

# Veien mot fjernstyrte og autonome skip



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Produktsjef - Automation & Control

Norsk forum for autonome skip  
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# Marine trends

Freight rates



Global trade

Trade patterns

Oil price



Fuel diversity



Environmental  
Regulations

Technology trends



Ship intelligence  
Emerging technologies

# The Ocean Space opportunities



Oil & Gas



Offshore wind



Fish farming



Arctic exploration



Fishing / Biomarine



Ocean mining



# Digitalisation – disruptive change

Internet of Things



# Digitalisation in the marine market



We have named it "Ship Intelligence"

# Shipping trends – operation



# Example: Windmill Maintenance Operations

-  High speed automated operations between windmills
-  High precision DP operation with gangway integration
-  Effective mobilisation and de-mobilisation at each windmill
-  Waiting mode with minimum energy consumption



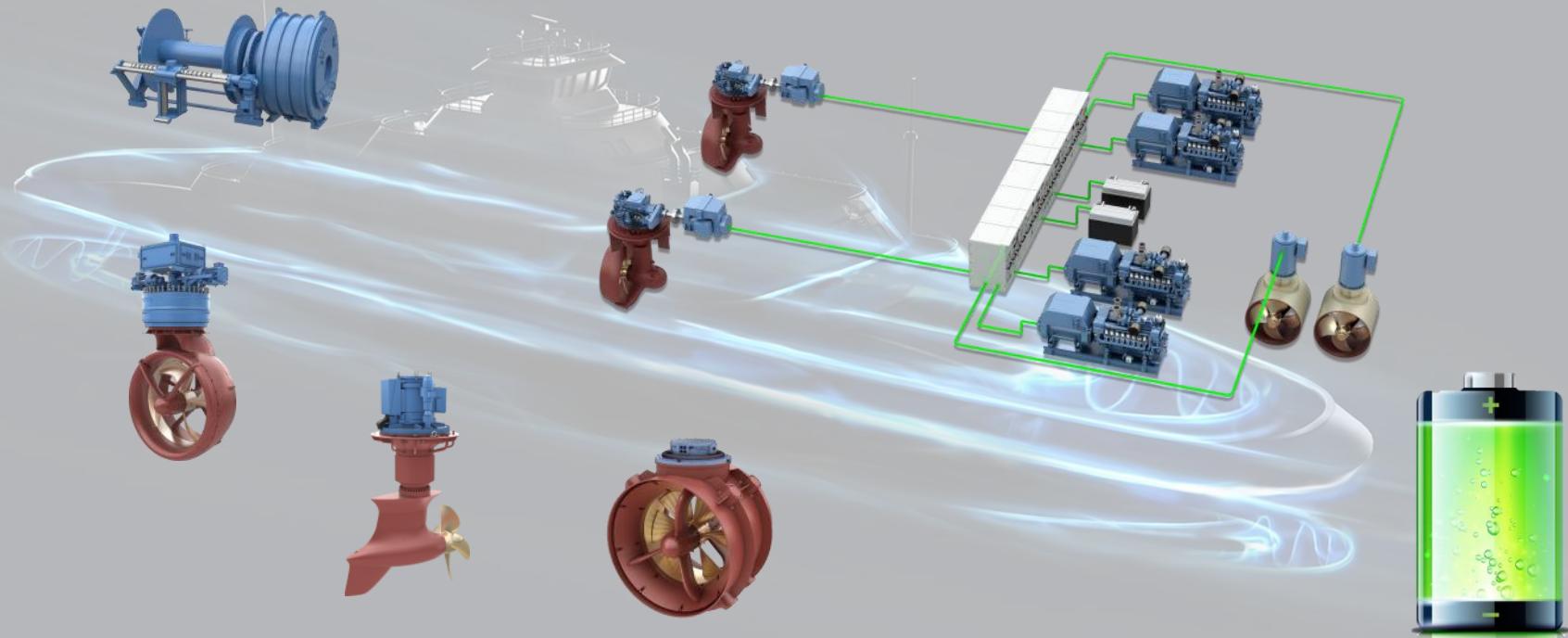


# Shipping trends - electrification





# Shipping trends - electrification



# Shipping trends - management

"Total awareness"

