

# The Future is Large Unmanned Surface Vessels

Dr Eshan Rajabally, Rolls-Royce Future Technologies Group

Marine Autonomous Systems Regulatory Working Group Conference  
November 16<sup>th</sup>, 2016, Southampton



© 2016 Rolls-Royce plc and/or its subsidiaries

The information in this document is the property of Rolls-Royce plc and/or its subsidiaries 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 and/or its subsidiaries.

This information is given in good faith based upon the latest information available to Rolls-Royce plc and/or its subsidiaries, 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 and/or its subsidiaries.

Trusted to deliver excellence



Rolls-Royce



Rolls-Royce



Rolls-Royce



Turun yliopisto  
University of Turku



Åbo Akademi



REDEFINING SHIPPING



TAMPERE  
UNIVERSITY OF  
TECHNOLOGY



Aalto University

*“... supports development of remote controlled and autonomous vessels and will enable proof of concept demonstration...”*



Rolls-Royce

# RESEARCH AREAS

**TECHNOLOGY**

**SAFETY &  
SECURITY**

**SOCIETAL &  
LEGAL  
ACCEPTANCE**

**ECONOMY &  
BUSINESS  
MODELS**



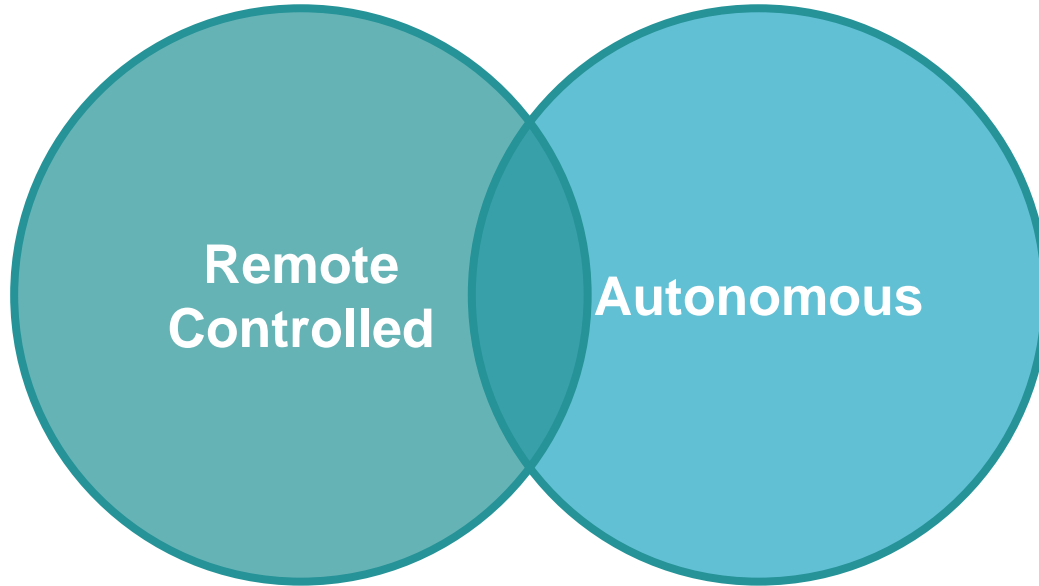
**Rolls-Royce**

# PROJECT TIMELINE

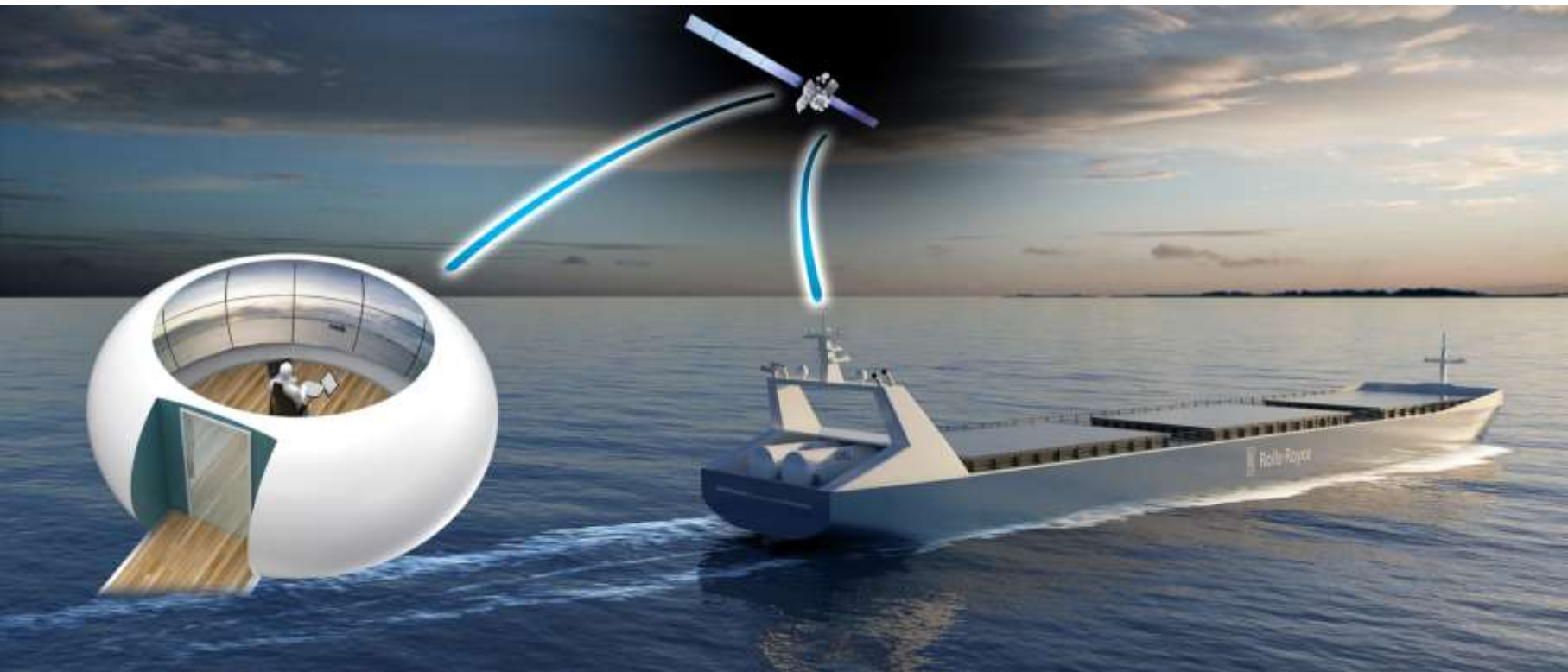


