

Journey towards autonomous ships in the ship intelligence era



Esa Jokioinen, Head of Blue Ocean Team, Rolls-Royce Marine
International Seminar in IoT and Logistics, 6th March 2017, Tokyo

© 2016 Rolls-Royce plc

The information in this document is the property of Rolls-Royce plc and may not be copied or communicated to a third party, or used for any purpose other than that for which it is supplied without the express written consent of Rolls-Royce plc. This information is given in good faith based upon the latest information available to Rolls-Royce plc, no warranty or representation is given concerning such information, which must not be taken as establishing any contractual or other commitment binding upon Rolls-Royce plc or any of its subsidiary or associated companies.

Trusted to deliver excellence



Rolls-Royce

Digitalisation – disruptive change

Internet of Things

Industry 4.0

Big Data



U B E R

amazon.com



Digitalisation in the marine market



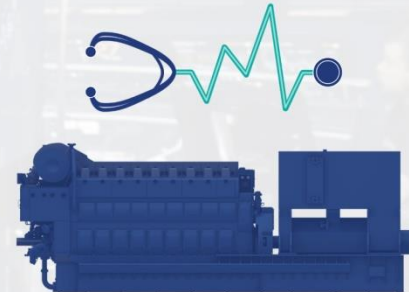
The dawn of the Ship Intelligence era

Shipping trends - management

”Total awareness”

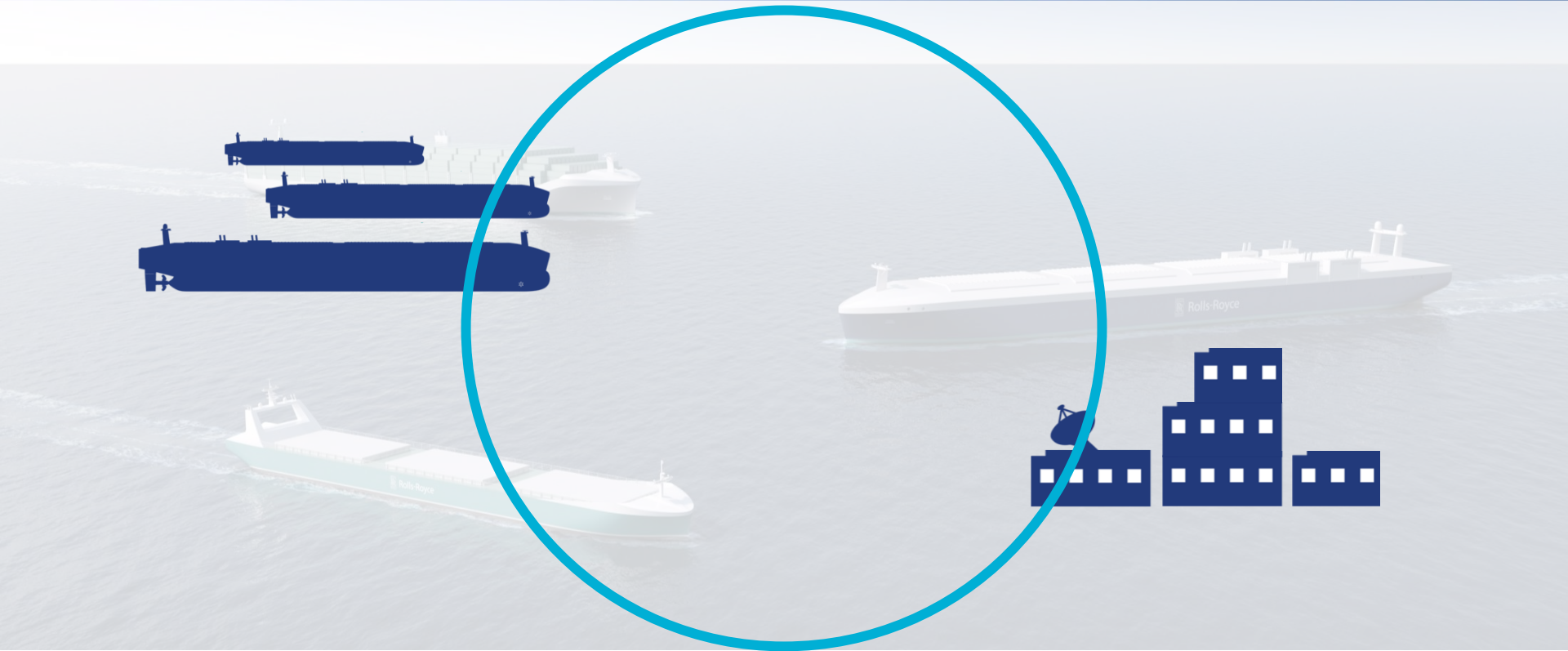


Asset management

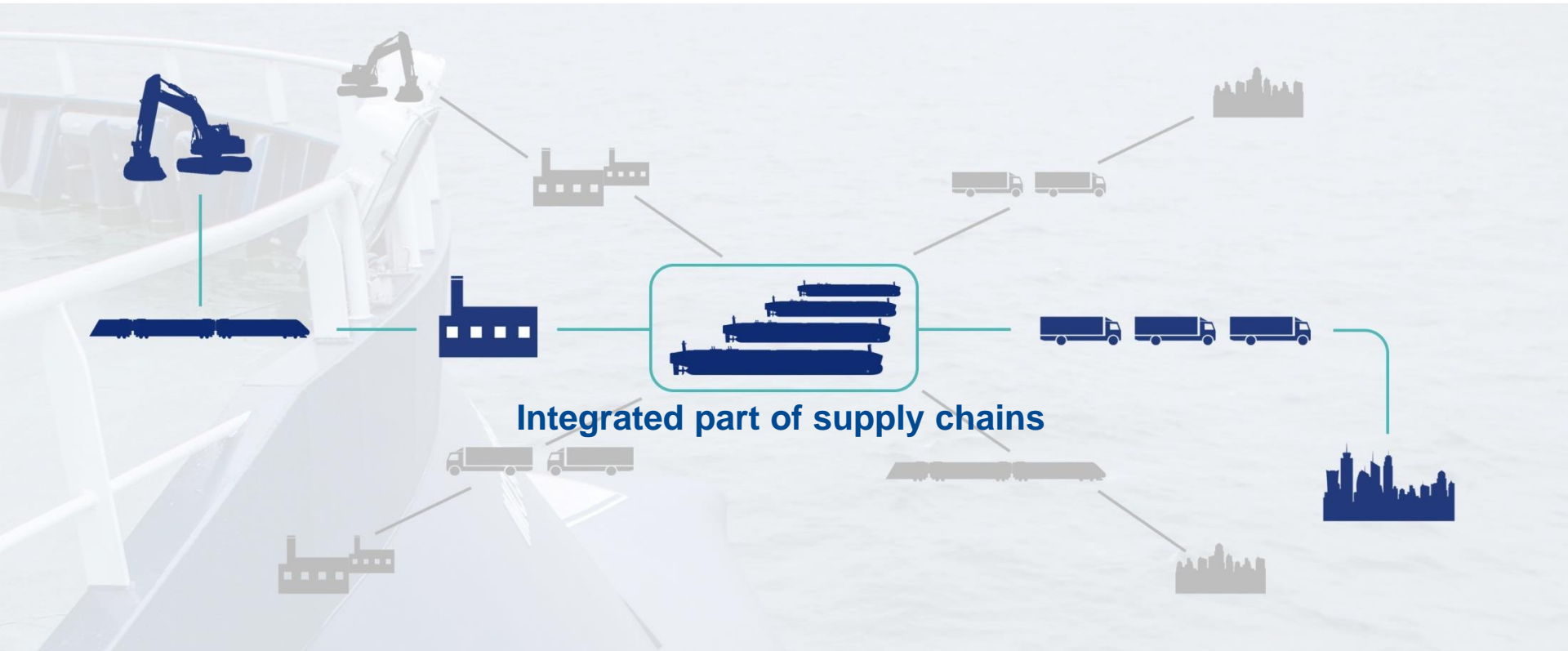


Health management

Integrating ship and shore

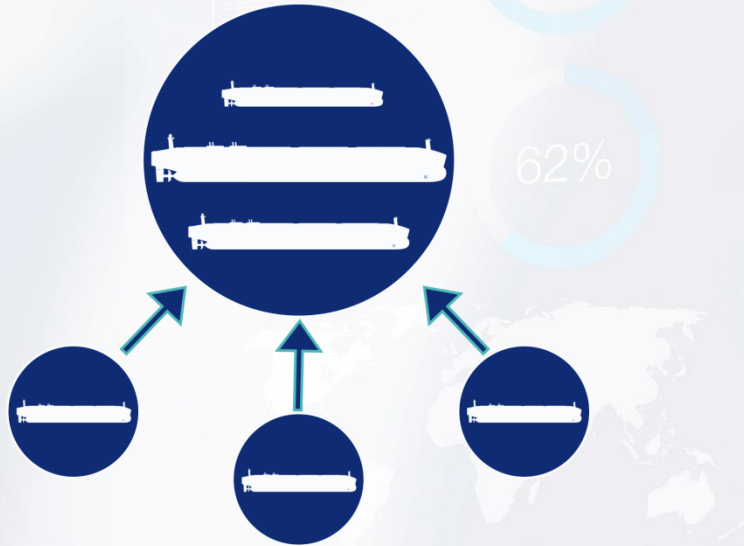


Shipping trends – operation



Shipping trends - business

Consolidation



New players and digital alliances

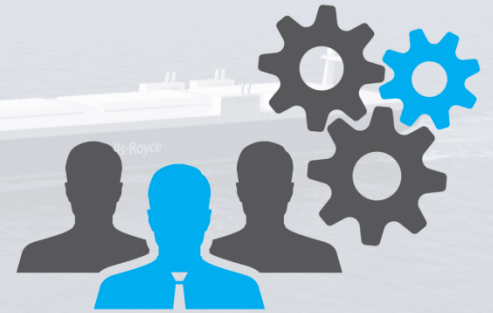


New players?

