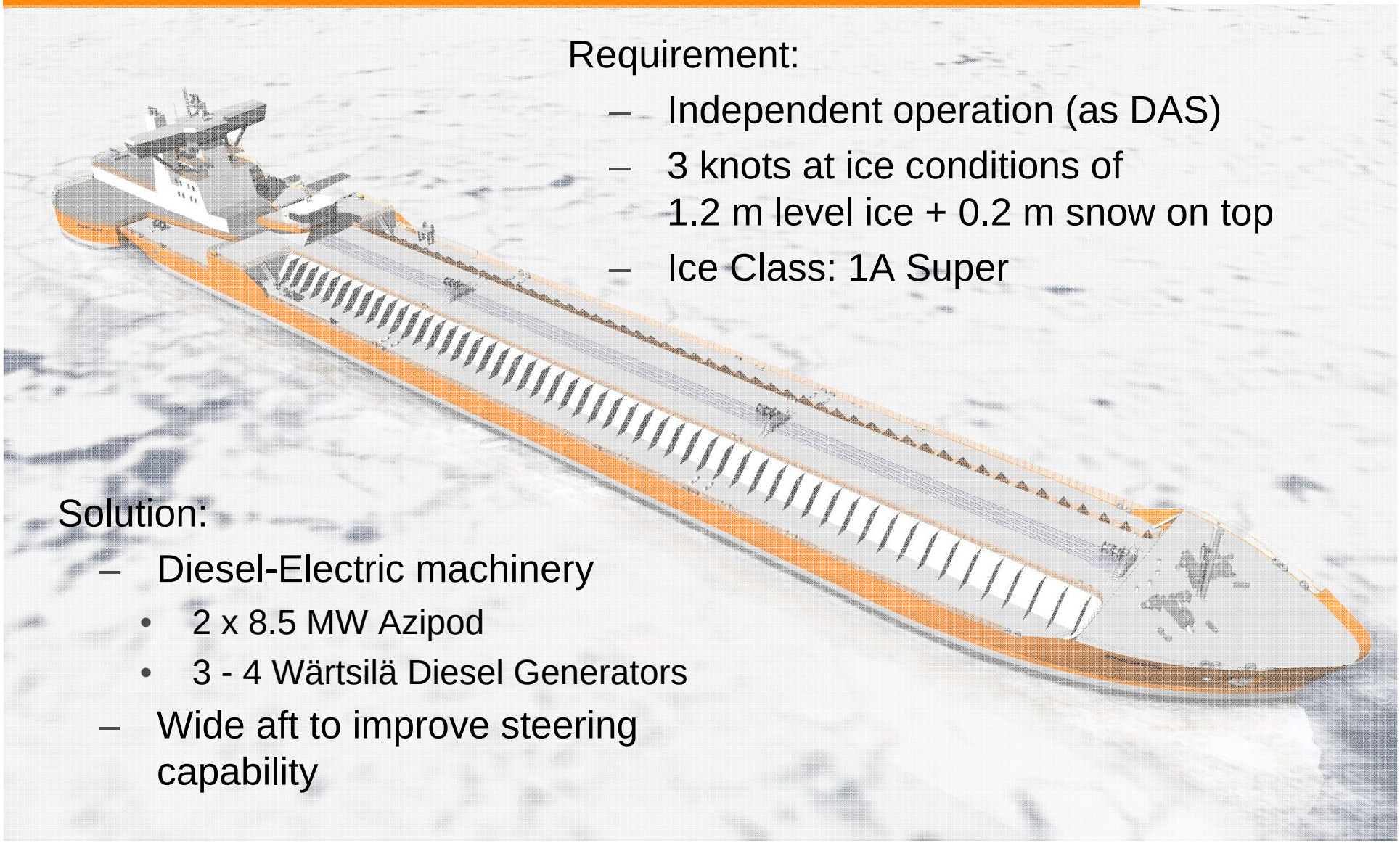
Ice Performance for Puller-Barge combination



Requirement:

- Independent operation (as DAS)
- 3 knots at ice conditions of
  1.2 m level ice + 0.2 m snow on top
- Ice Class: 1A Super

