


Roadmap towards autonomous ships



Morten Skogvold
TPM, Autonomous Navigation System

Innovasjonskonferansen e-nav.no 2018

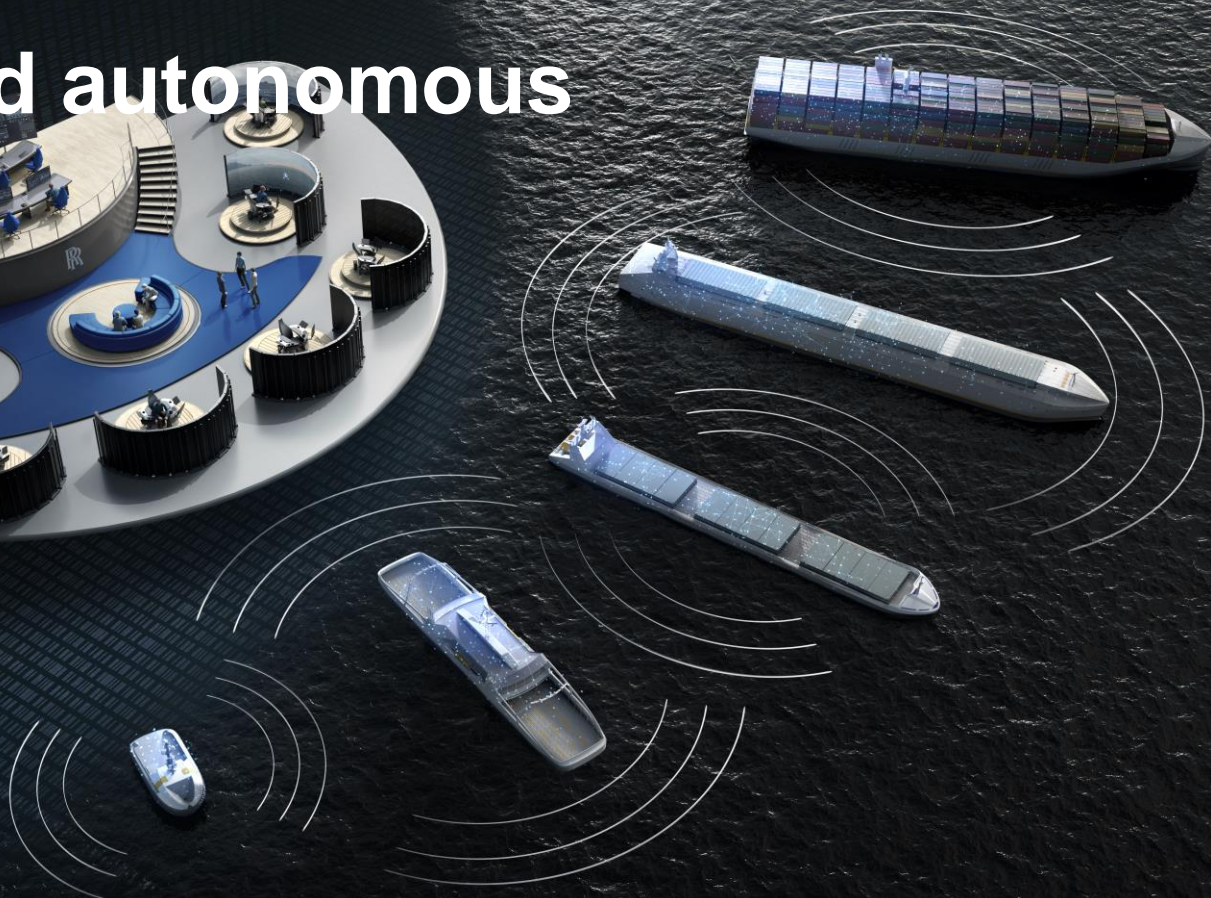
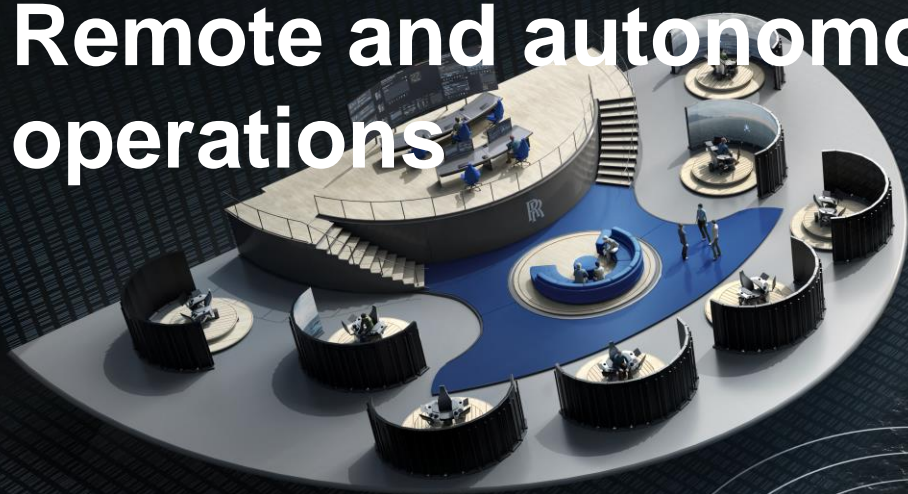
Oslo, 12.9.2018