Investors

Digital market place

Asset management



Goals of ship intelligence



Efficient and safe operations

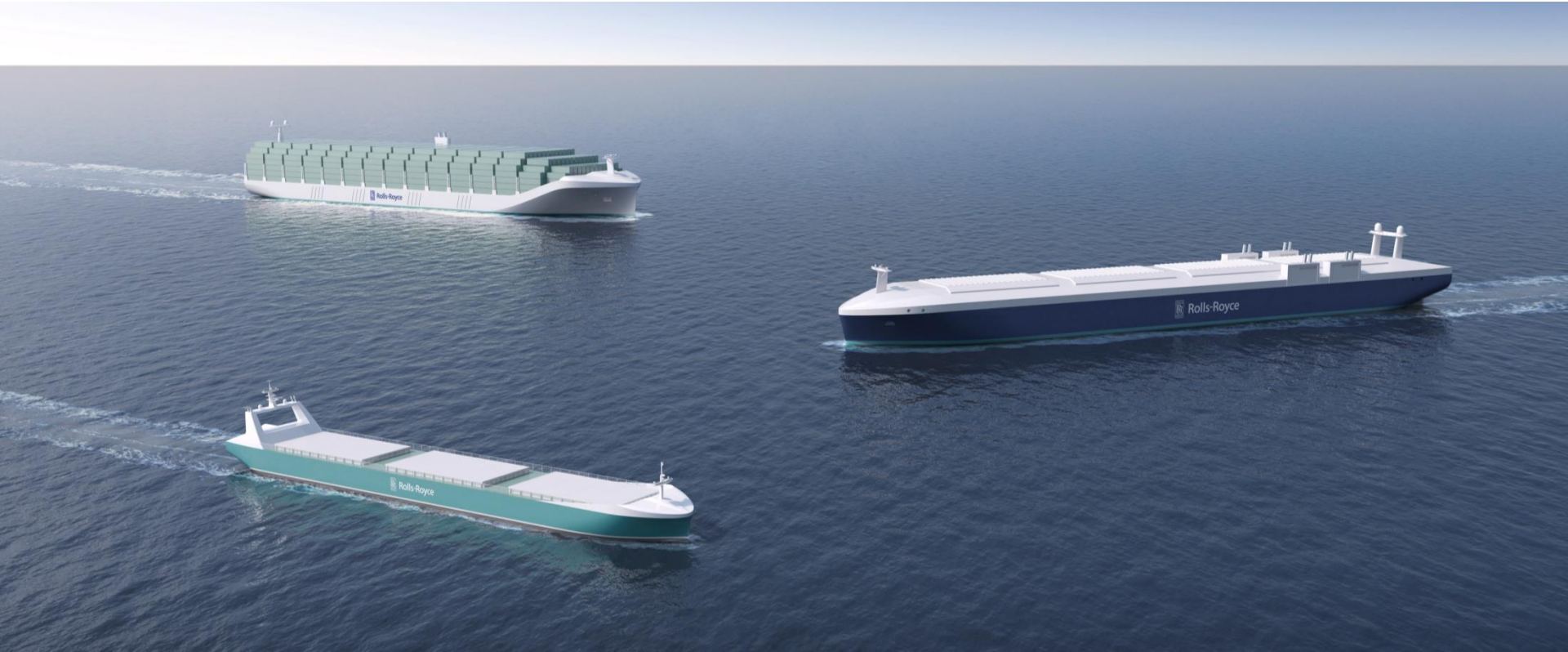


Container revolution



Ship intelligence revolution?

Autonomous ships



Autonomy trend in society



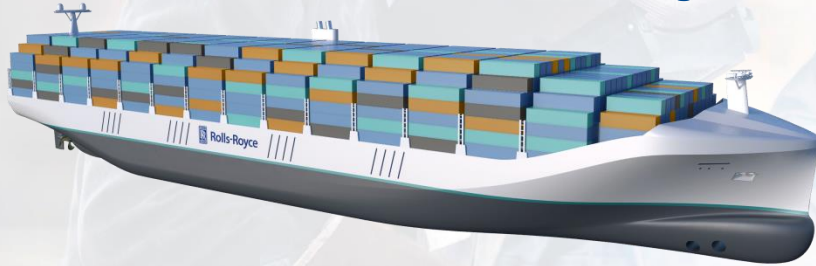
It is not IF, but WHEN...

Why autonomous



Remote controlled ships - features

More cargo

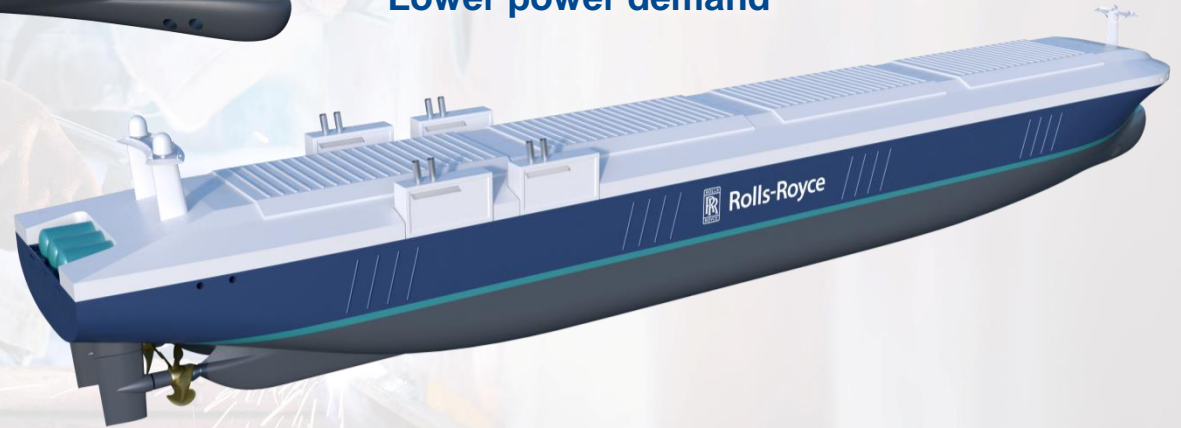


Lower power demand

No hotel systems

No deck house

Redundant machinery



Energy reduction

Lower operating speed?

Lower weight: 700 – 1.000 ton

Wind resistance: ~1% saving

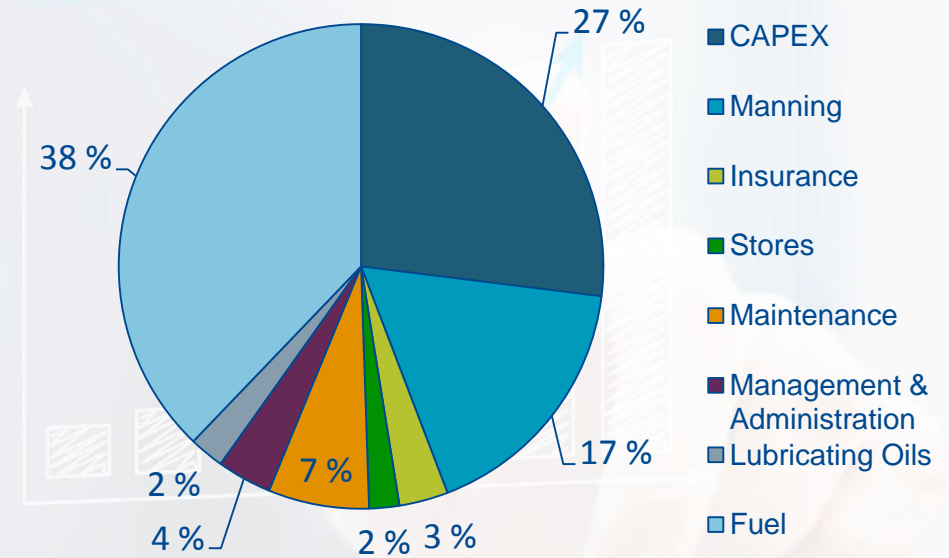


Reduced hotel load: 200 – 270 kW

Cost structure

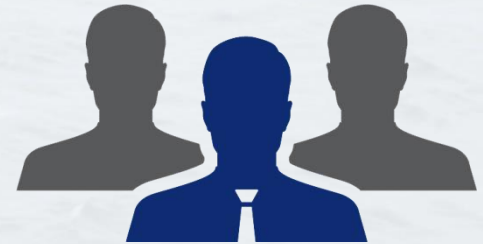
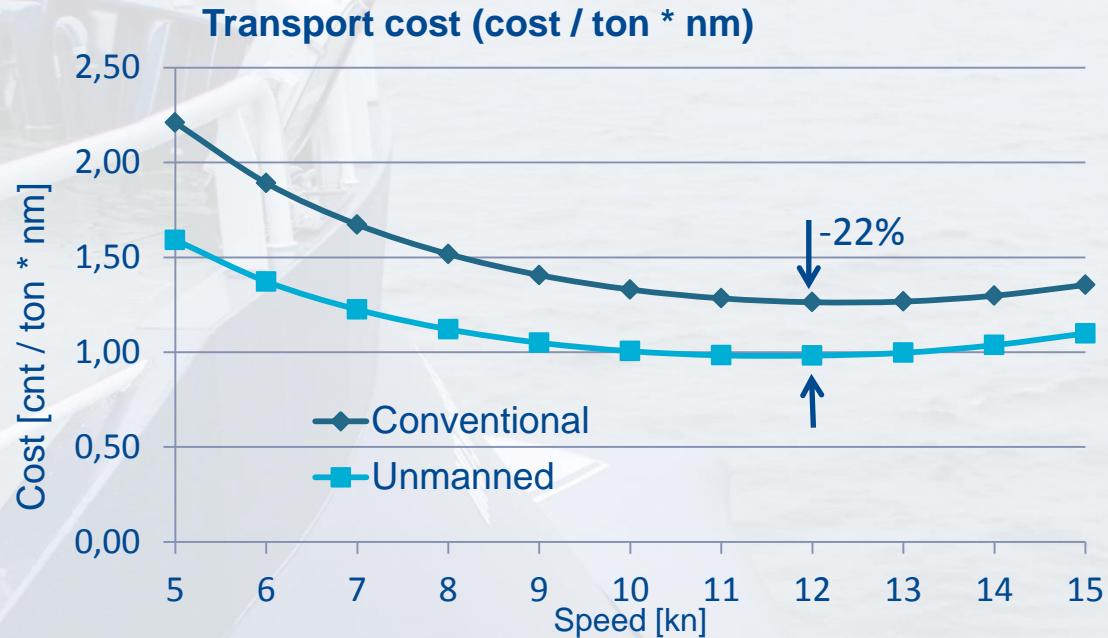