Solution:

- Diesel-Electric machinery
  - 2 x 8.5 MW Azipod
  - 3 - 4 Wärtsilä Diesel Generators
- Wide aft to improve steering capability

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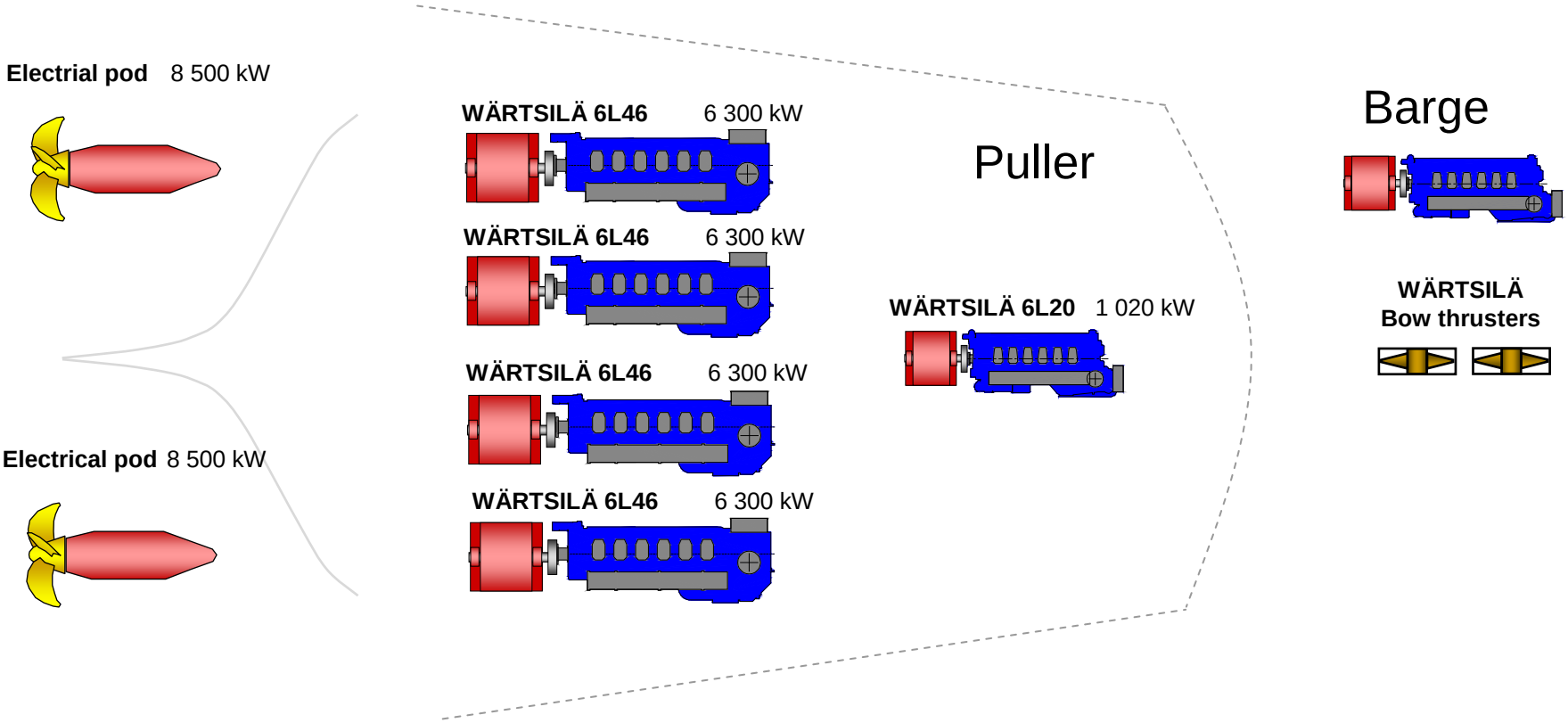
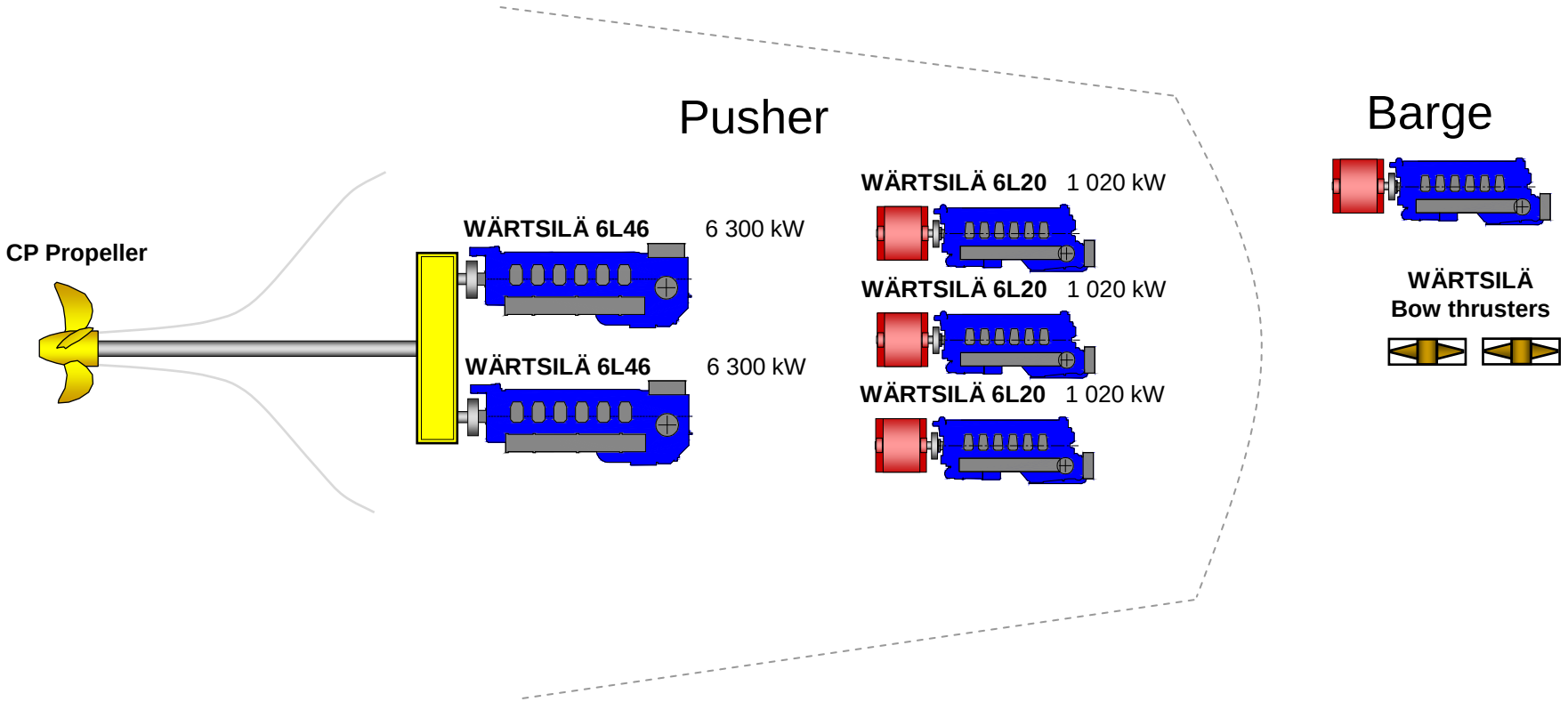
Machinery example for ice Puller