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Remote and autonomous operations



Remote and Autonomous shipping



Safety



Business



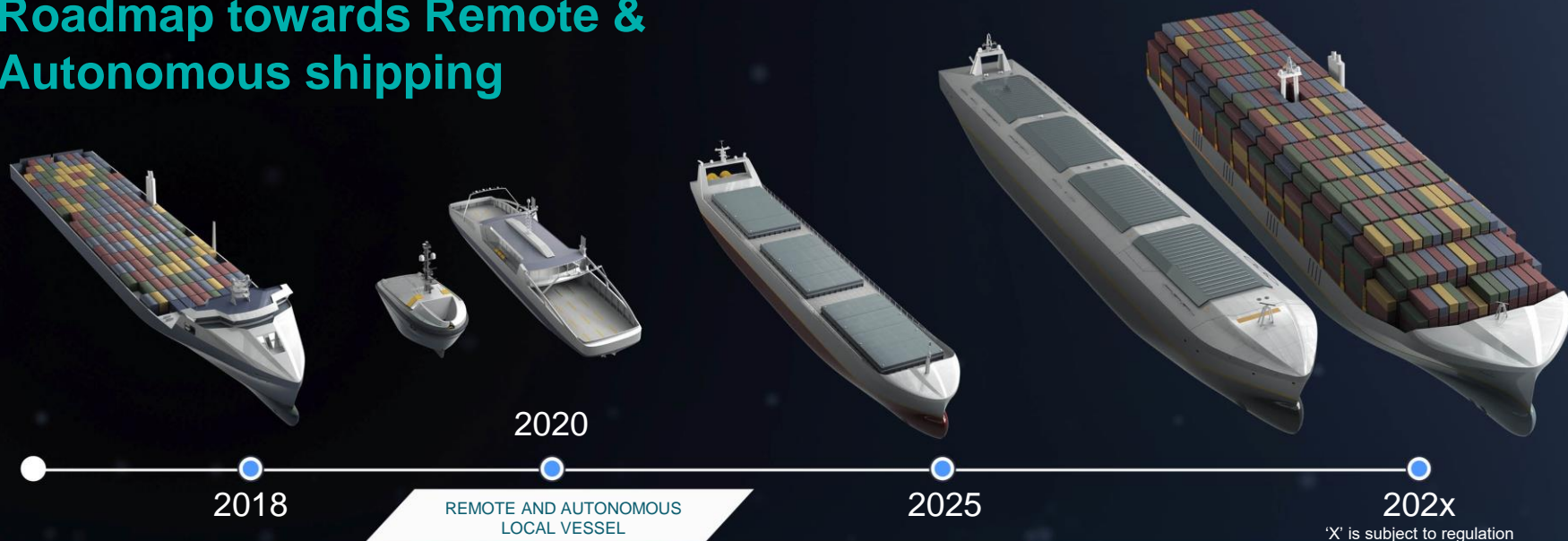
Cost



Reduced risk



Roadmap towards Remote & Autonomous shipping



REMOTE SUPPORT, OPERATION
OF CERTAIN FUNCTIONS

REMOTE AND AUTONOMOUS
LOCAL VESSEL

REMOTE AND AUTONOMOUS
SHORT SEA VESSEL

REMOTE AND AUTONOMOUS OCEAN GOING VESSEL

First automatic control systems to Fjord1

- The automatic crossing system ensures safe and energy efficient transit by automatically controlling the vessel's acceleration, deceleration, speed and track.
- The captain will supervise the system, and intervene if needed
- The vessels started operation early this year



The future starts today – Sisu – world's first remotely operated commercial vessel

Control hands over to on-shore Captain, departs Pier 248

Navigates course southbound towards Pier 167

Departs Pier then conducts a 360 degree manoeuvre, and returns to Pier 248

Successfully moors alongside Pier 167

The Svitzer Hermod makes the historic journey along Copenhagen harbour



Rolls-Royce



RR/Svitzer Remote Controlled Tug Demo





Key areas of demonstration (Jan 2017)