General cargo annual costs



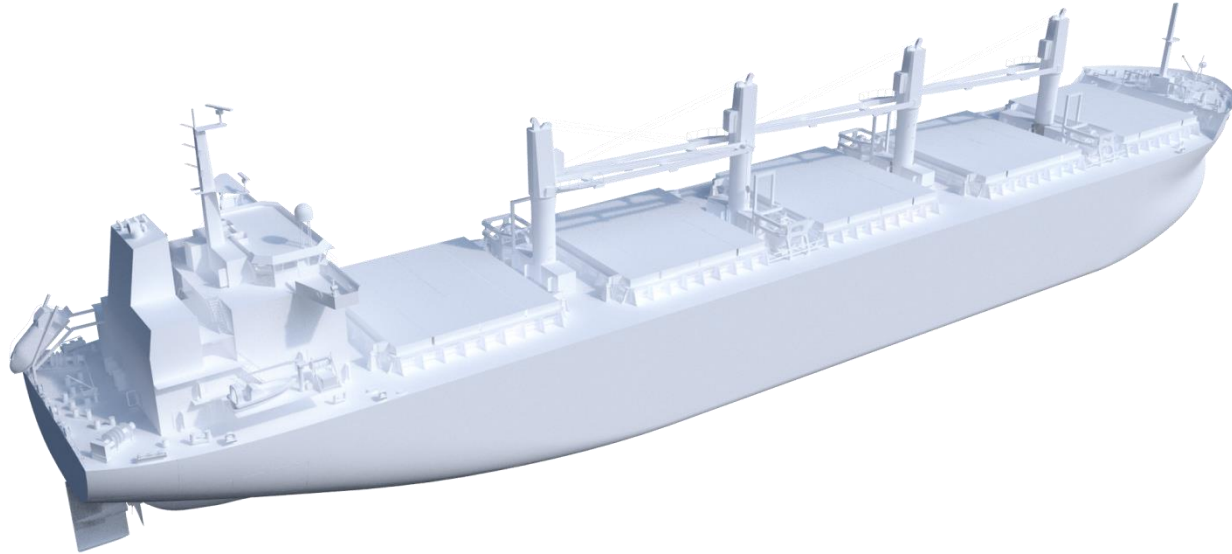
Cost - transport

20.000 dwt general cargo vessel



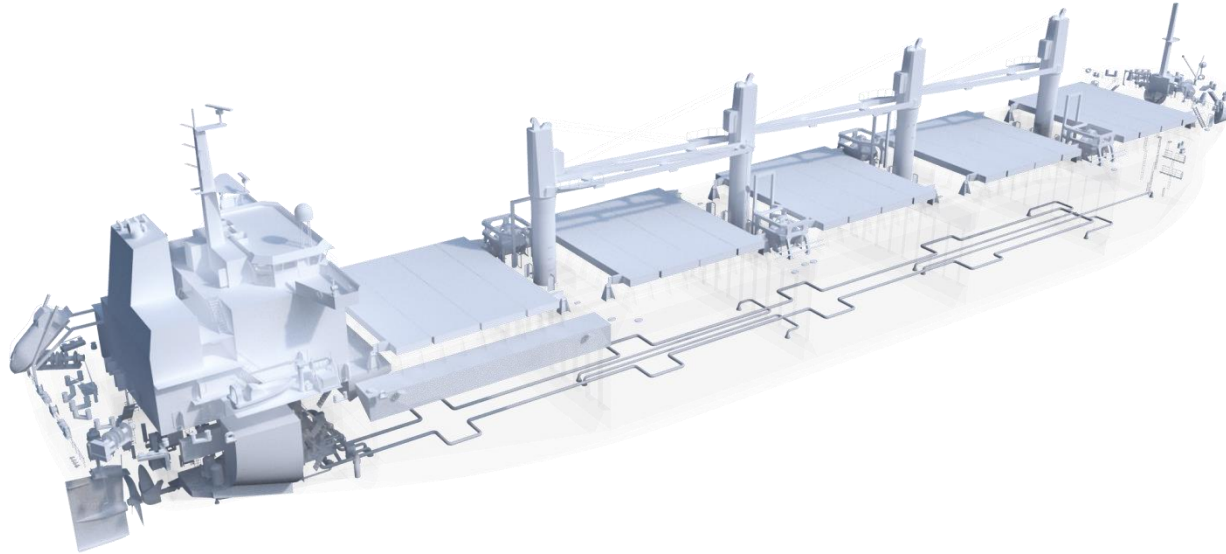
The evolution of autonomous vessels

Manned vessel



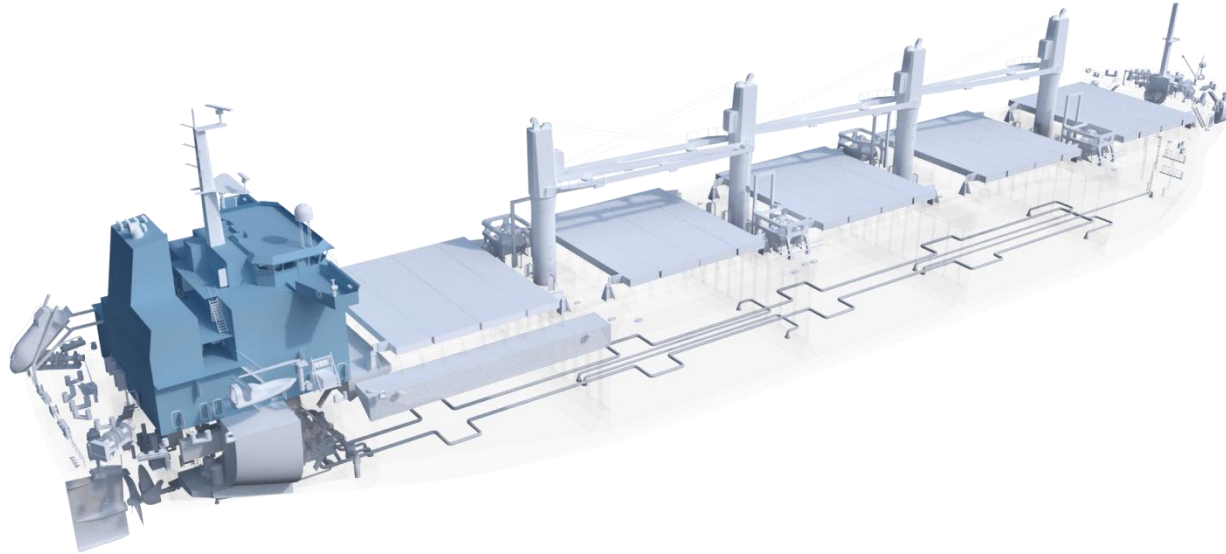
The evolution of autonomous vessels

Manned vessel



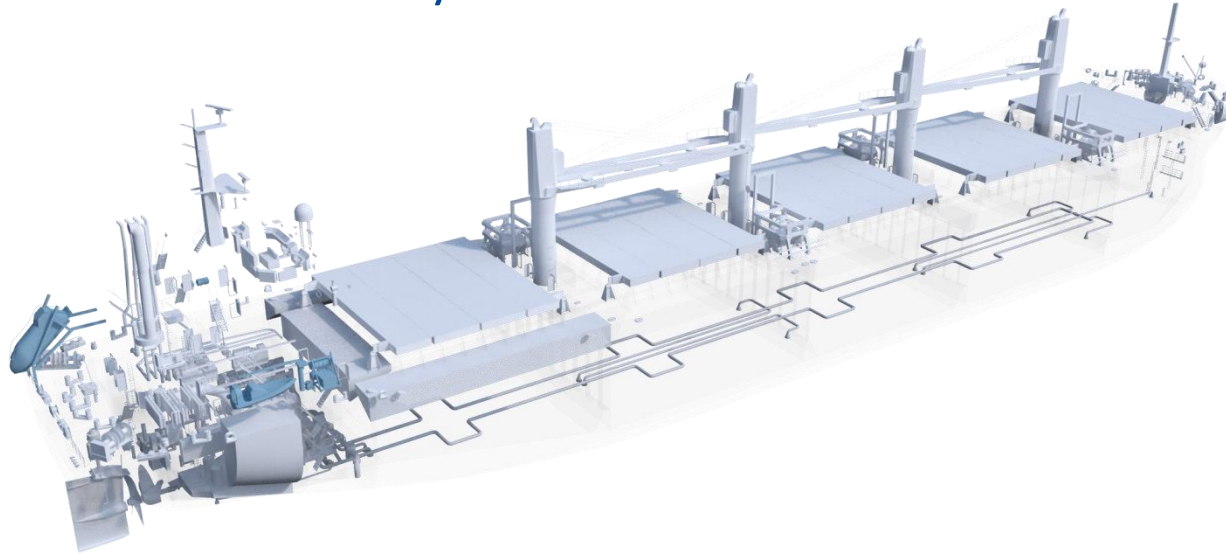
The evolution of autonomous vessels

Manned vessel - steel



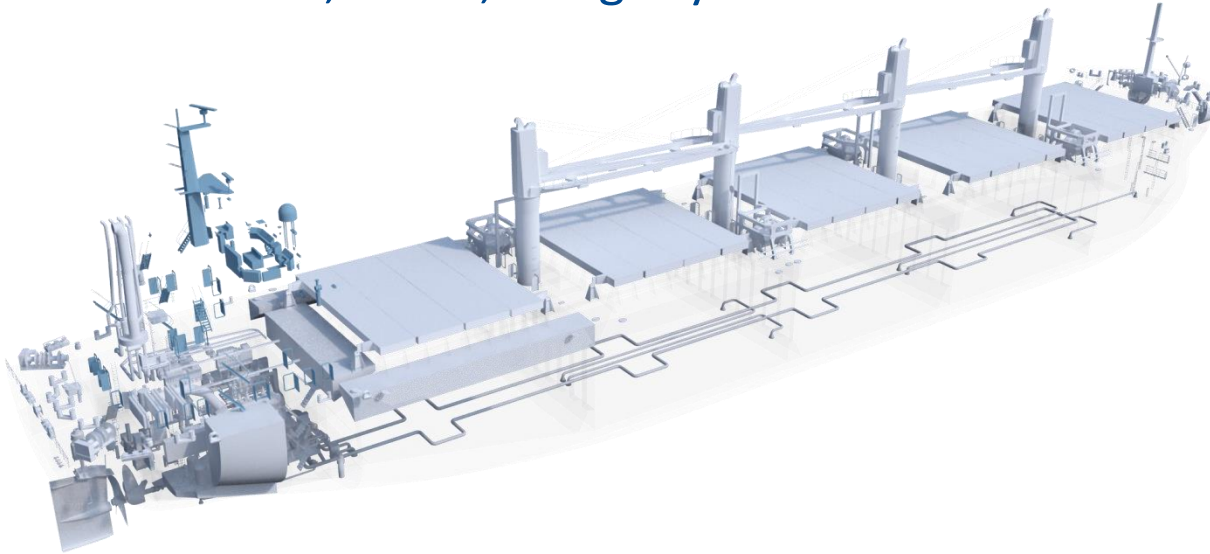