Rolls-Royce

# REMOTE CONTROL AND AUTONOMY

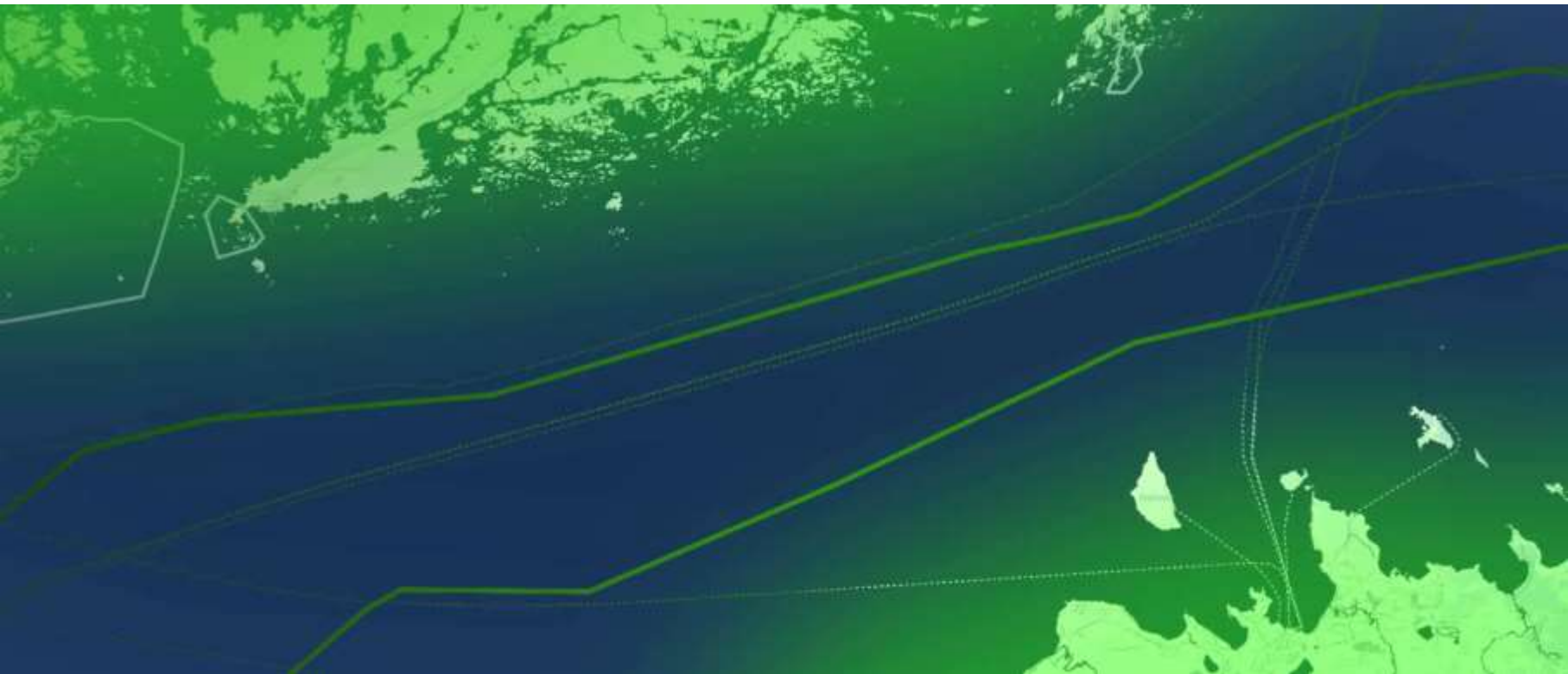


# OPERATION EXAMPLE





# VOYAGE PLANNING

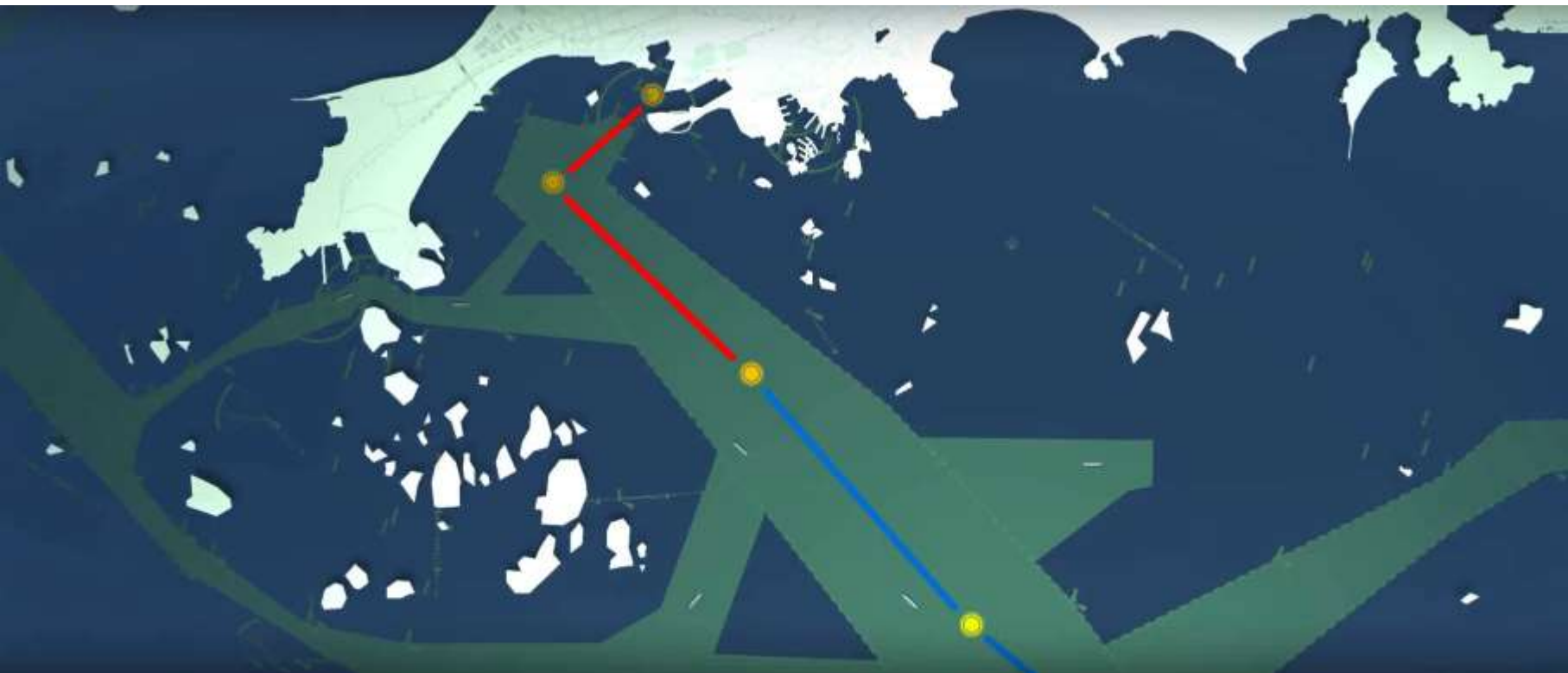




# UNMOORING



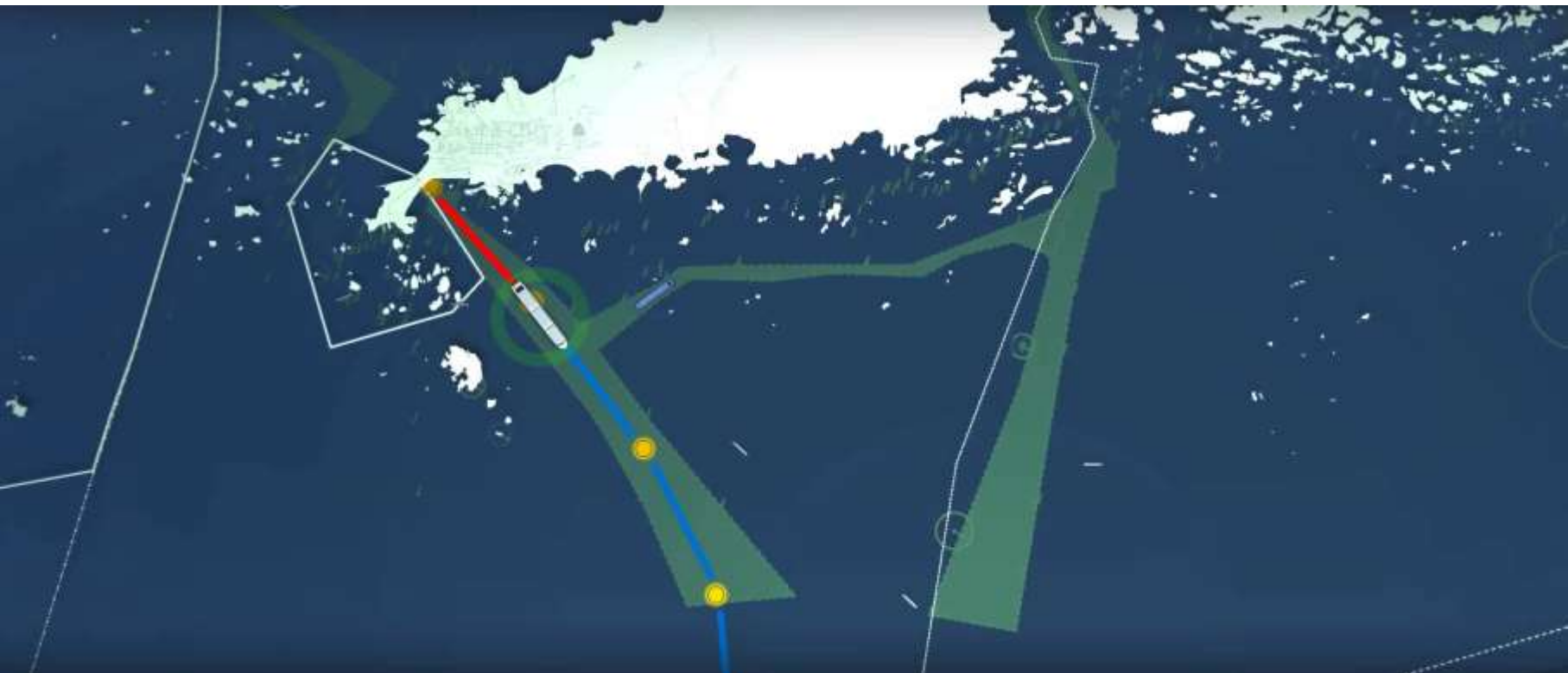
# REMOTE SUPERVISORY CONTROL



# REMOTE SUPERVISORY