Connectivity



Cyber security



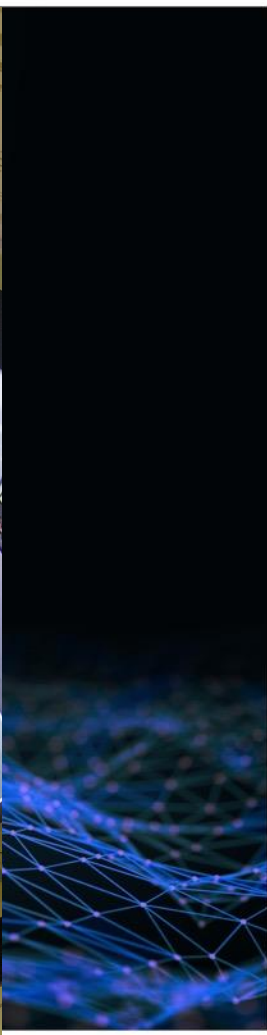
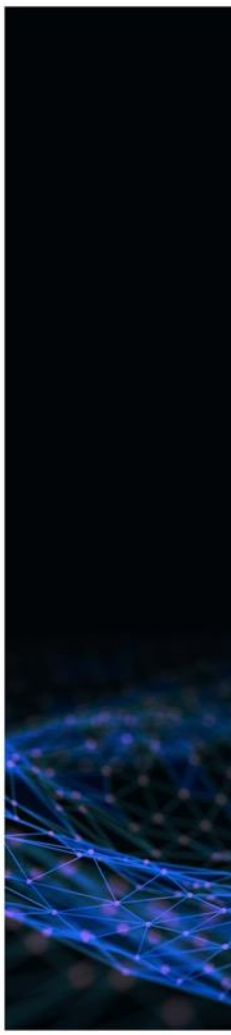
Situational awareness