The evolution of autonomous vessels

Manned vessel – lifeboat systems



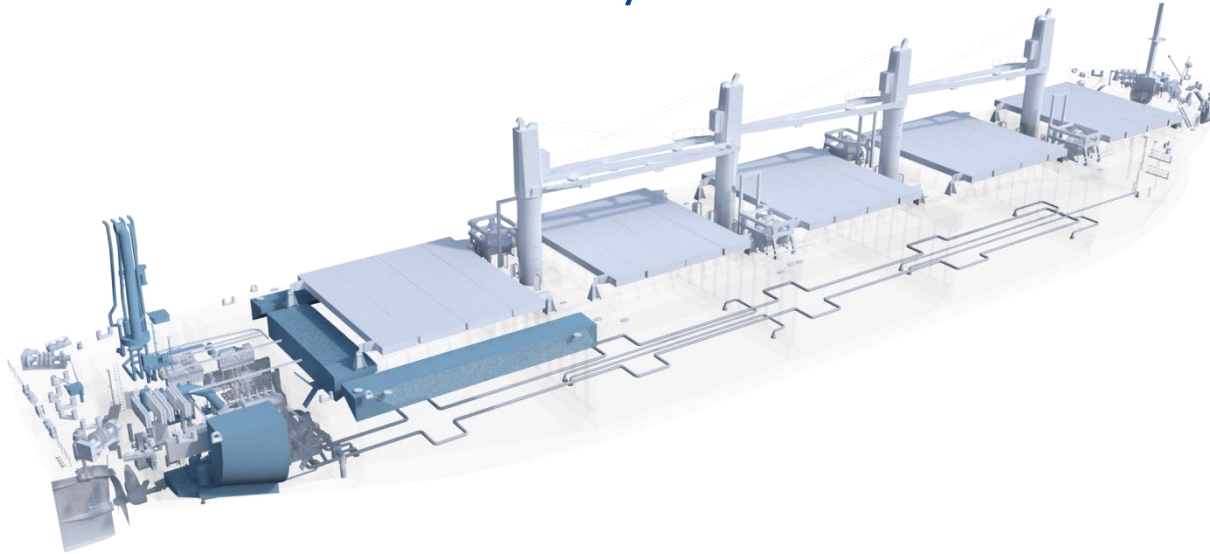
The evolution of autonomous vessels

Manned vessel – stairs, doors, bridge systems



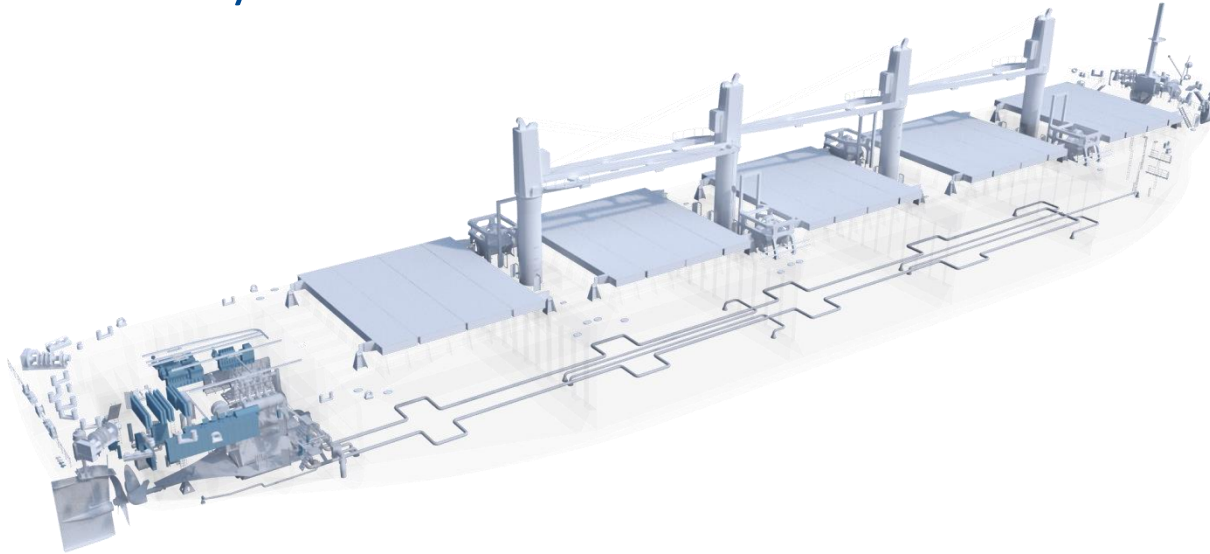
The evolution of autonomous vessels

Manned vessel – tanks and funnel systems



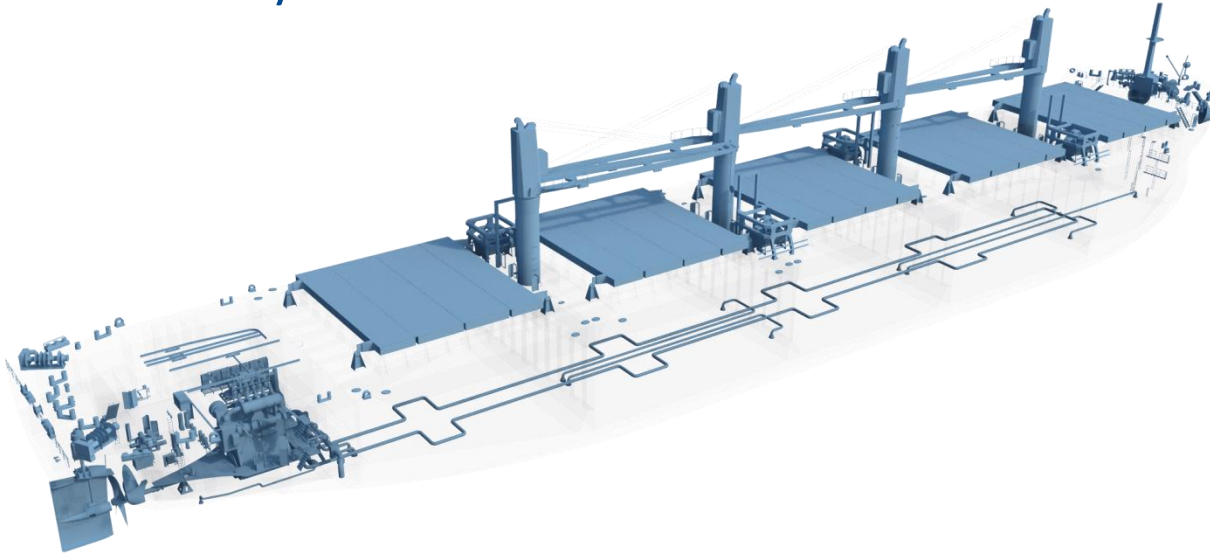
The evolution of autonomous vessels

Manned vessel – systems



