Autonome skips påvirkning på havner

Axel Andenæs, Rolls-Royce Marine

Drammen, 29th November 2017

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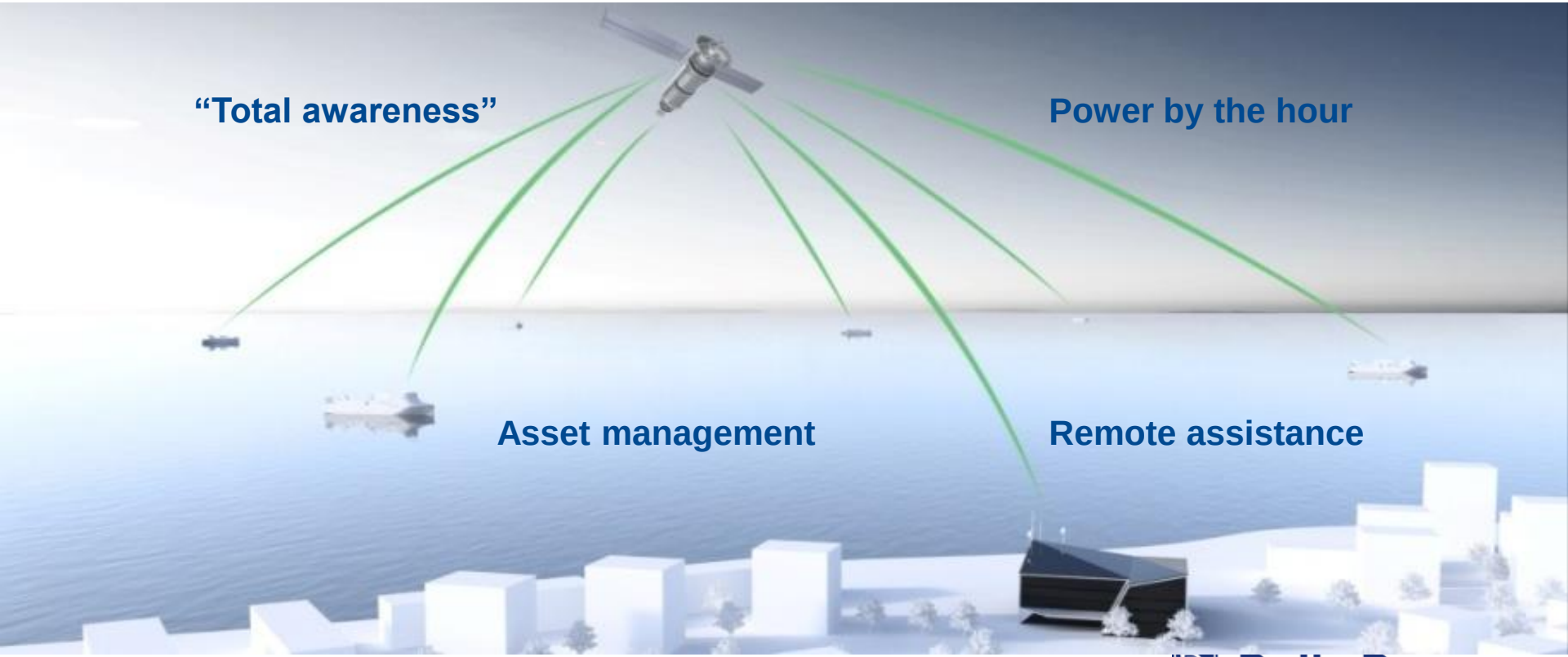
Changes driven by digitalization in marine

Digital management



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From remote monitoring to operations