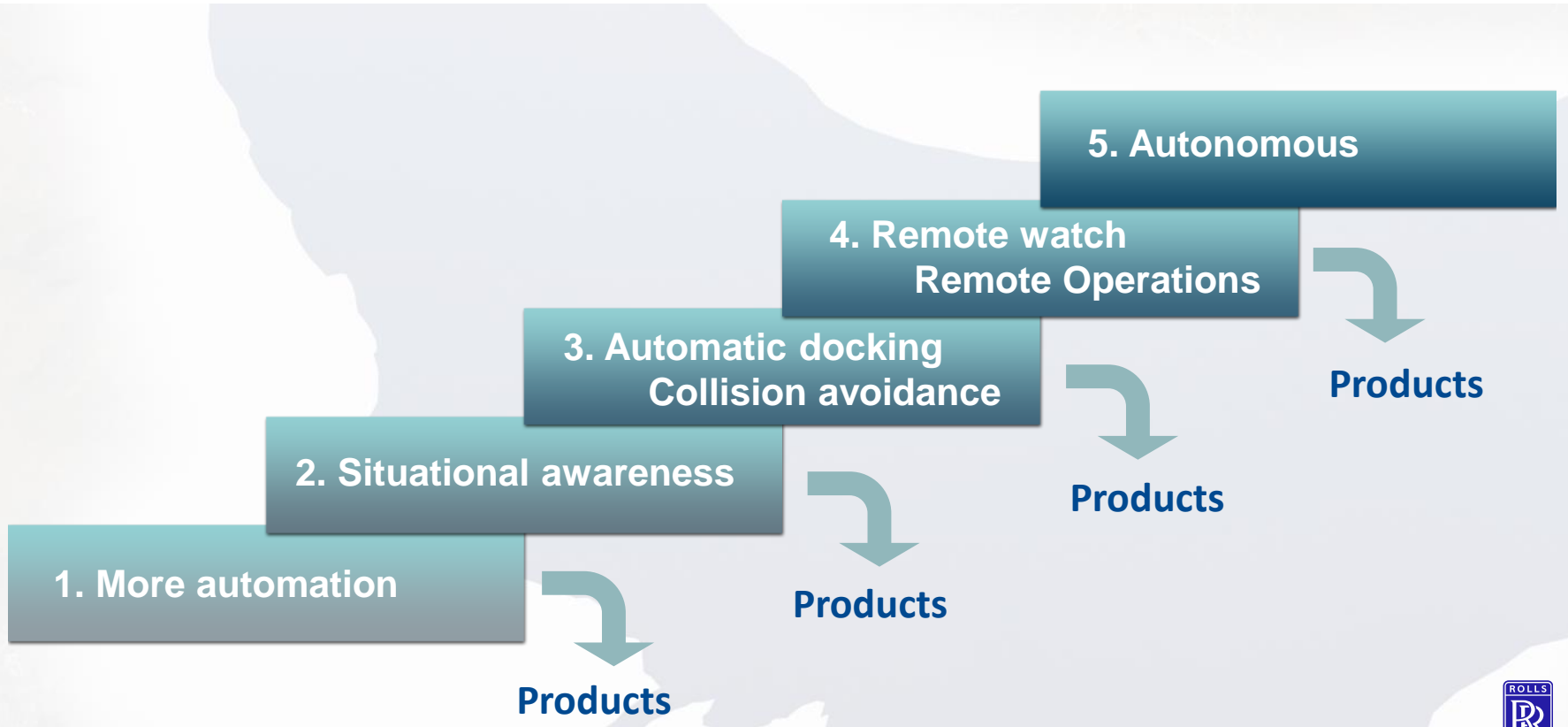
Remote operation station



Dynamic positioning



Steps Towards Autonomous Ships







Highlighting hazards in real time

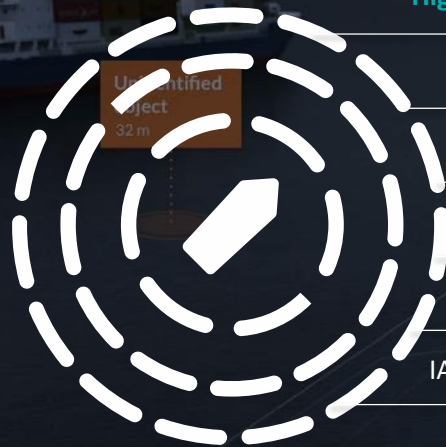
Providing short and medium range **object detection**

Providing **better visibility** in fog, dark and poor weather

Assisting crew with **safer operations** and **shared awareness**

Enhancing **reliability, reducing risk** of human error

IA system **data is stored and available** to owner at any time



Unidentified
Object
32 m

153.52 m

285.02 m

162.32 m

Sai Sunshine

34.32 m

Bollard
54.32 m



Intelligent
Awareness

How does it work?

Sensors

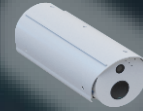
R-R Lidar



R-R antenna



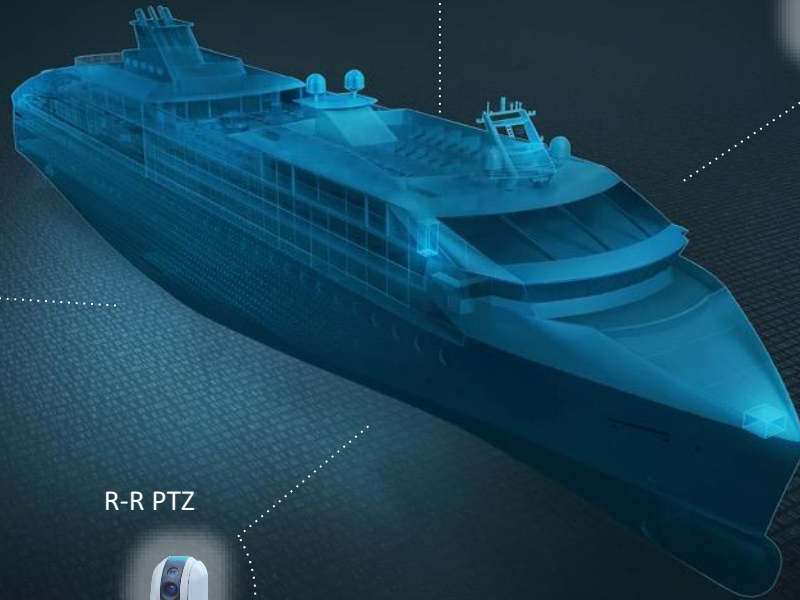
R-R Camera Unit



R-R Radar



R-R PTZ





Intelligent
Awareness

How does it work?

Intelligent Data Fusion



Intelligent Awareness

Building block for autonomous ships

Advisory
Human in control



Intelligent
Awareness

Connected Control Systems
Human in control



Intelligent
Awareness



Autonomous
Navigation System



Intelligent
Awareness

**Remote Control &
Autonomous Decision Making**
Human monitoring



Autonomous
Navigation System



Remote
Operations Centre

Remote operation centres



” Redefining the
maritime industry

with intelligent ”
solutions