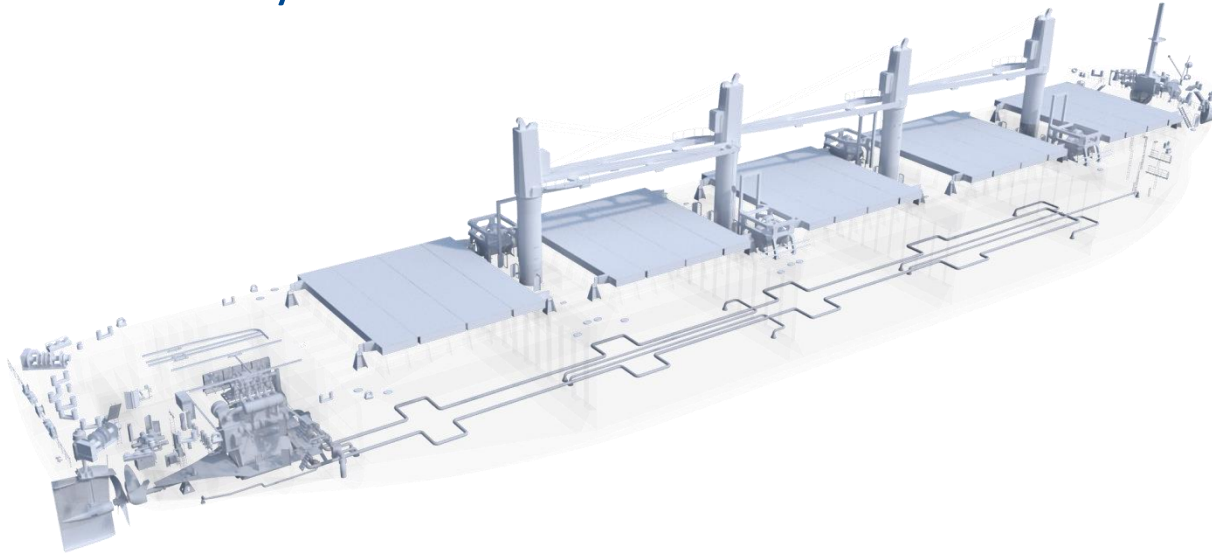
The evolution of autonomous vessels

Systems that will stay similar



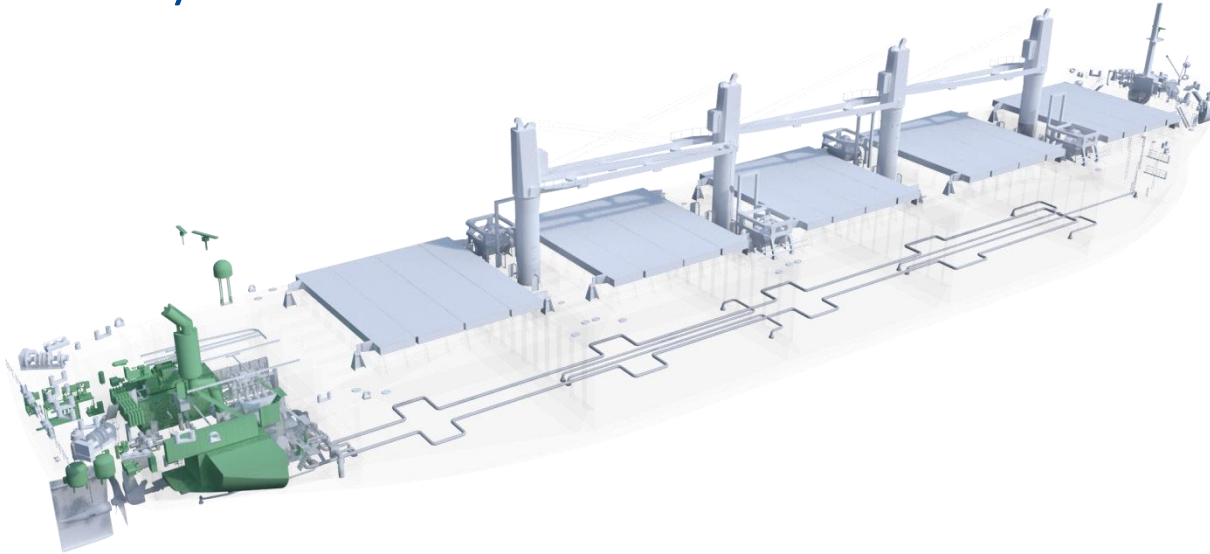
The evolution of autonomous vessels

Systems that will stay similar



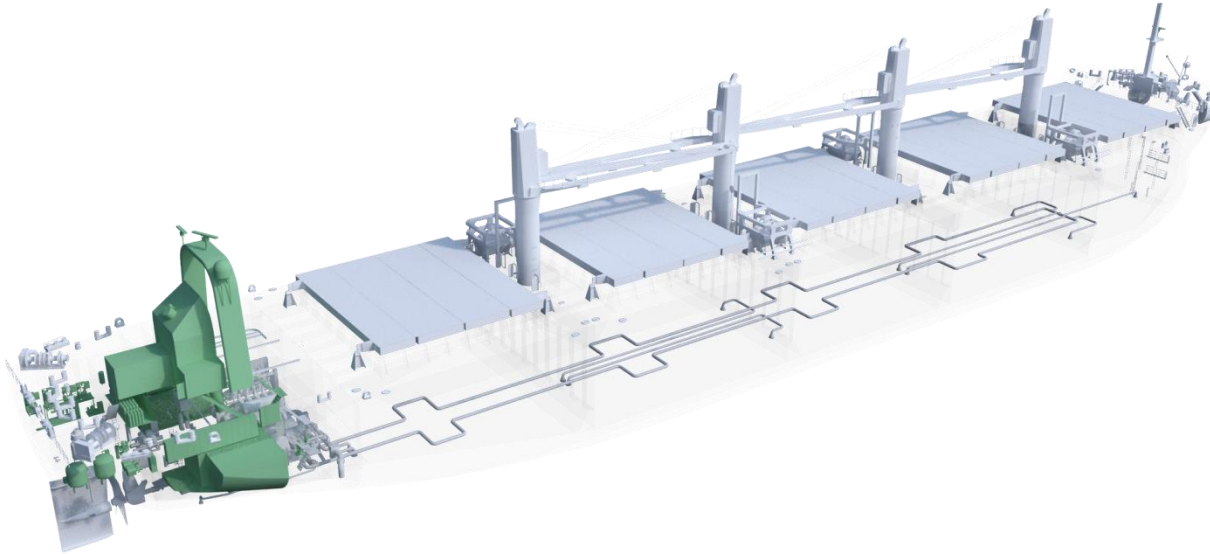
The evolution of autonomous vessels

Autonomous - systems



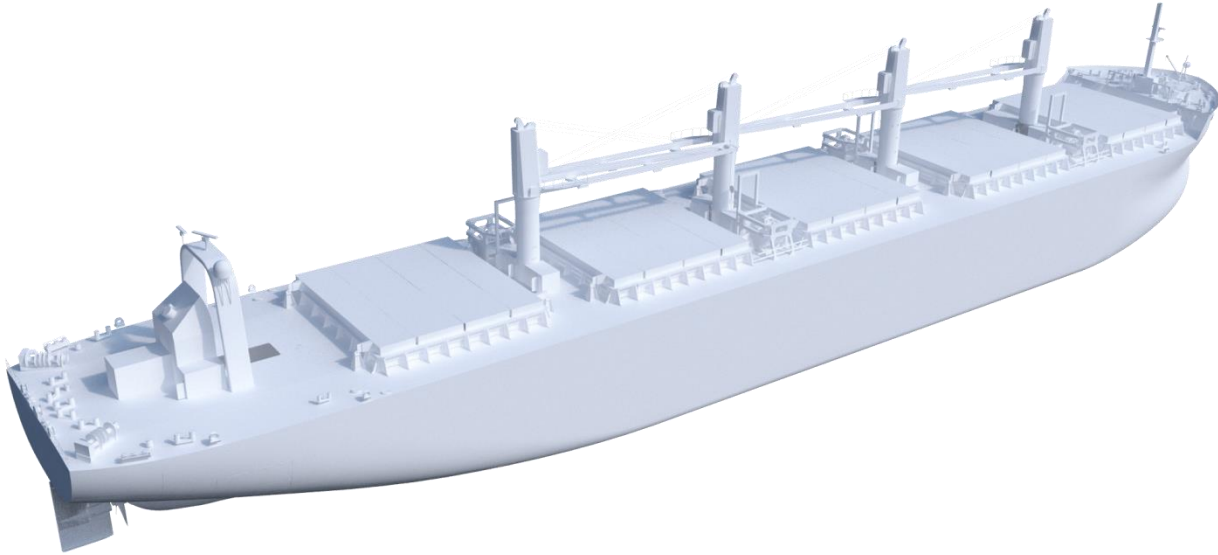
The evolution of autonomous vessels

Autonomous - steel