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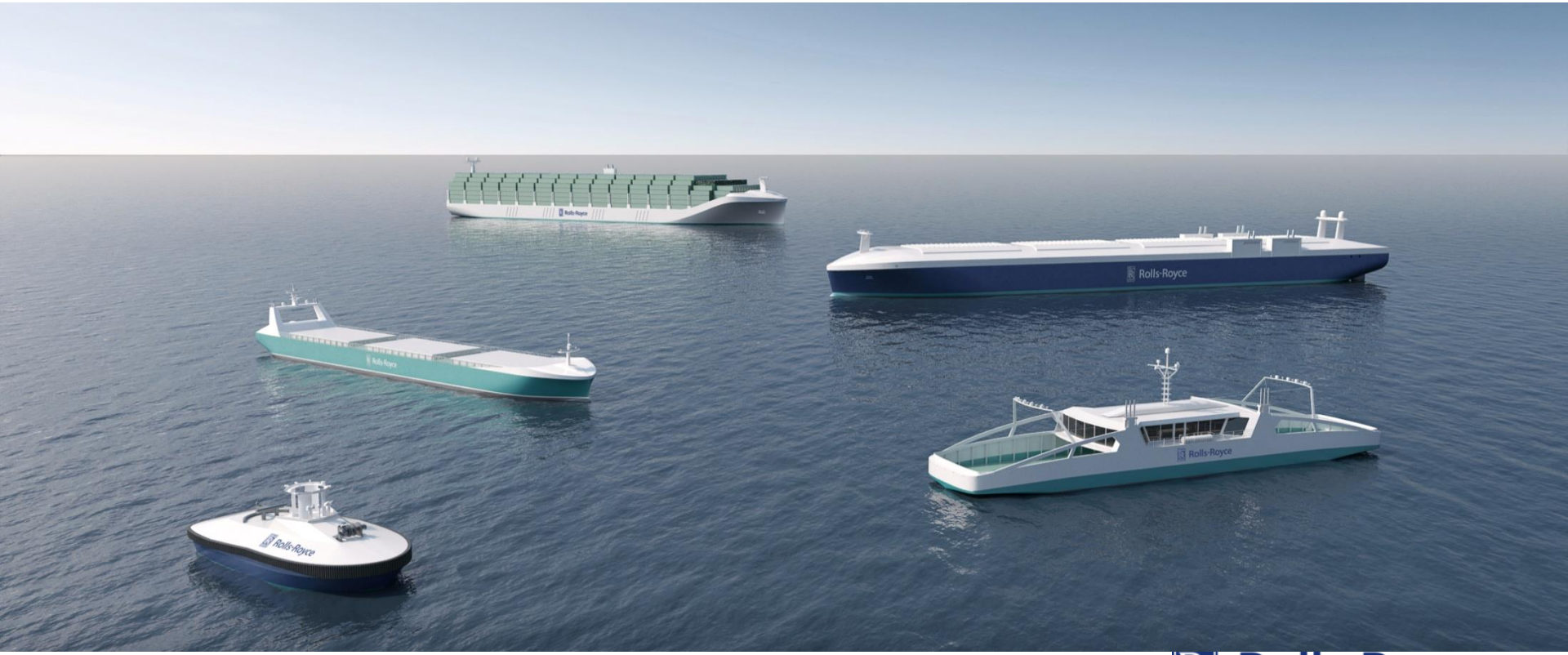
Remote and autonomous shipping