Machinery example for Pusher



Our offering

NEWBUILDING SERVICES:

- Feasibility studies (technical and commercial).
- Tender documentation.
- Shipyard offer evaluation and comparison (technical and commercial).
- Plan approval and optimization.
- Newbuilding supervision.

SHIP DESIGN:

- Initial design (general arrangement drawings).
- Basic design (classification drawings).
- Detail design (production drawings).
- Upgrades and modifications (initial, basic and/or detail design).

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Our engineering expertise

COMPLETE RANGE OF ENGINEERING DISCIPLINES:

- Ship theory.
- Structural design.
- Outfitting & accommodation.
- Mechanical engineering.
- Electrical engineering, navigation & communication.

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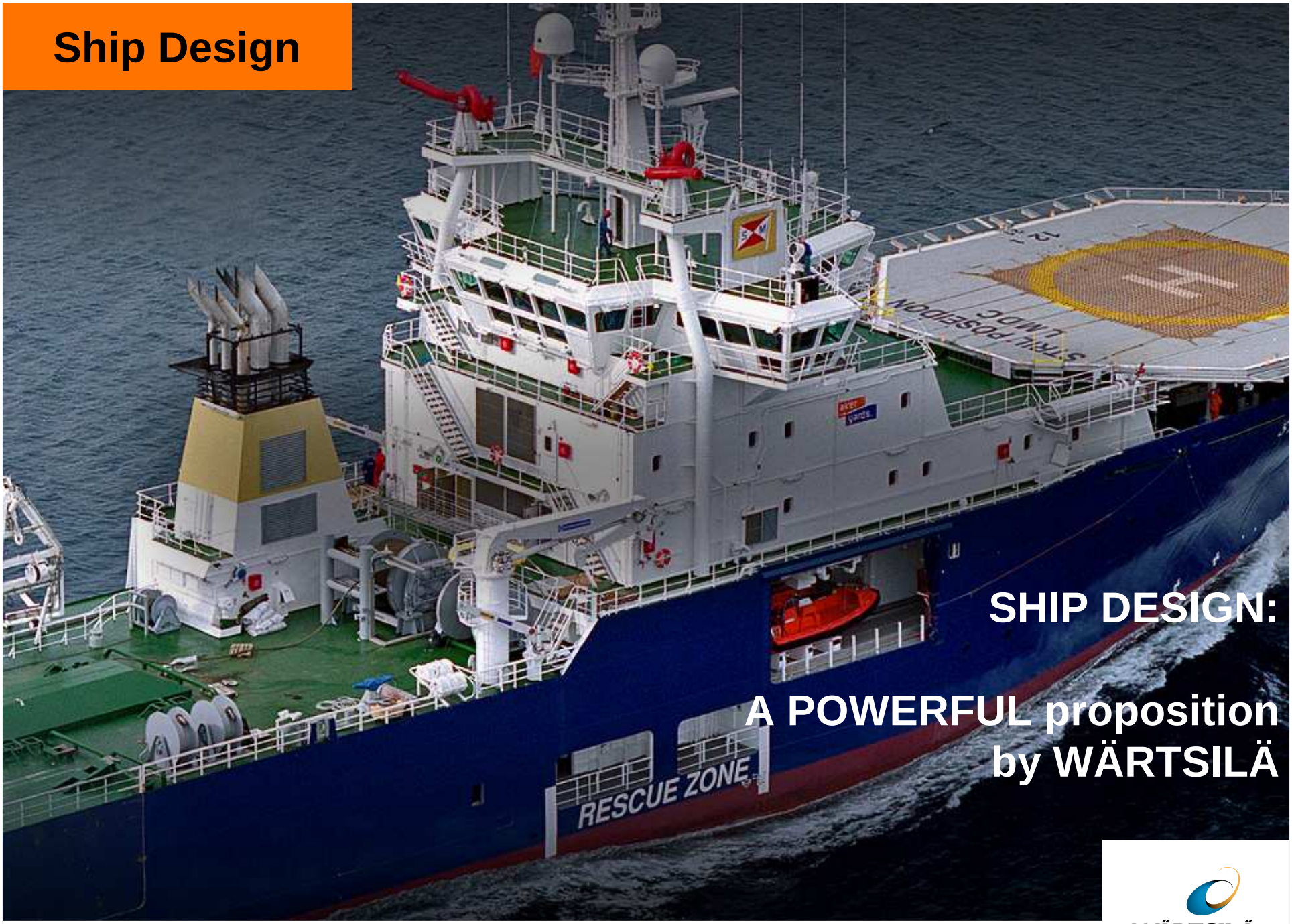
Ship Design



SHIP DESIGN:

A POWERFUL proposition by WÄRTSILÄ

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