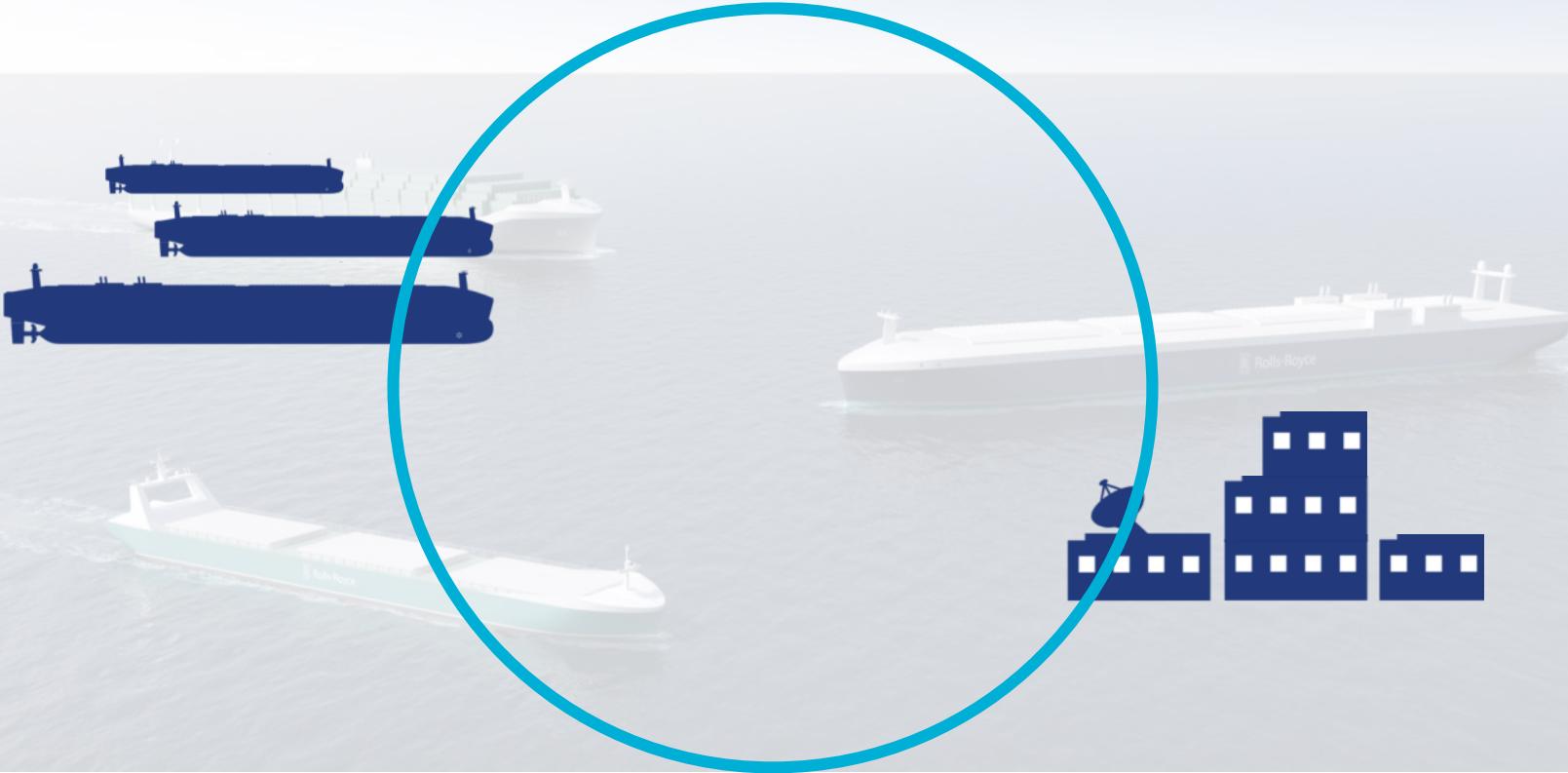


Asset management

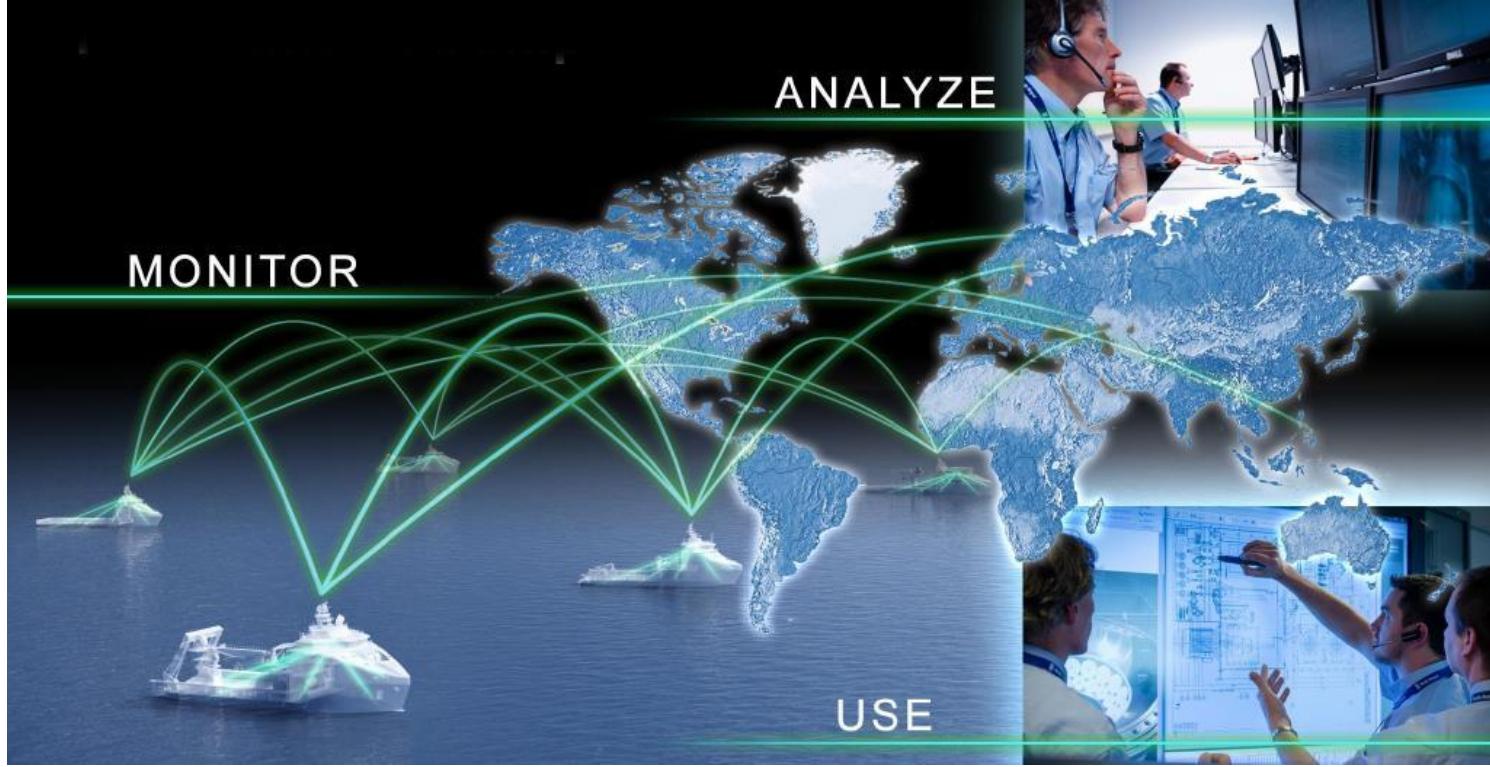


Health management

# Integrating ship and shore



# “The connected ship”



# Example - Energy management web portals



Eliza 4,2 %  
317 m³

Petronia 2,1 %  
328 m³

Zhou 0,1 %  
853 m³

3,5 %  
913 m³

43

Vessels in fleet

# Ship Intelligence Business Areas



Health management  
solutions



Optimisation and decision  
support



Remote and autonomous  
operations



OBJECT  
DETECTION



INTERNET OF THINGS



SATELLITE  
COMMUNICATIONS



BIG DATA



AUTOMATION &  
ROBOTICS



APPLICATIONS &  
CLOUD

Enabling technologies

# Disruptive change



# Unmanned trend in society



**It is not IF, but WHEN...**

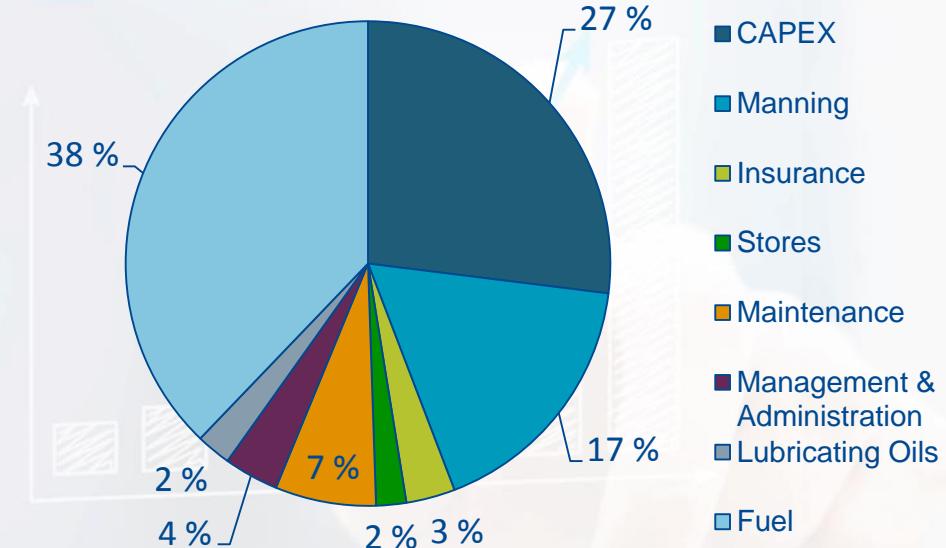
# Unmanned or reduced crew?