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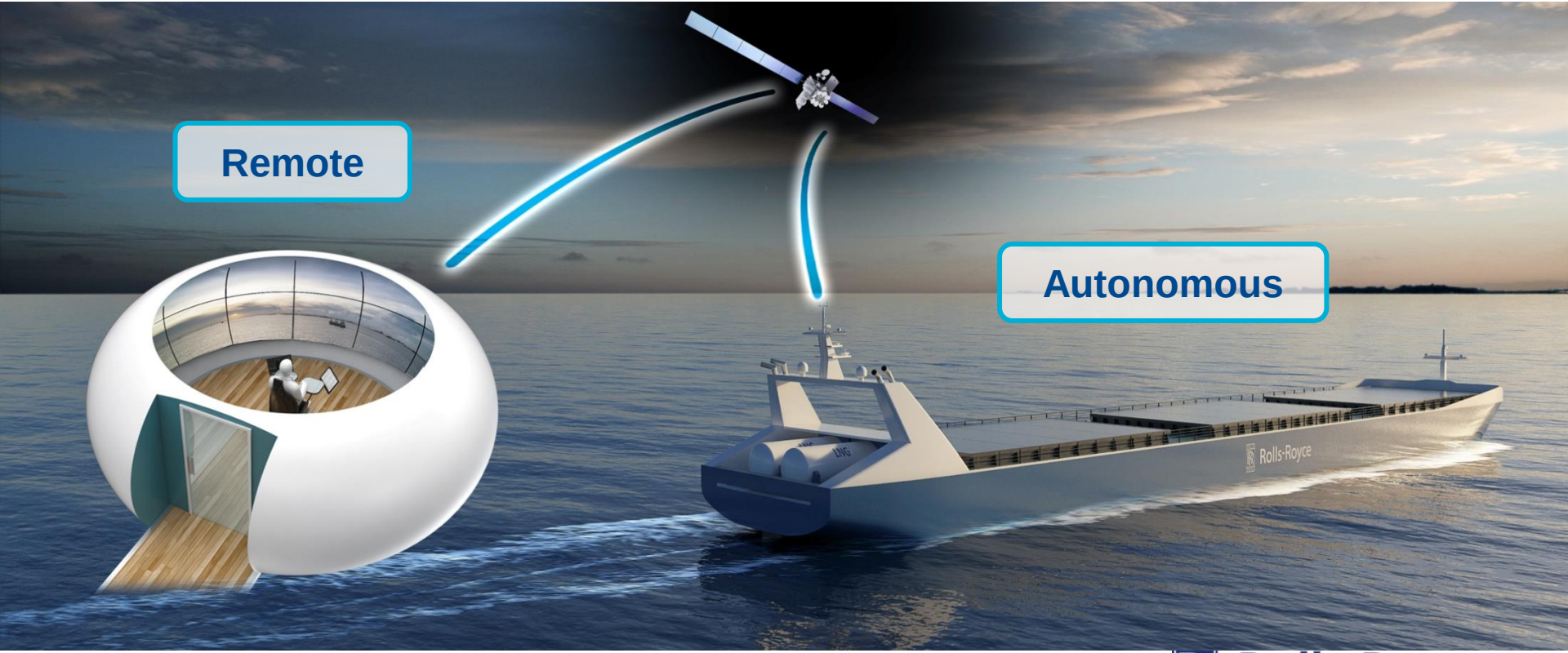
R&A markets vs ship segments

	R&A technology	Low manning	Unmanned
Bulker			
General cargo			
Feeder container			
Large container			
Tanker			
LNG/LPG			
OSV			
Tug			
Road ferry			
RoRo			
RoPax			
Cruise			

Remote and autonomous operation



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Remote and autonomous shipping

Safety

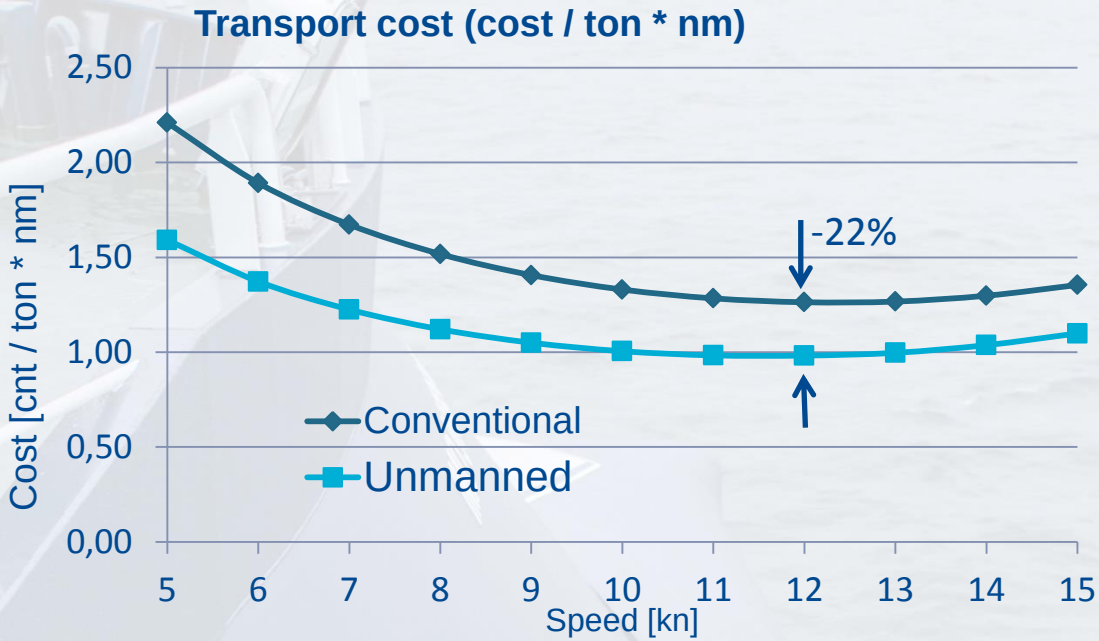
Business

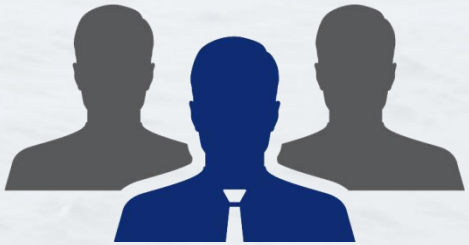
Cost

Reduced risk

Cost - transport

20 000 dwt general cargo vessel





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Rules and regulations

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RR journey to autonomous vessels