CONTROL



# AUTONOMOUS NORMAL



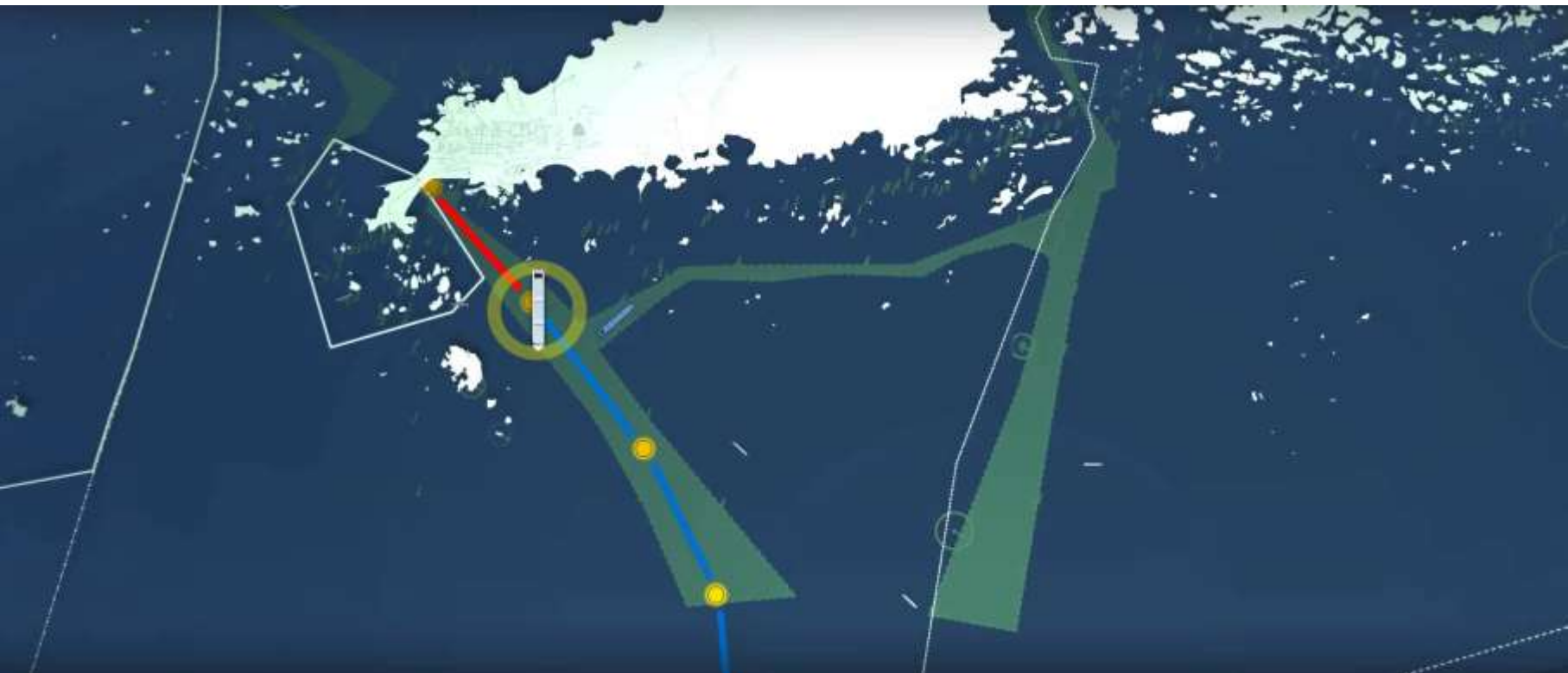
# AUTONOMOUS NORMAL

CONTROL ROOM

MONITORING



# AUTONOMOUS “EVADE”

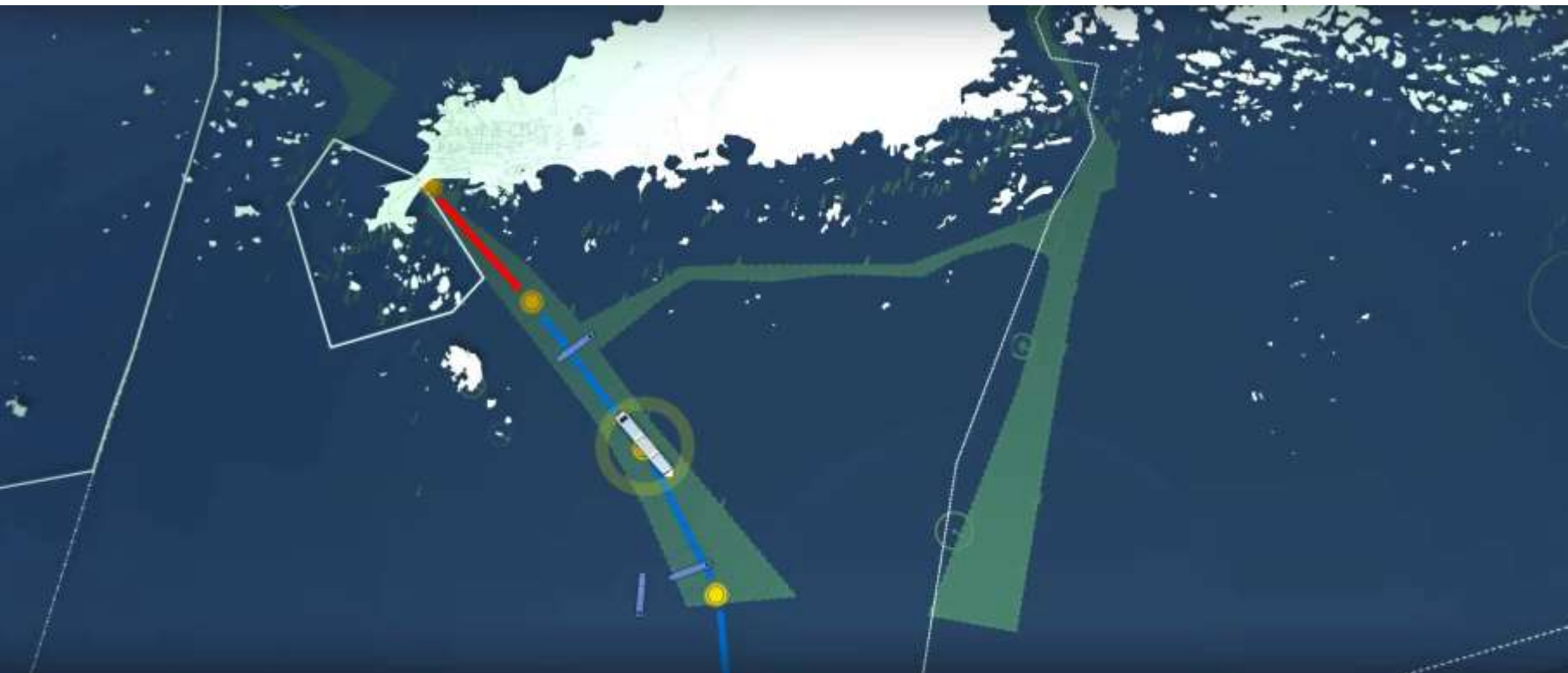




# AUTONOMOUS “EVADE”



# AUTONOMOUS “REPLAN”



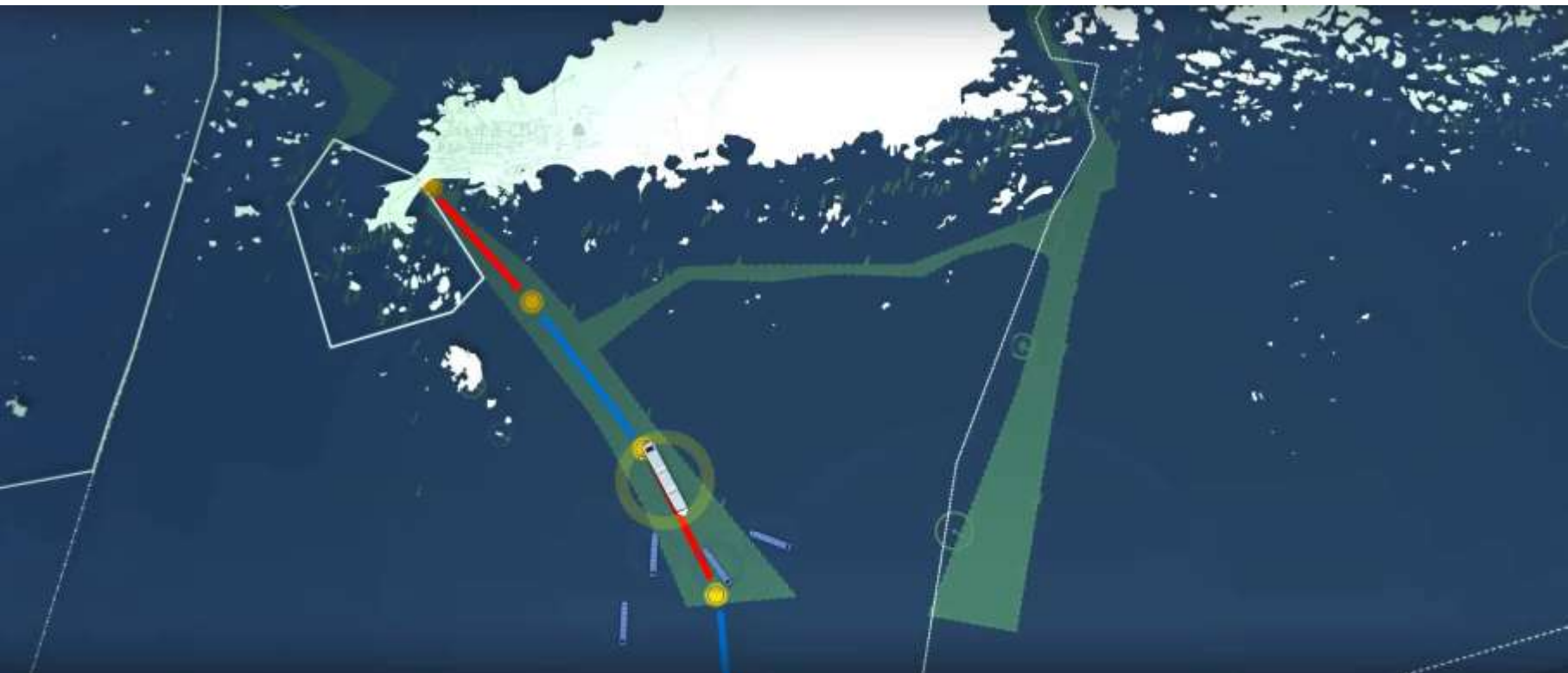
# AUTONOMOUS “REPLAN”