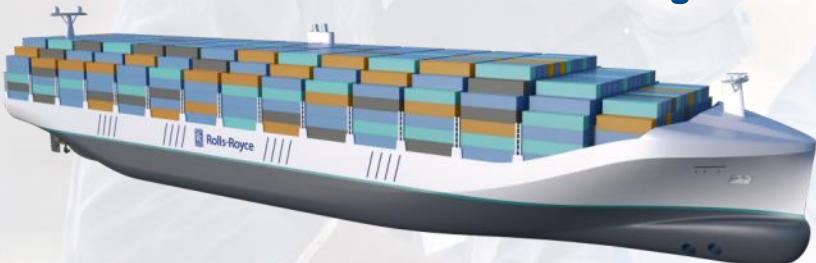
# Cost structure



## General cargo annual costs



# Remote controlled ships - features



No hotel systems

Lower power demand



No deck house

Redundant machinery

# Energy reduction

Lower operating speed?

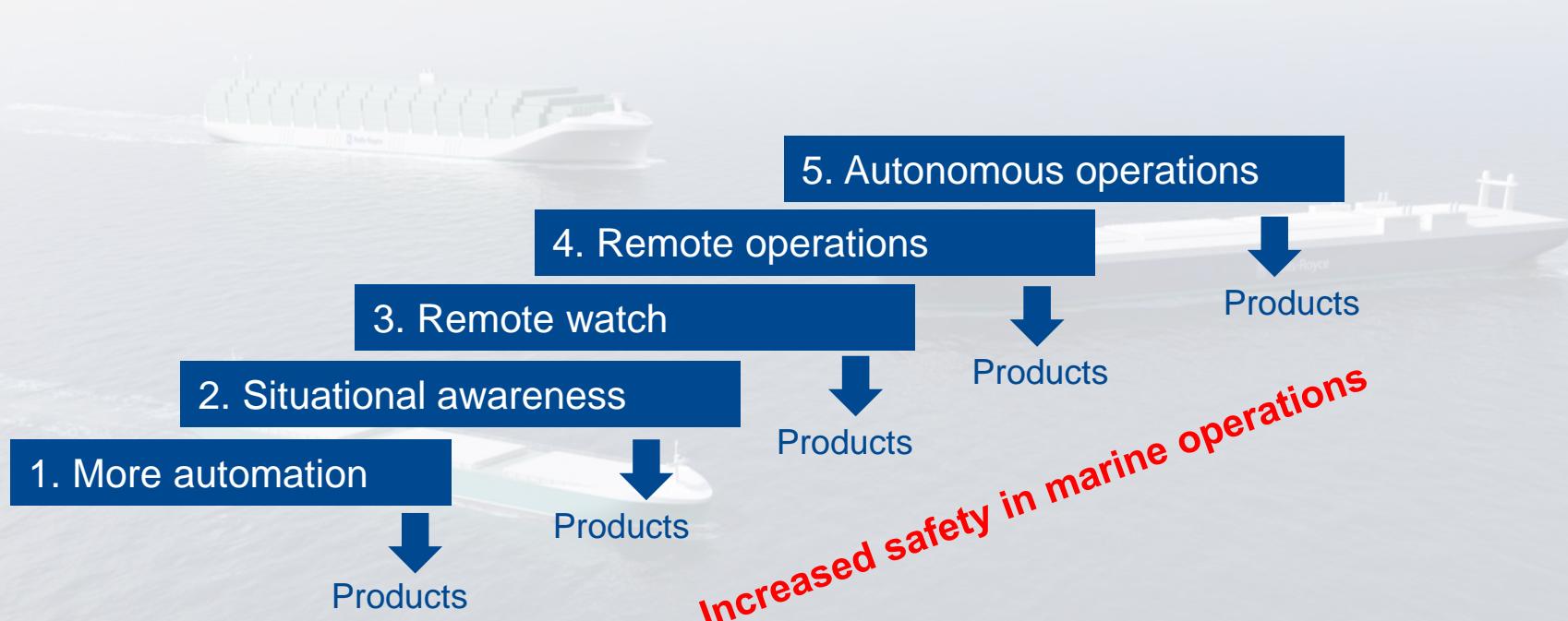
Lower weight: 700 – 1.000 ton

Wind resistance: ~1% saving

Reduced hotel load: 200 – 270 kW