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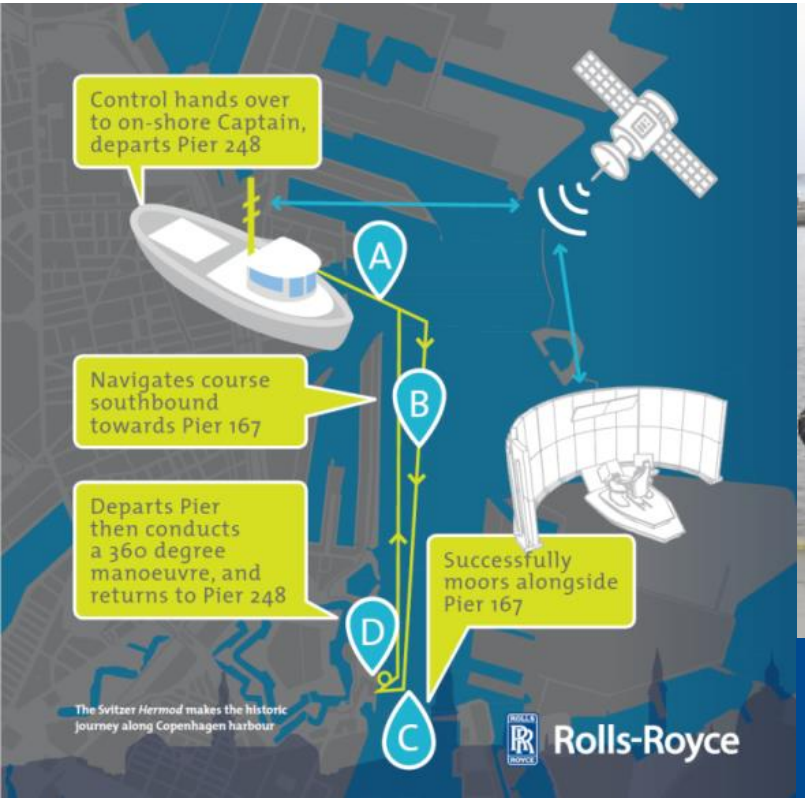
World’s first remotely controlled commercial tug



Svitzer/RR
Remote Controlled Tug Demonstrator

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MAERSK

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SVITZER

Potential implications to ports

1. Work transfer from ships to harbours
2. Mooring arrangements
3. Situational awareness
4. Connectivity
5. Remote pilotage
6. Remote controlled tug operations

1. Work transfer from ships to harbour

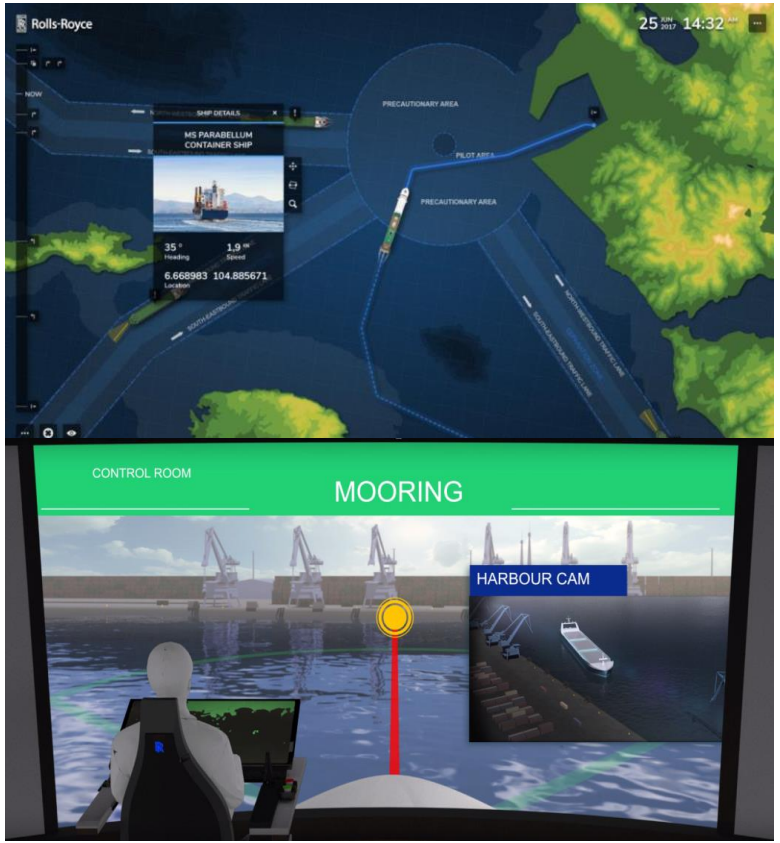
- Routine maintenance work carried out at harbour
- Inspections of vessel and her seaworthiness etc.