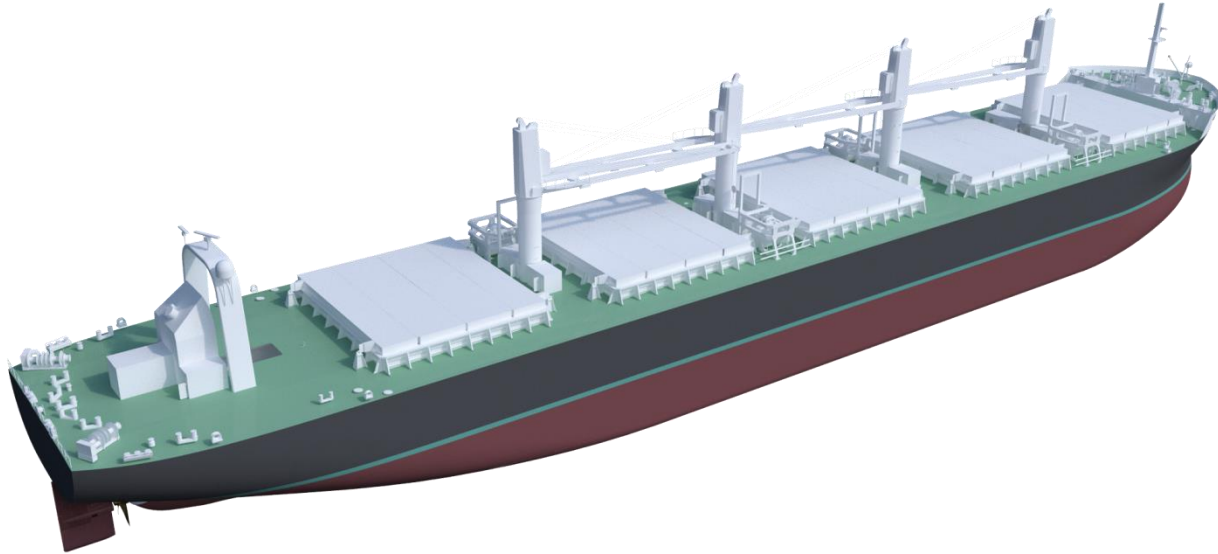
The evolution of autonomous vessels

Autonomous vessel



The evolution of autonomous vessels

Autonomous vessel



Safety

Safer than before

Fewer accidents

Reduced human error factor



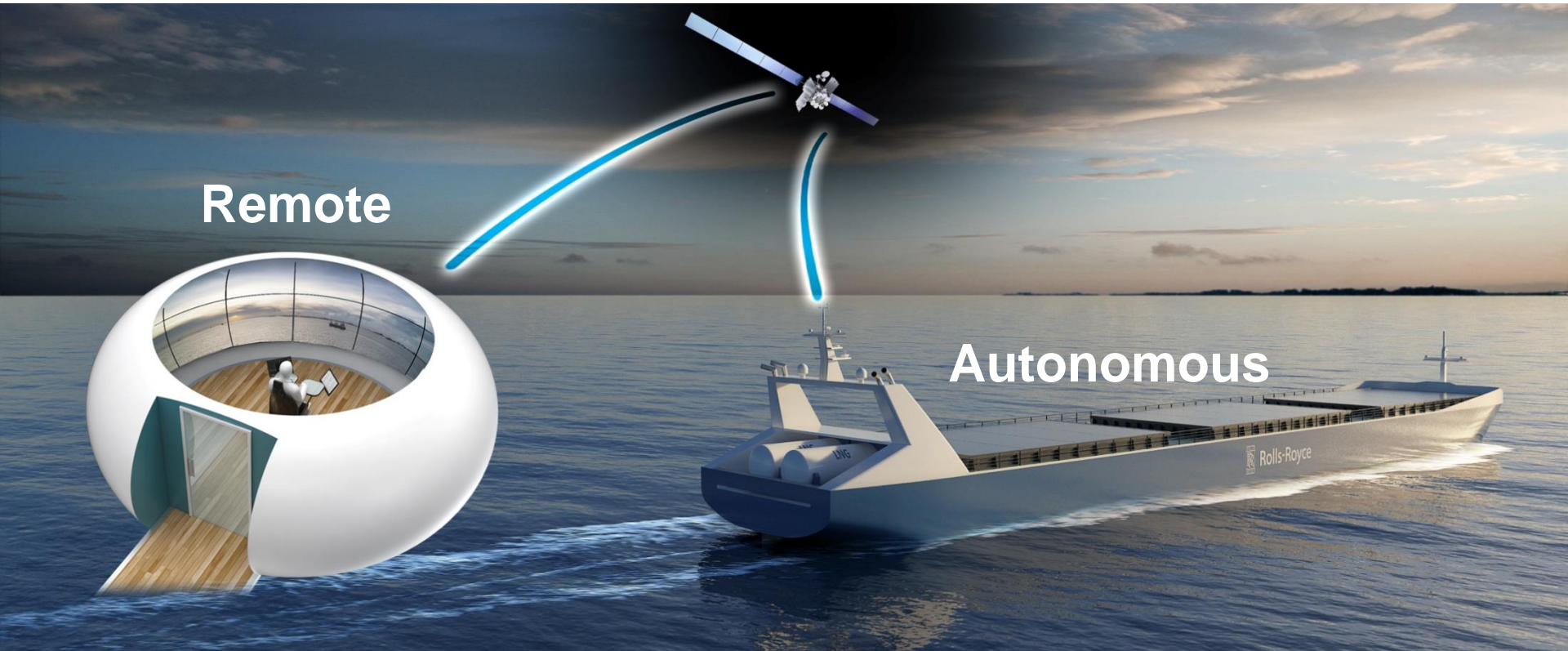
No piracy victims

Humans out of harms way

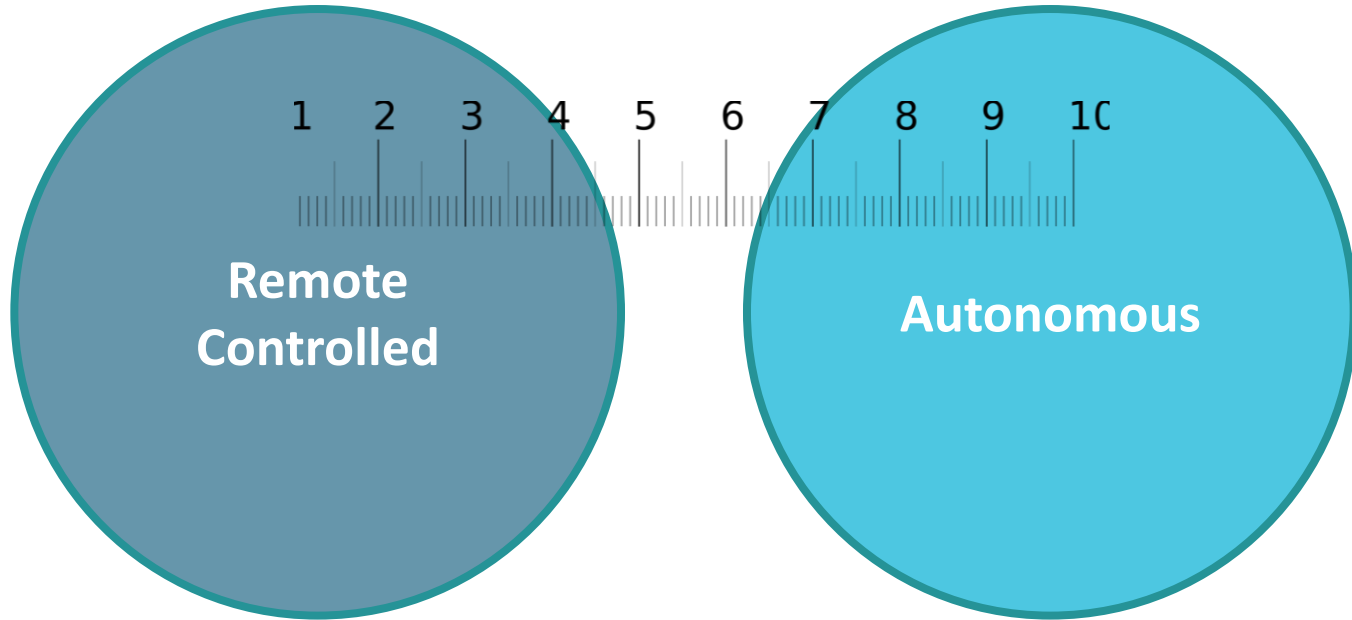
Cyber security



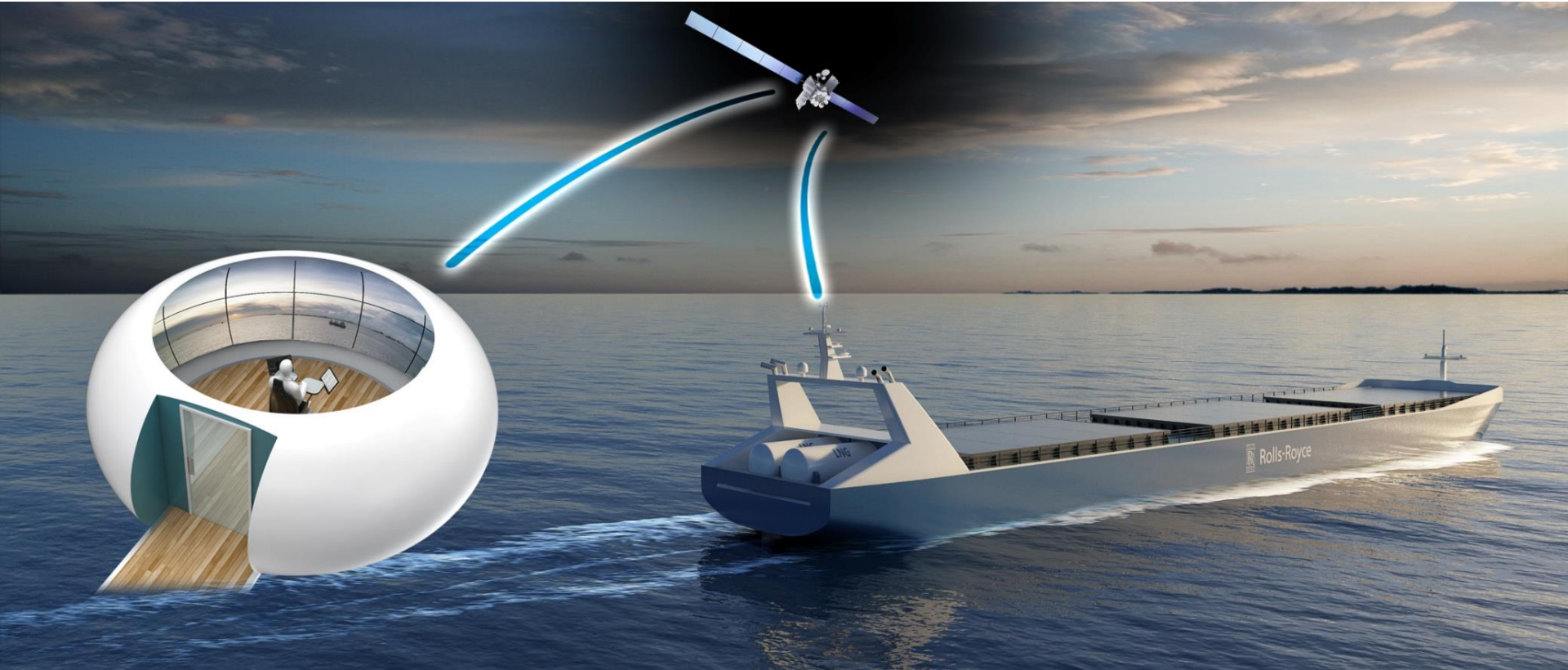
Remote and autonomous operation