# Steps towards autonomous operations

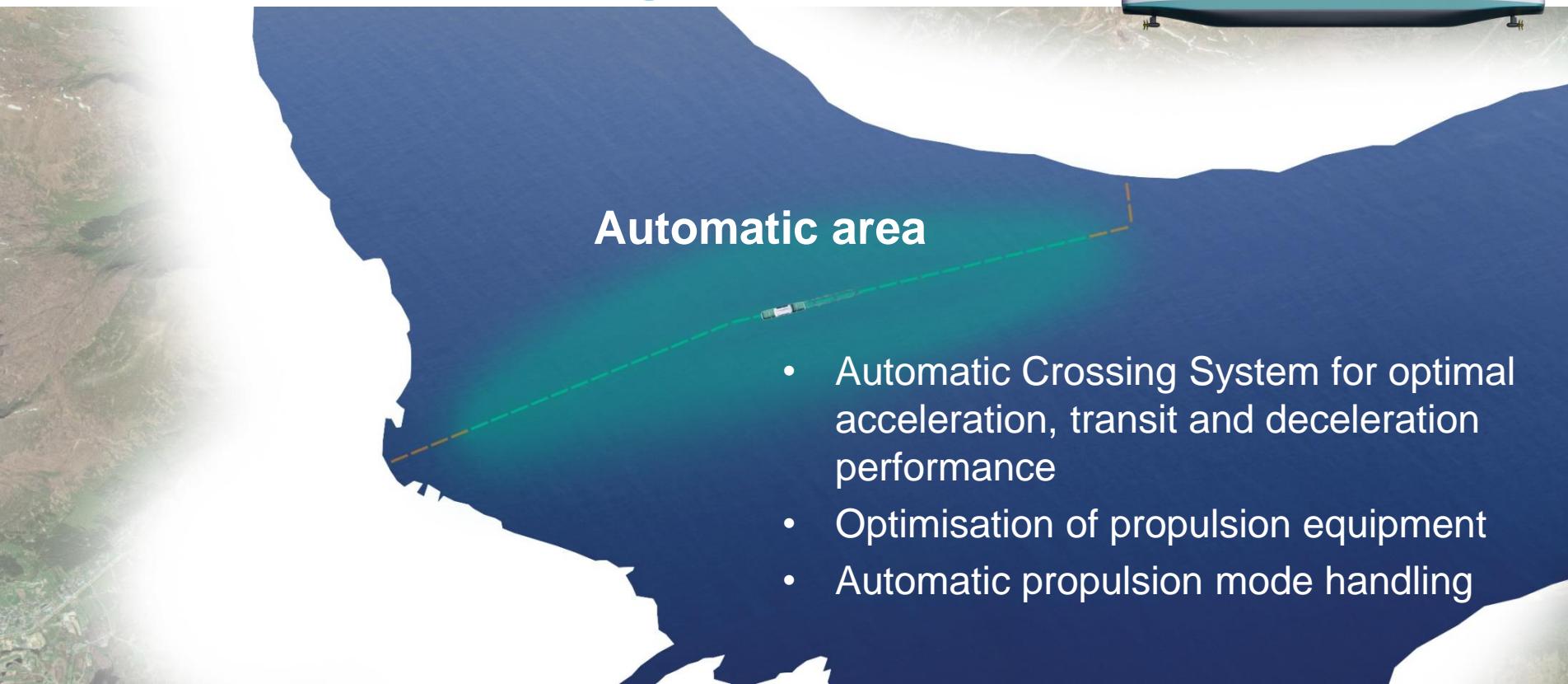


# First movers - automatic ferry

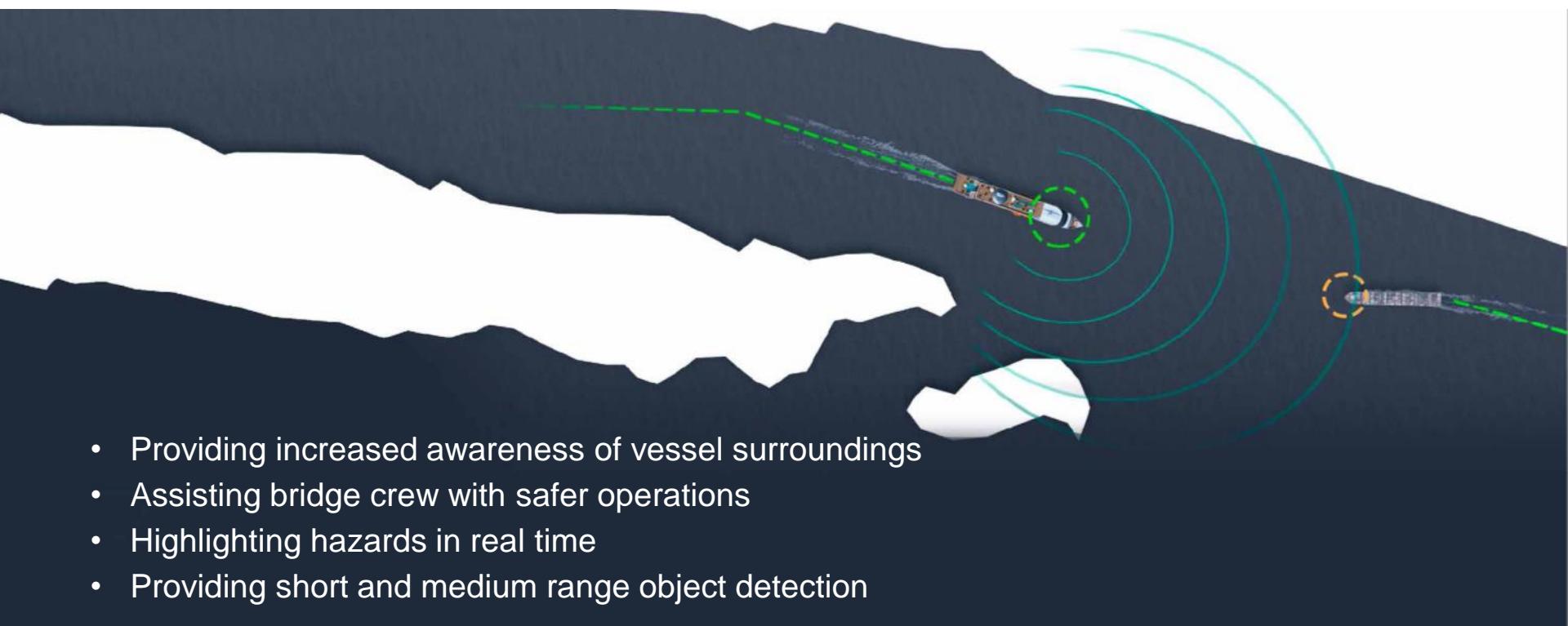


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# Automatic crossing

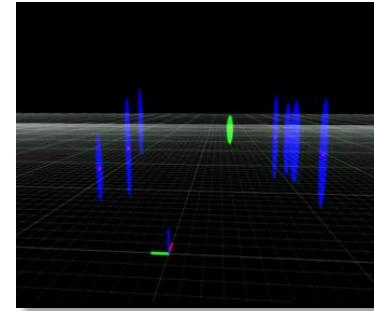
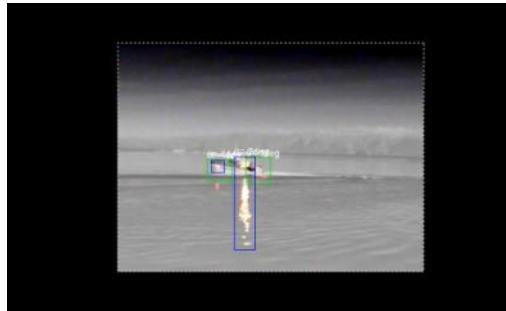
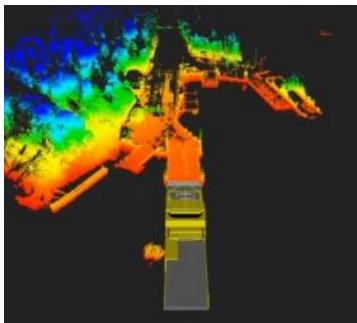
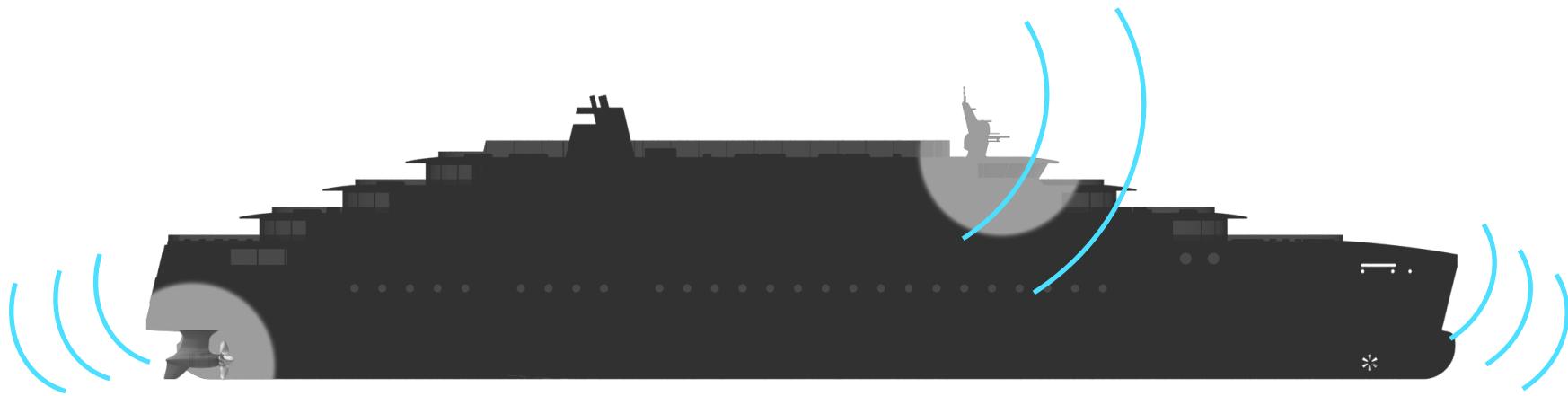