2. Mooring arrangements

- Separate berths for autonomous vessels or capability to use any berth (flexibility)?
- Automated mooring systems (vacuum-, magnet-, or other mechanism?)
- Automatic mooring systems can also be combinations of rope based and other systems

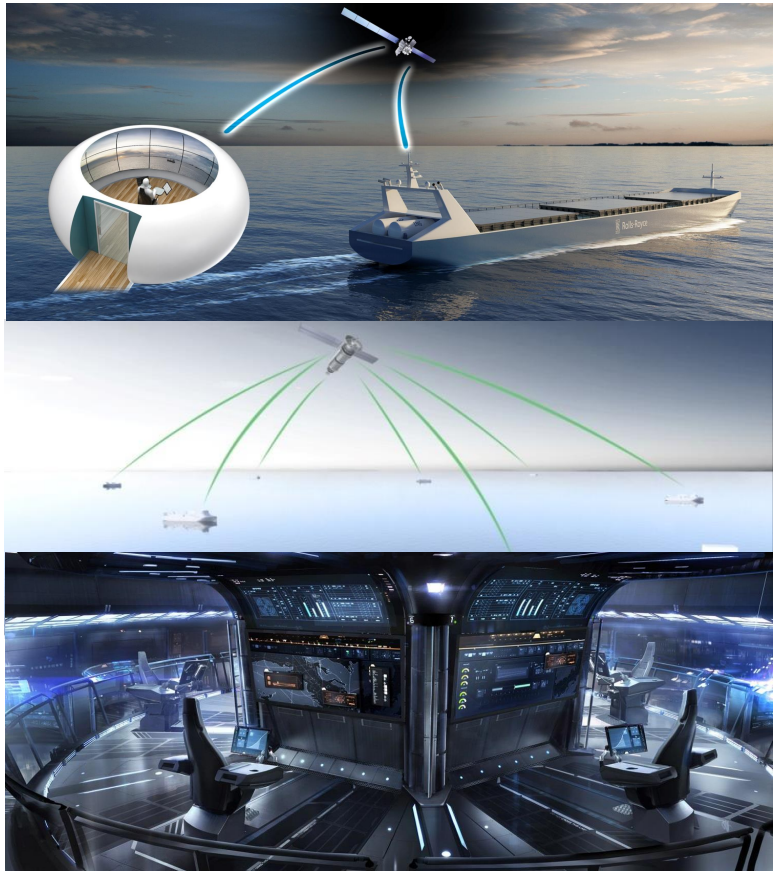
3. Situational awareness

- Autonomous vessels will have their own awareness systems which can be supported by fixed infrastructure in port / fairways
- Real time awareness of all traffic in the harbour shared with all stakeholders
- Benefits also existing (manned) traffic