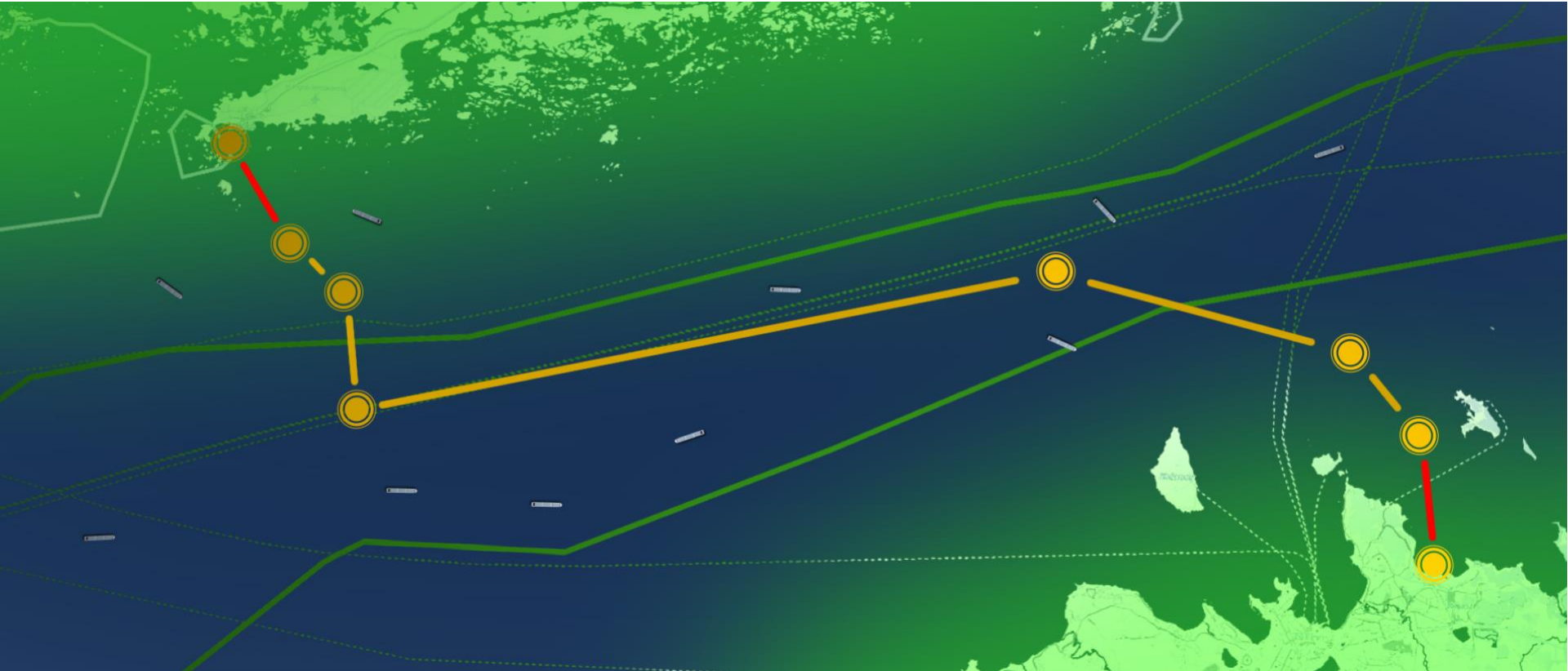
Remote control and autonomy



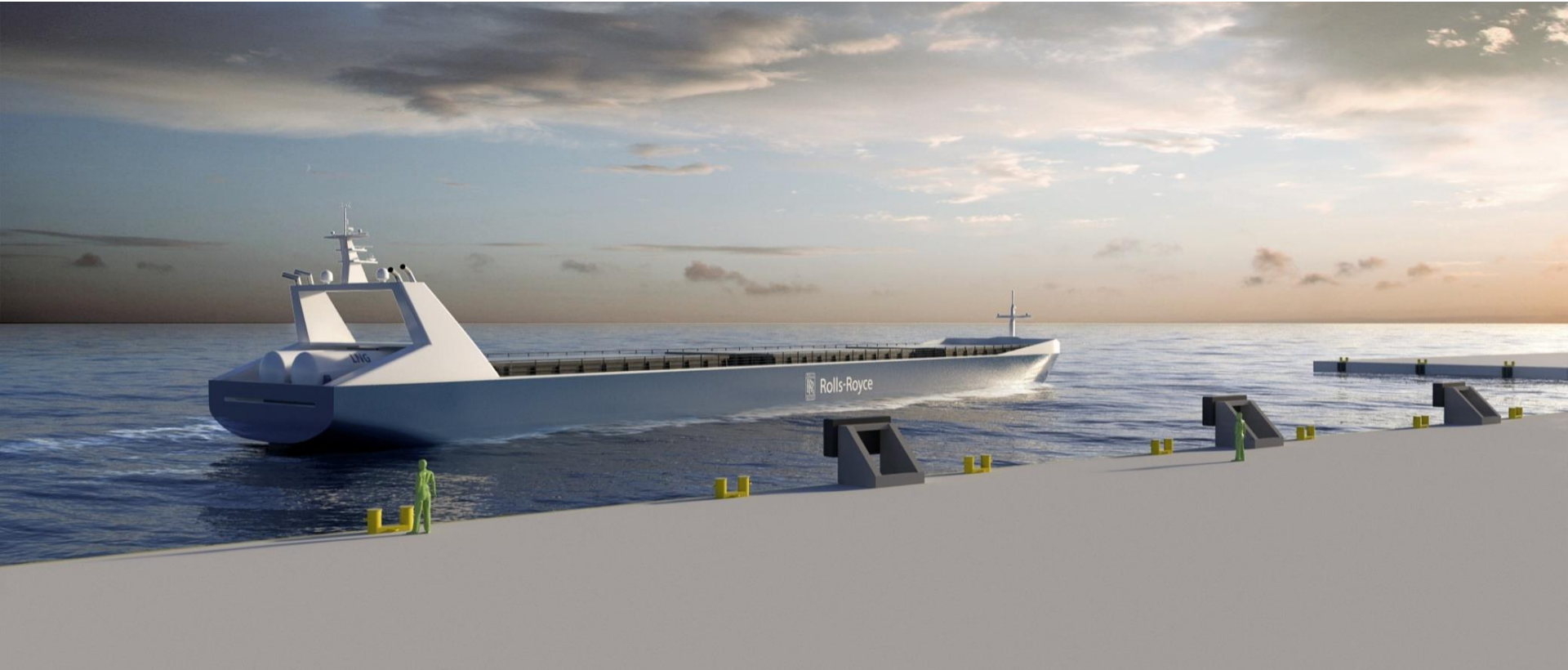
Operation example



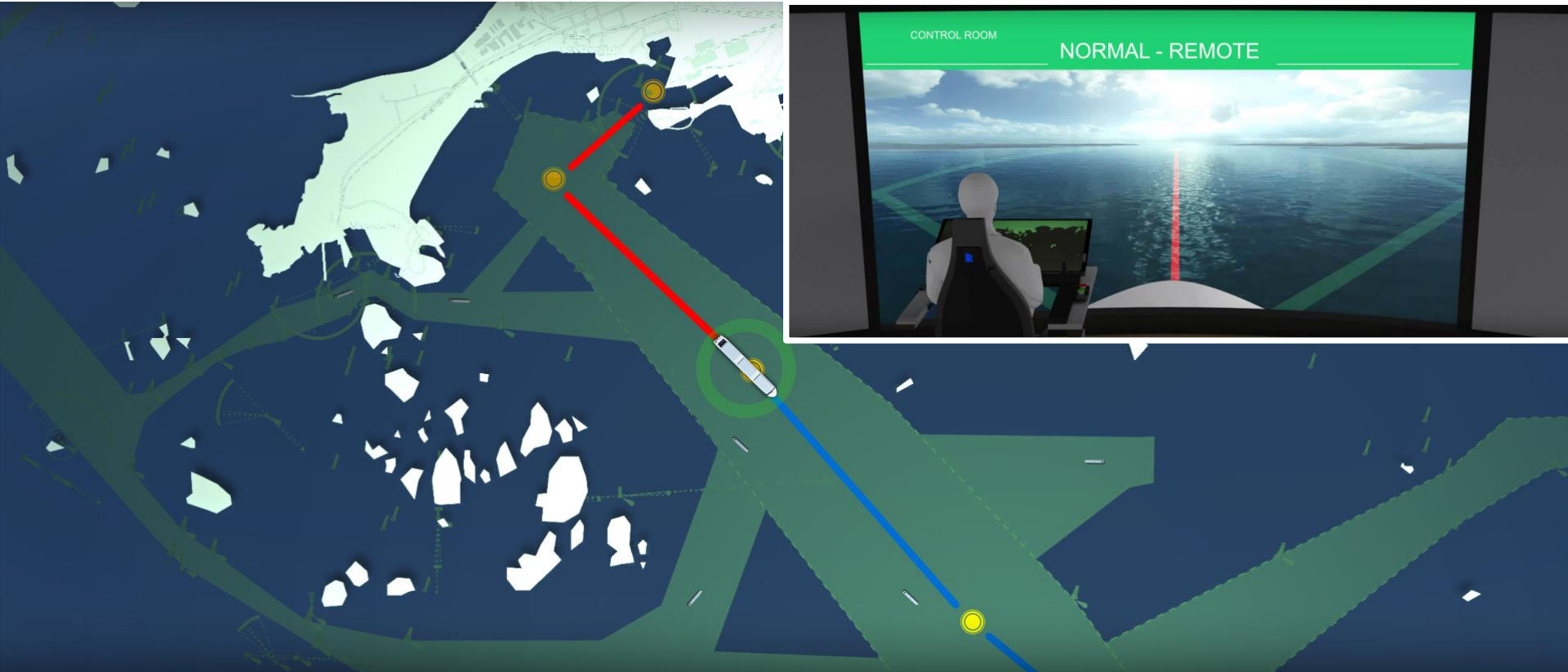
Voyage planning



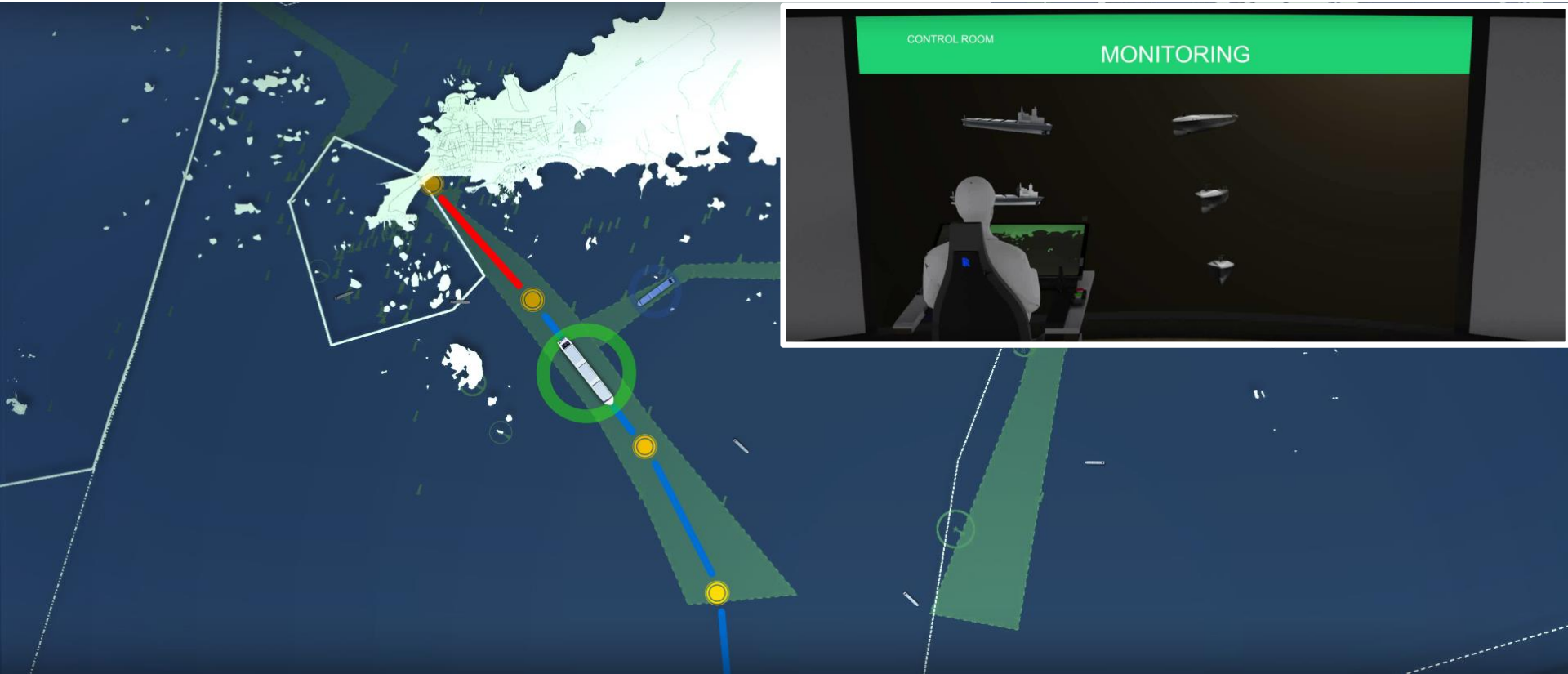
Unmooring



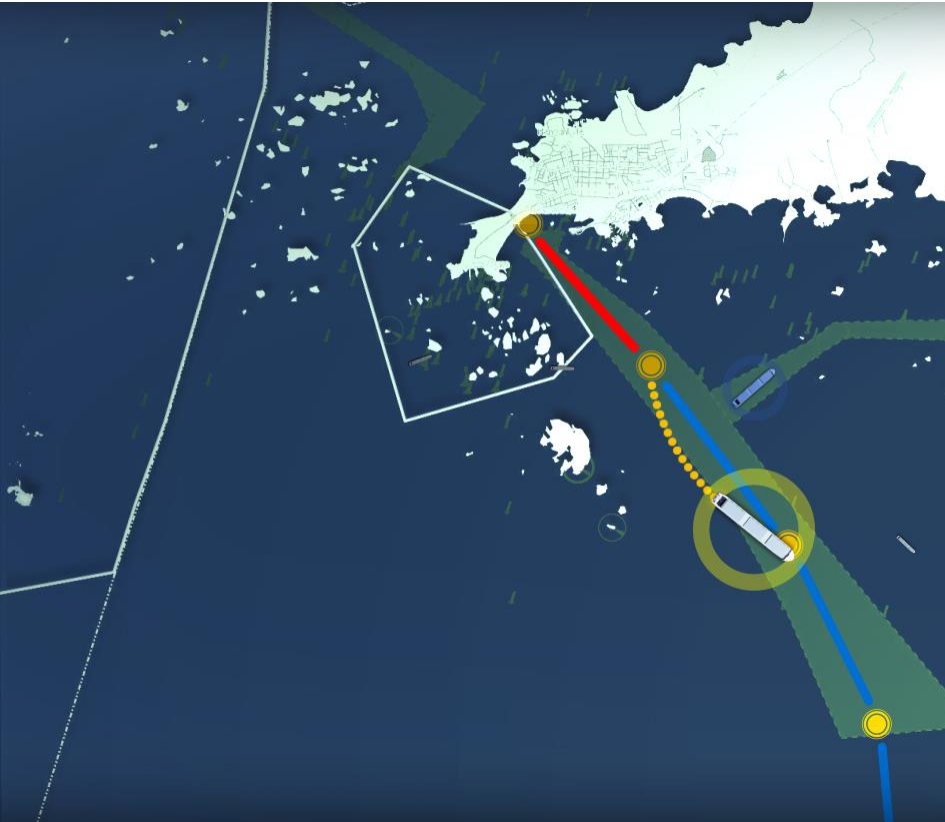
Remote supervisory control



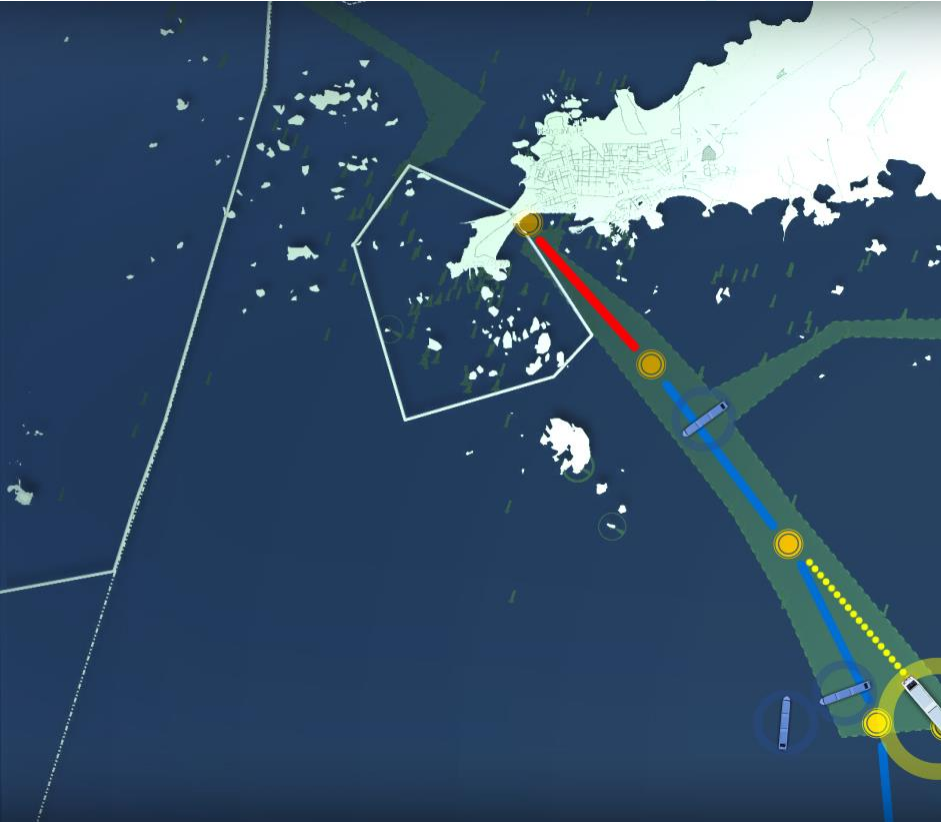
Autonomous normal



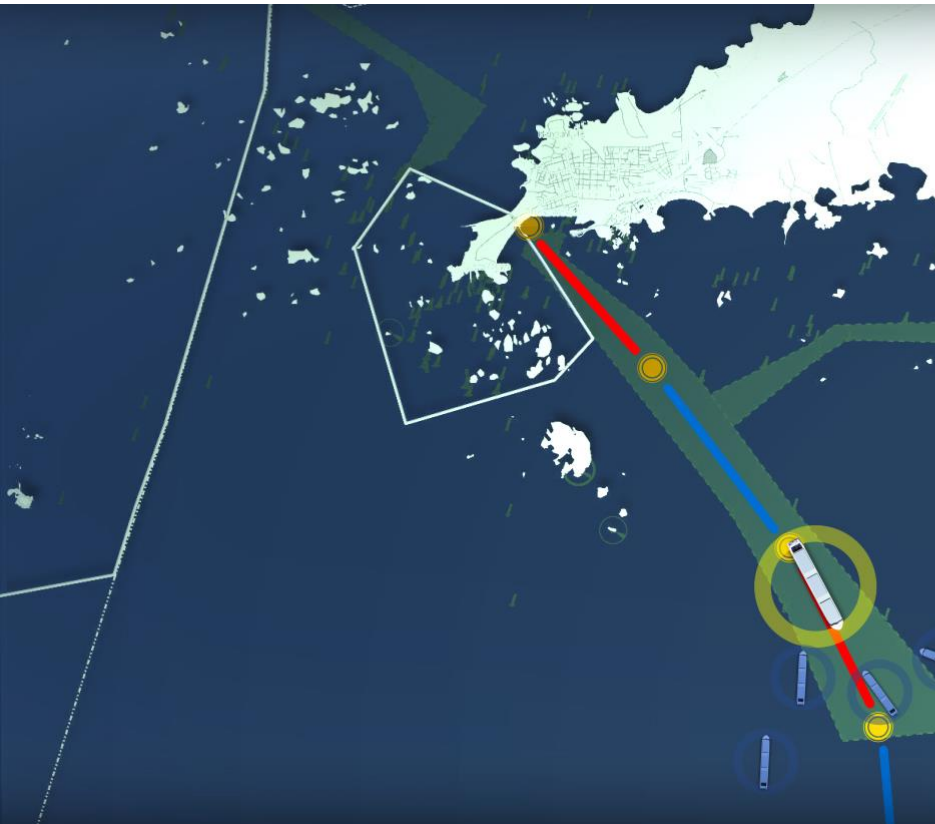
Autonomous “evade”