# Situational awareness

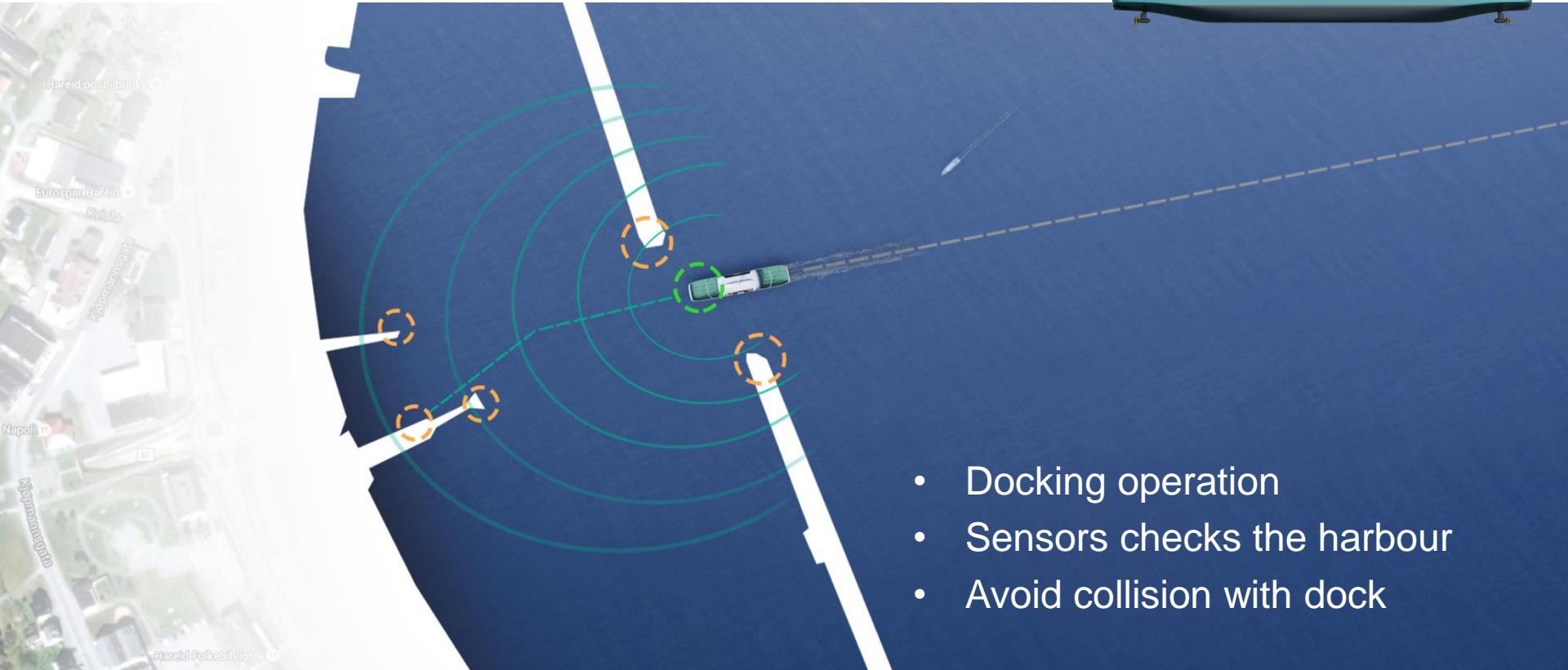


- Providing increased awareness of vessel surroundings
- Assisting bridge crew with safer operations
- Highlighting hazards in real time
- Providing short and medium range object detection