CONTROL ROOM

REPLAN



# AUTONOMOUS “PAN-PAN”



# AUTONOMOUS “PAN-PAN”

CONTROL ROOM

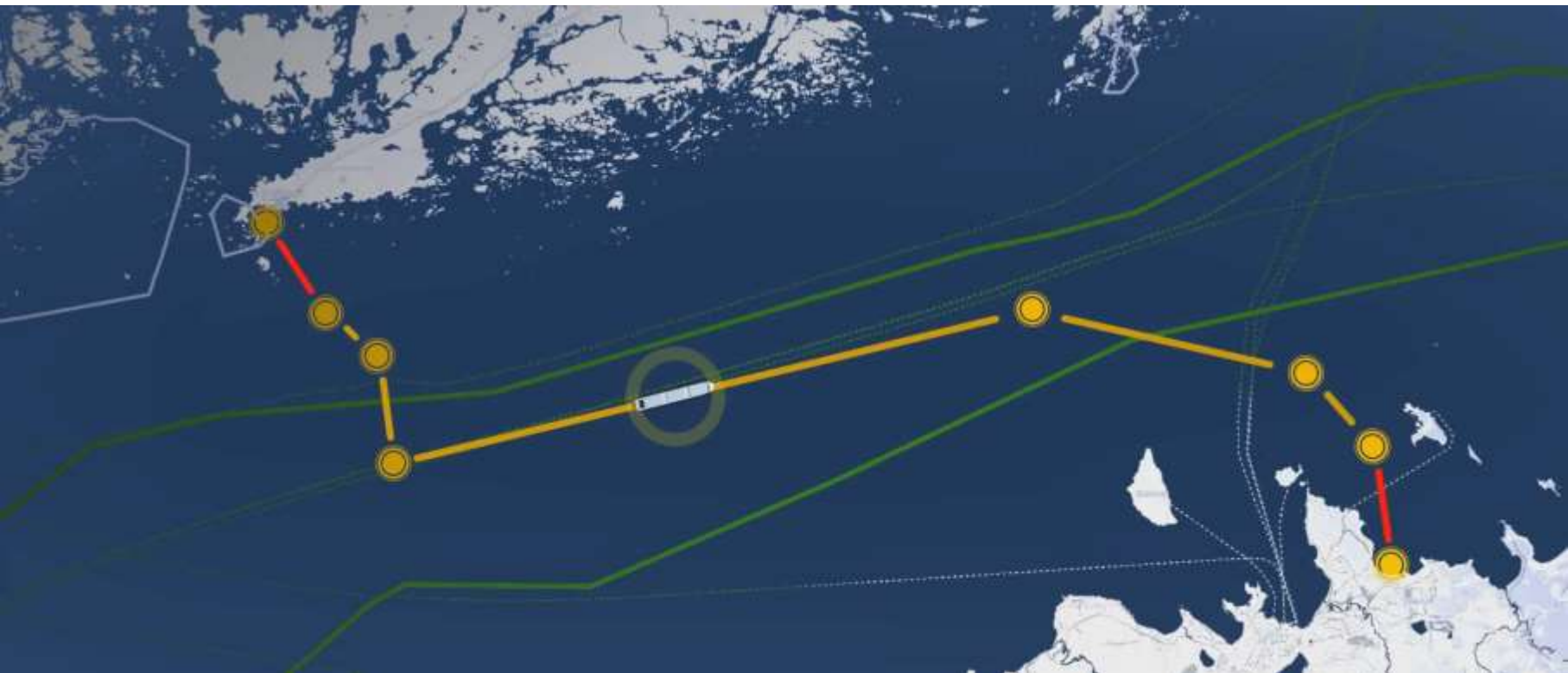
PAN - PAN



Rolls-Royce



# AUTONOMOUS NORMAL





# REMOTE CONTROL

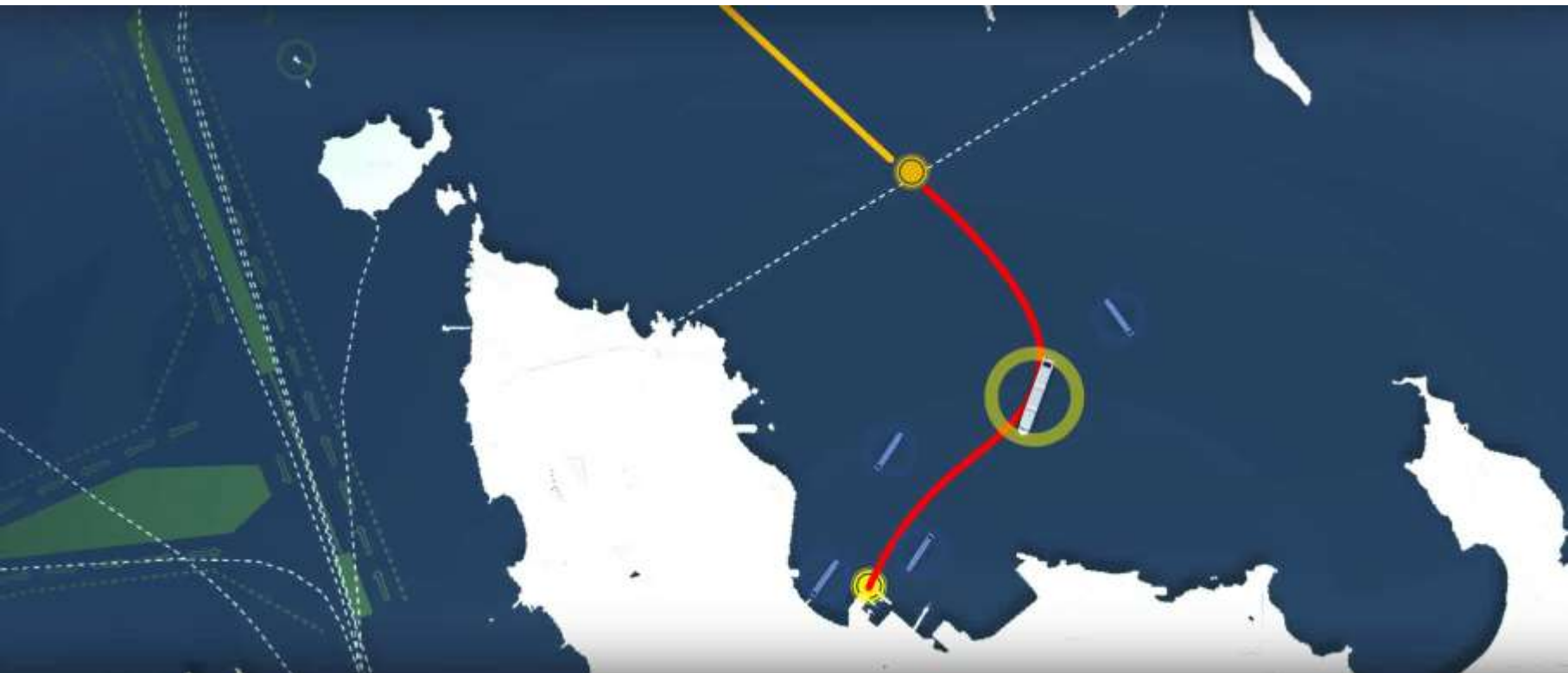


Rolls-Royce

# REMOTE CONTROL



# REMOTE CONTROL



Rolls-Royce

# REMOTE CONTROL



# AAWA PHASE 1 CONCLUSIONS

**Operation:** Will be hybrid of remote control and autonomy and will depend on the type and function of the vessel.”

**Technologies:** Technologies to make remote and autonomous ships a reality exist. The task is to find the optimum way to combine them reliably and cost effectively.

**Safety:** Ships will be as least as **safe** as existing vessels. There is a potential to reduce human based errors but at the same time new types of risk will arise and will need to be addressed.

**Legislation:** can be changed if there is a political will. Change will start at a national level and extend to the global level. The question of liability remains open.

**Business:** It's not about ships or equipment but the shipping business as whole – remote controlled and autonomous ships has the potential to redefine the maritime industry and the roles of the players in it.



**Rolls-Royce**

# THANK YOU



SLIDES COURTESY OF ESA JOKIOINEN, ROLLS-ROYCE MARINE