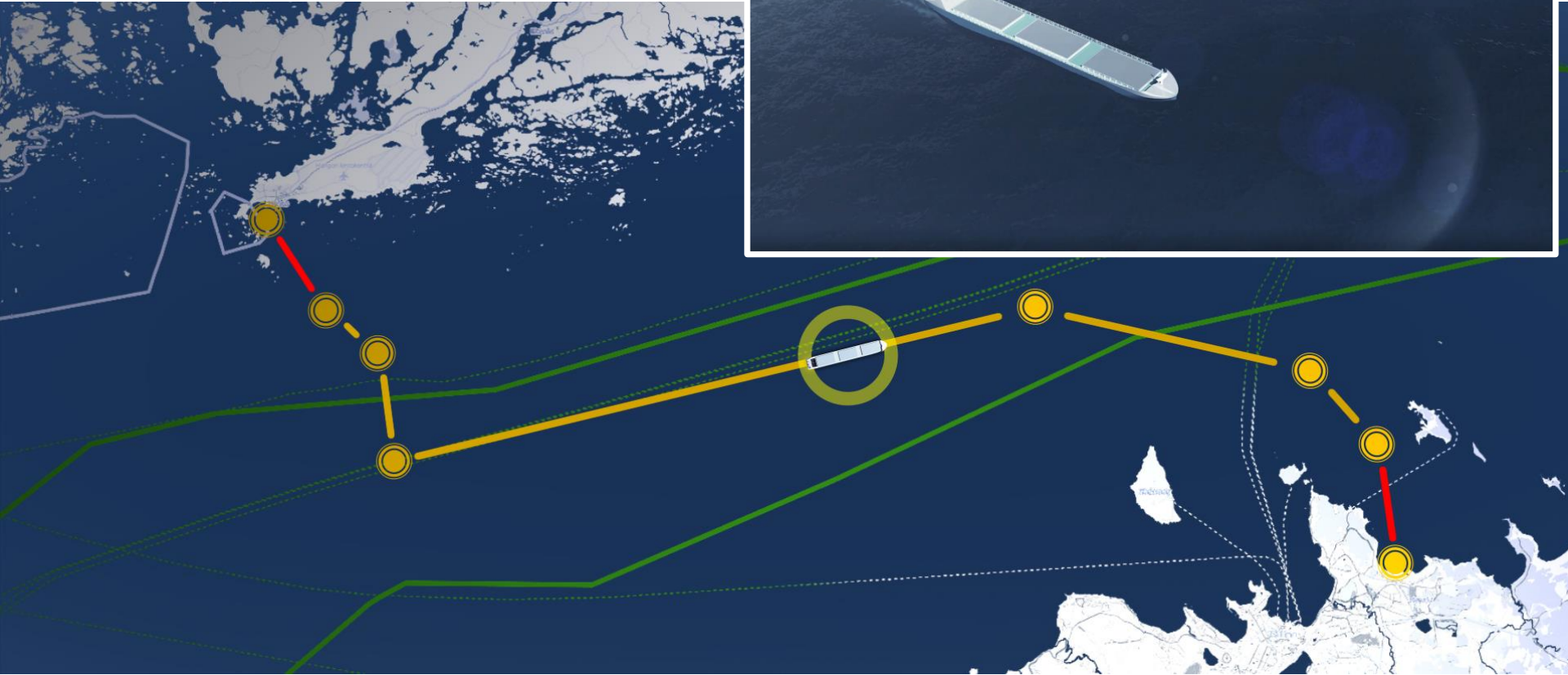
Autonomous “replan”



Autonomous “Pan-Pan”



Autonomous normal



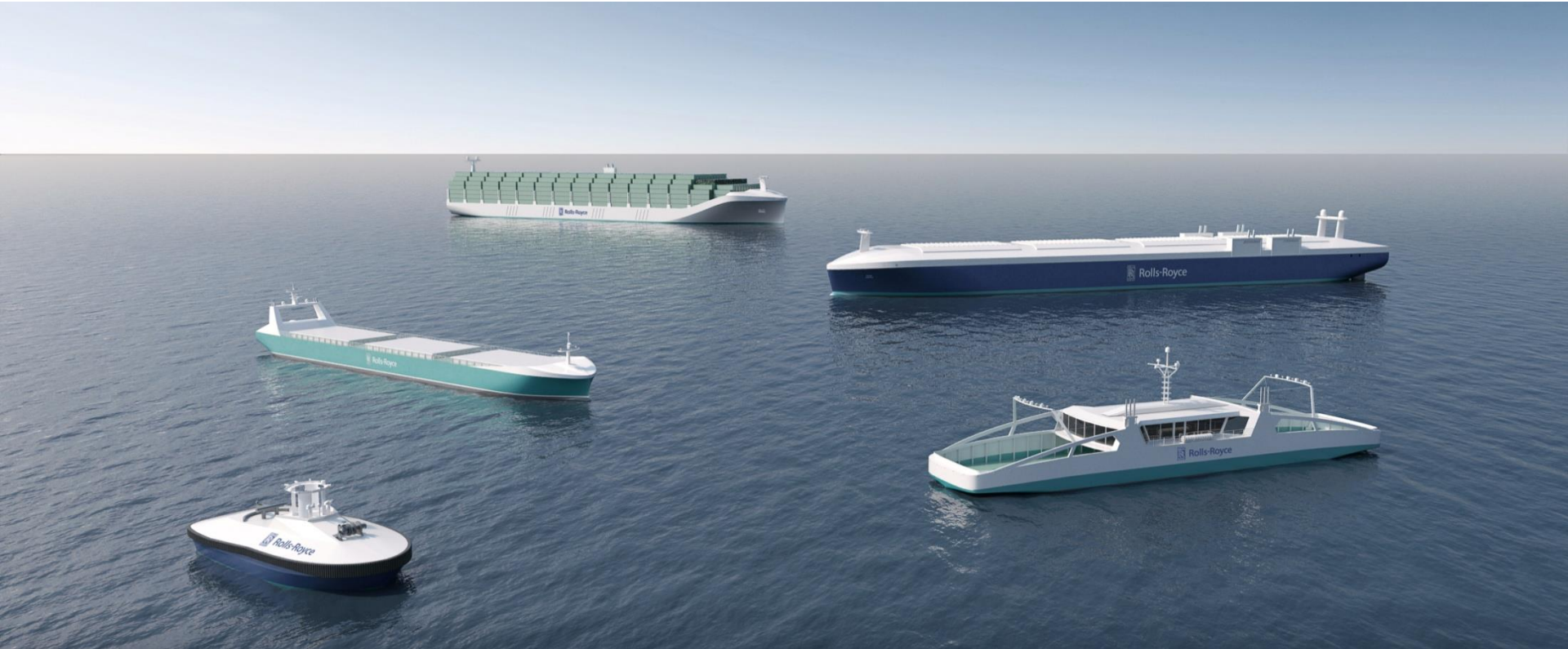
Remote control



Remote control



Ship-specific differences



Development areas



Rules and regulations



SOLAS

Legal aspects

Marine liability



Product liability

Roadmap

2020

Reduced crew with remote support and operation of certain functions

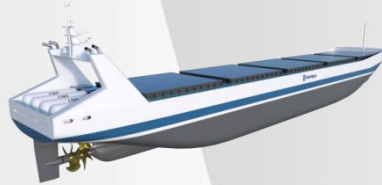


Remotely operated local vessels



2025

Remote controlled coastal vessels

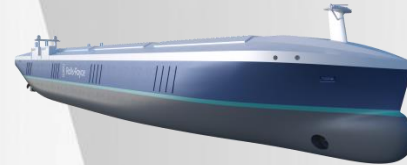


Remote controlled ocean going ships



2030

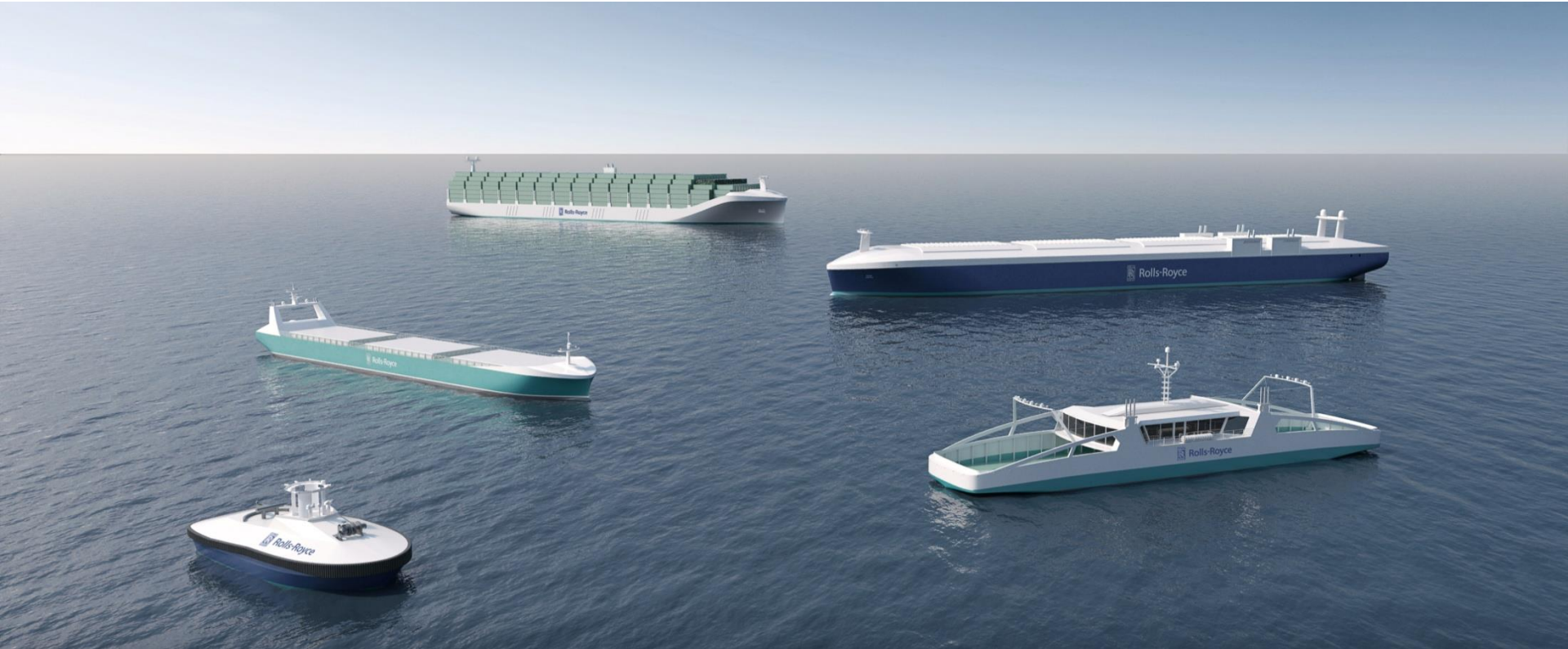
Autonomous ocean going ships



2035

Autonomous ships will start with local applications!

Unmanned or reduced crew?



Finnish Ecosystem for Autonomous Ships

DIMECC Ecosystem for Autonomous Ships

Finland aims to operate world's first autonomous ship system in 2025



Image © Rolls-Royce



HIRB - KALMAR - MACGREGOR



ERICSSON



SHIPYARD 1337



Rolls-Royce

tieto



Tekes

© 2016 Rolls-Royce plc

Norwegian Forum For Autonomous Ships



KYSTVERKET



KONGSBERG



Rolls-Royce



GMC Maritime



Improving life at sea



Rolls-Royce

The dawn of the ship intelligence era



” The best way to
predict the future

is to **create**
the future”



Rolls-Royce