# Situation Awareness – Sensor Fusion

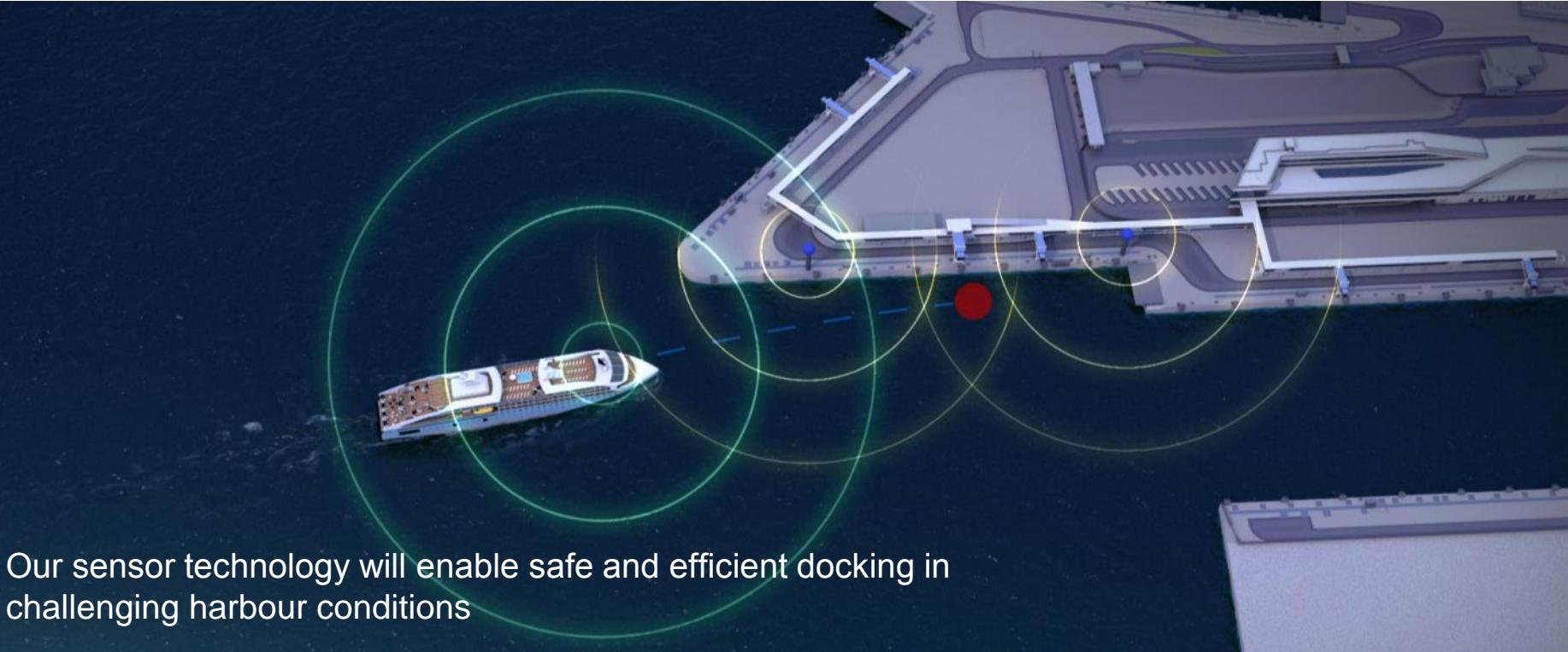


# Automatic docking



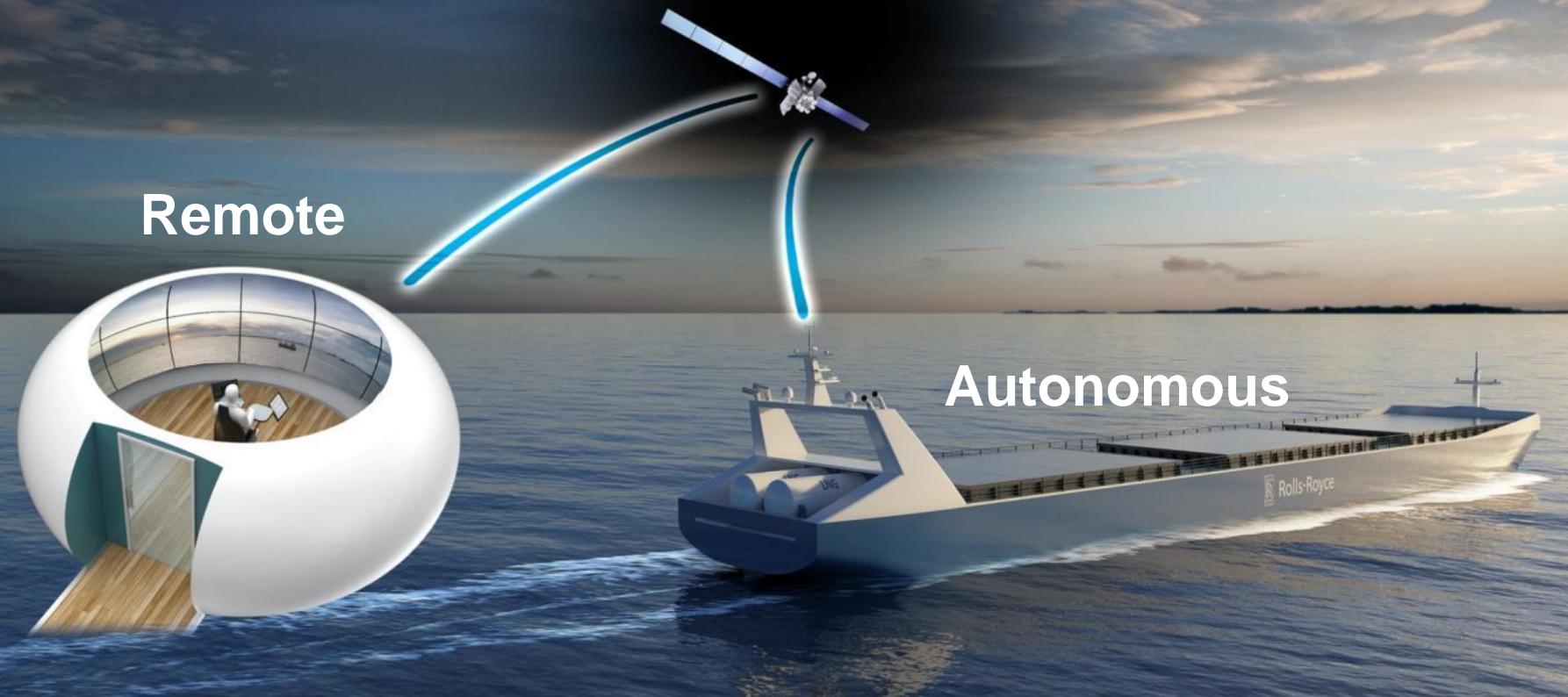
- Docking operation
  - Sensors checks the harbour
  - Avoid collision with dock

# Auto parking



Our sensor technology will enable safe and efficient docking in challenging harbour conditions