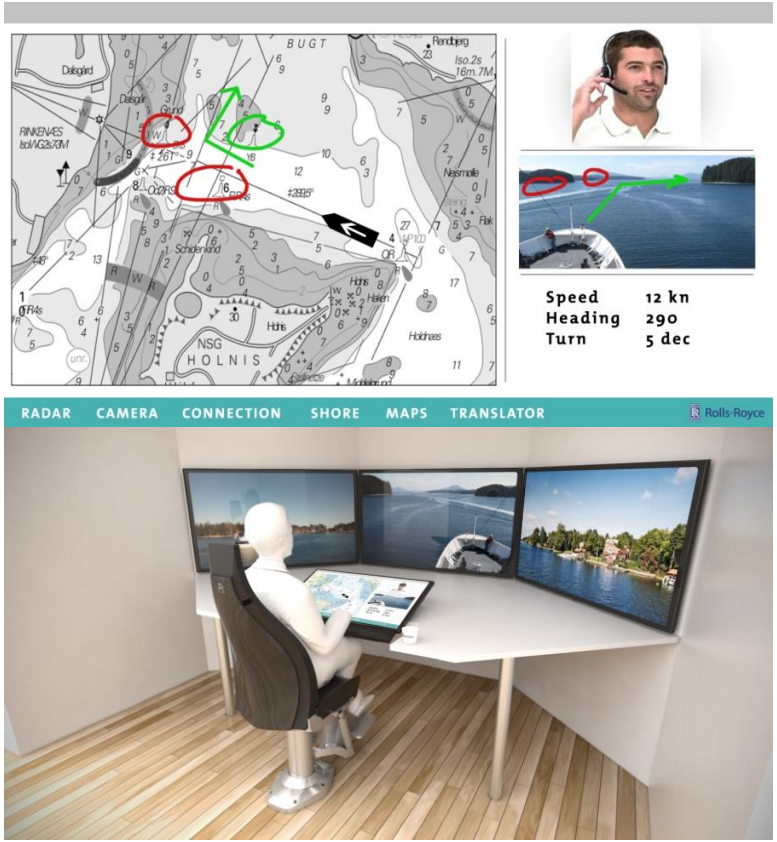
4. Connectivity

- Ships approaching harbour are expected to be remotely supervised even if sailing in autonomous mode
- Multiple carriers will be used for data transfer along with ship-to-ship information exchange
- Potentially large amounts of data, especially in multi-vessel operations, will require both high bandwidth and low latency



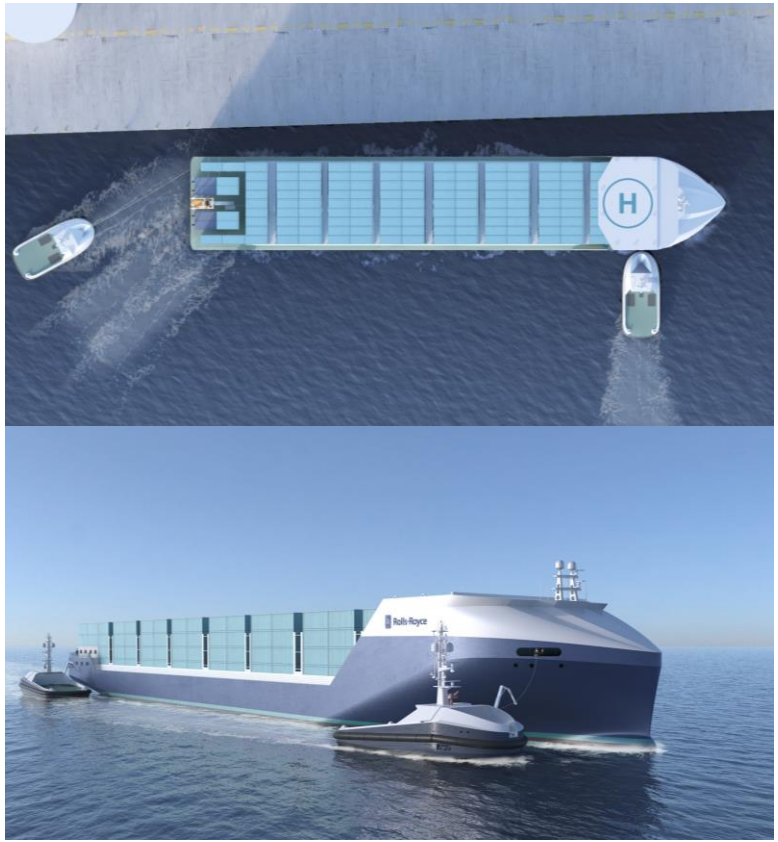
5. Remote pilotage

- Pilot to remote operation centre interaction or pilots directly steering the vessel?
- Multiple options exist
- First vessels expected to be in local traffic thus don’t likely require remote pilotage



6. Remote controlled tug operations

- Remote controlled and autonomous tugs can create significant savings
- Complex operation to be made fully autonomous, especially considering mix of manned and unmanned vessels
- Interfacing remote pilotage?

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