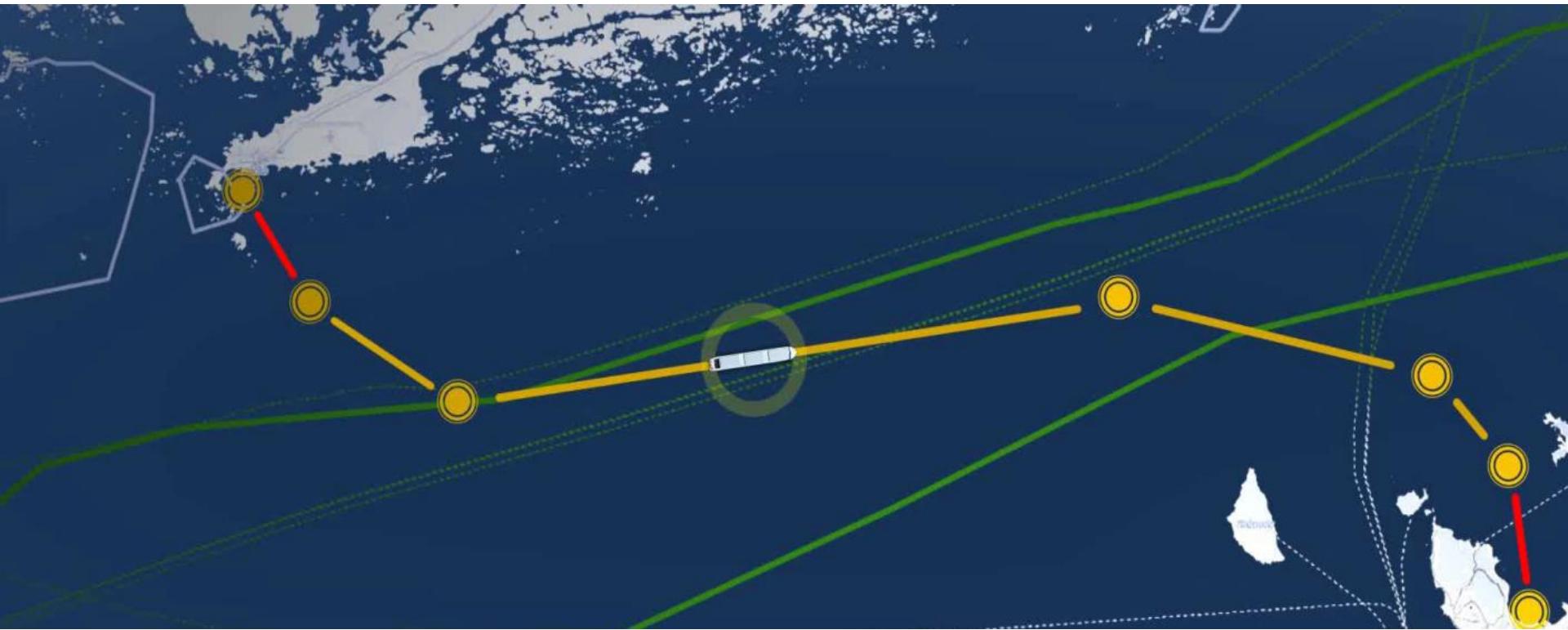
# Remote and autonomous operation



# Remote operation centre

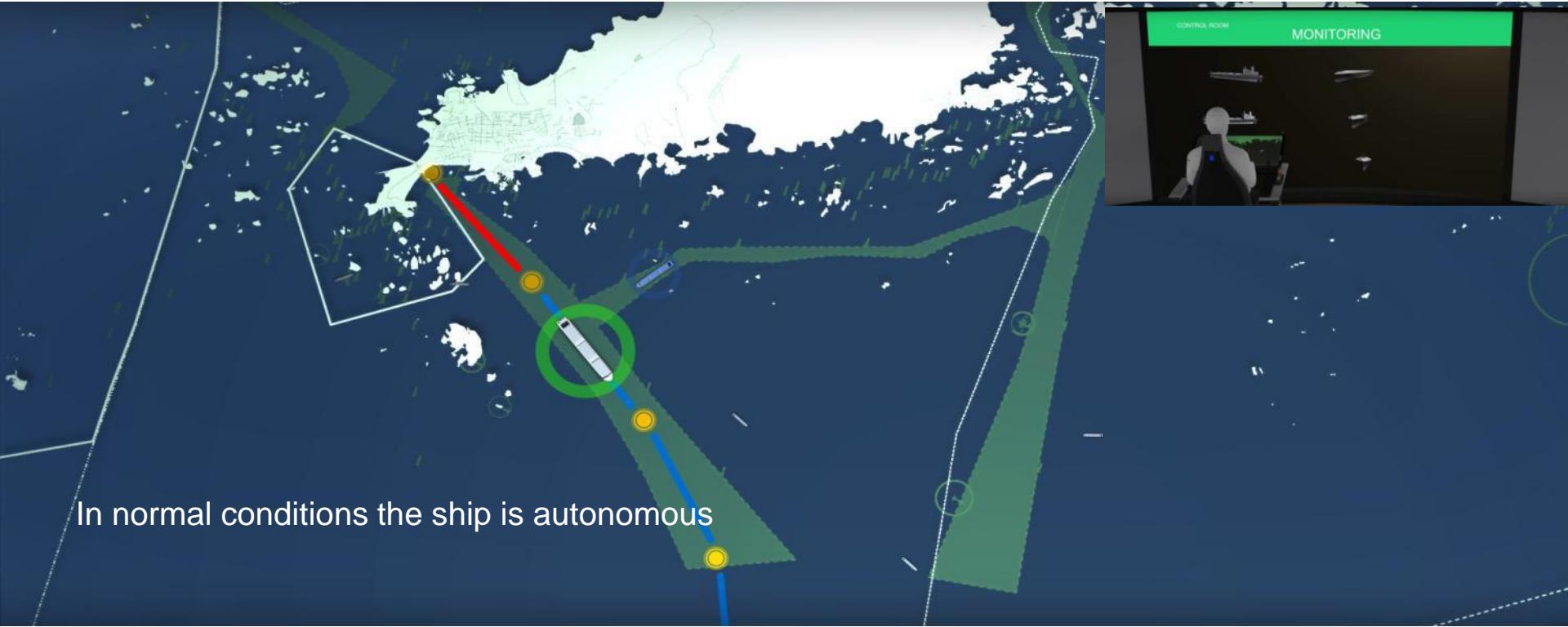


# Remote and autonomous operation



# Remote and autonomous operation

How does it work?



# Remote and autonomous operation

How does it work?



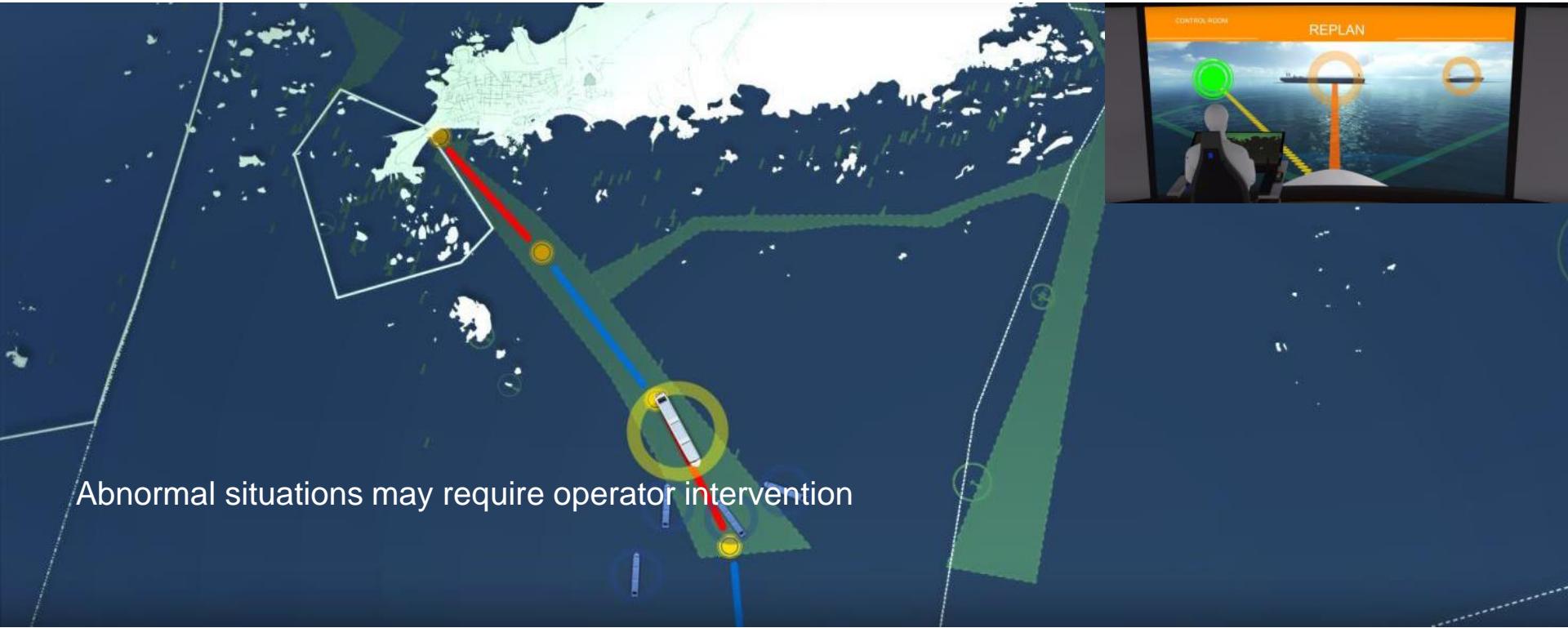
# Remote and autonomous operation

How does it work?

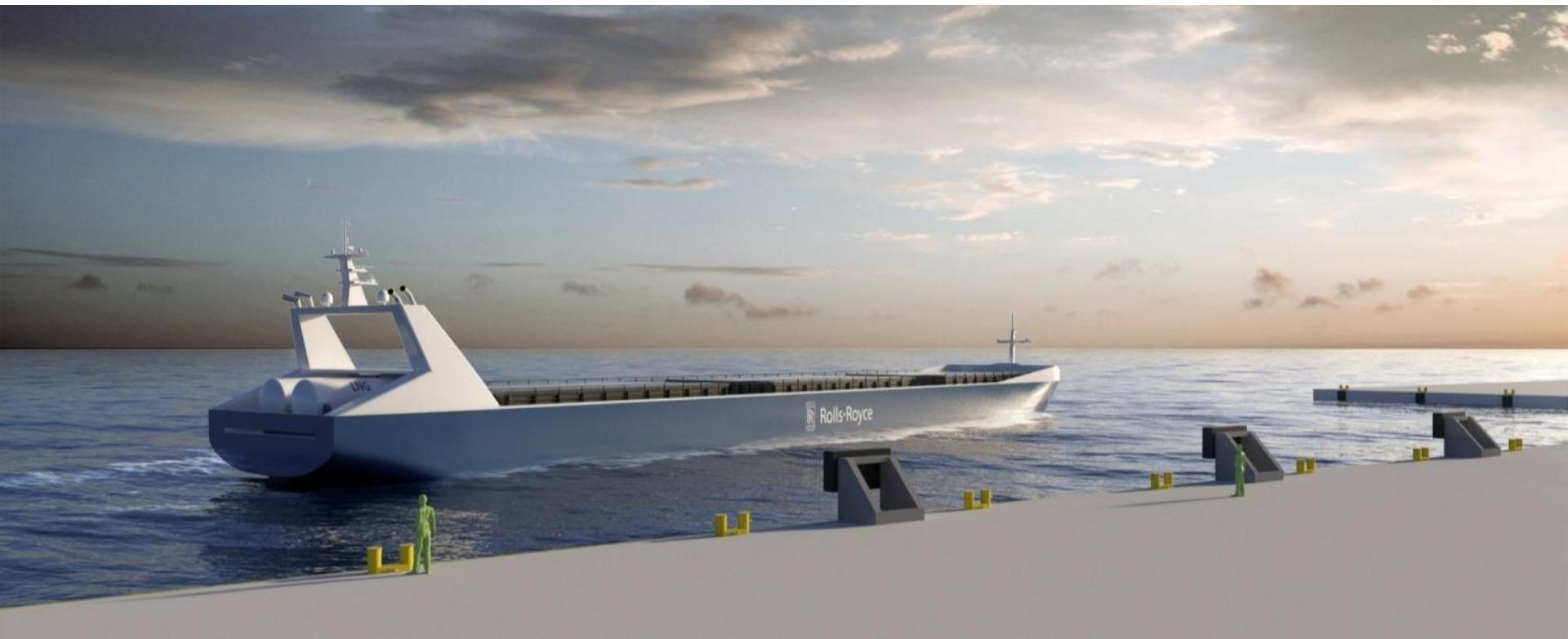


# Remote and autonomous operation

How does it work?



# Remote control in port



# Challenges



# Roadmap

**2020**

Reduced crew with remote support  
and operation of certain functions

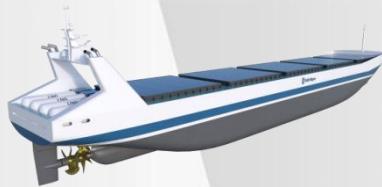


Remotely operated  
local vessel



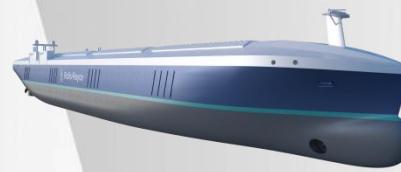
**2025**

Remote controlled unmanned  
coastal vessel



**2030**

Autonomous unmanned  
ocean going ship



Remote controlled unmanned  
ocean going ship



**Unmanned ships will start with local applications!**

# Rules and regulations



Lloyd's  
Register



SOLAS

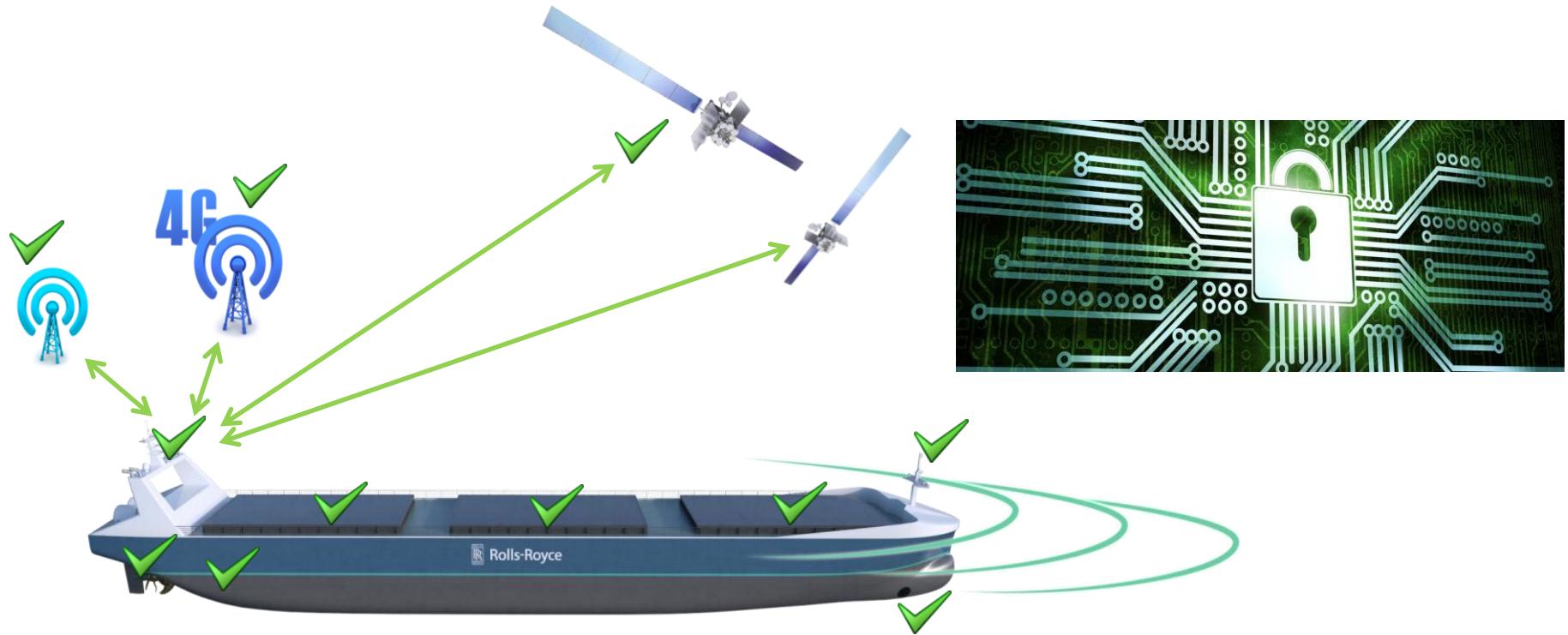
# Legal aspects

Marine liability



Product liability

# Communication & Cyber Security



# Current research

Advanced Autonomous  
Waterborne Applications  
Initiative (AAWA) - Finland

NTNU AMOS, Centre for  
Autonomous Marine Operations  
and Systems - Norway



“The best way to  
predict the future  
is to create  
the future”



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