國立臺灣海洋大學
NATIONAL TAIWAN OCEAN UNIVERSITY

2018資訊化船舶管理研討會
－ 無人船的發展與因應

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敬邀　(2018, 11, 30)

由現行航運模式轉換至無人船航運模式的準備與因應

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(2018, 11, 30)

簡報目錄

- 介紹
- 無人船(智慧船)的需求
- 航運工業的想法
- 船運業的想法
- 因應無人船世代到來的一些建議

Transition from current shipping to autonomous shipping

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(2018, 11, 30)

Outline

- Introduction
- Requirements for Autonomous shipping (Marine industry's thinking)
- Shipping company's thinking
- What should we do?

Introduction

- Why autonomous ?
- Intelligent shipping
- Requirements for autonomous ship
- Basic modules for autonomous ship

Why autonomous ?

- Economic consideration (competitiveness）
- Reduce likelihood of human errors (safety)
- Improve ship’s energy efficiency (sustainability)

Attractive Benefits

- More efficient use of space in ship design
- More efficient use of crew and their skills
- More efficient use of fuel
- **Allows improved optimization of operations and processes**

Ref. : Autonomous ships, The next step (*Rolls-Royce*) 2018.

Requirements for Intelligent shipping

- Intelligent ship
- Intelligent harbor
- Smart logistics
- Strong engineering backup

Requirements for Autonomous ship (smart ship)

- Reliable hardware
- Smart software
- Reliable communications

Basic modules for autonomous ship

- Navigation functions
- Vessel engineering functions
- Remote control centers
- Communication functions

Ref. : Class guidance for Autonomous and remotely operated vessels (DNV) 2018 September.

Required characteristics

- Fully automated
- Intelligent
- Reliable

Reliable control system

- **Self-contained**

  控制系統可自給自足，完整、不需要外再給予協助

- **Self-diagnostics and supervision**

  系統可自我監督、自我診斷

- **Fault-tolerant**

  當系統出現故障，仍能維持系統正常的運作

Fault tolerant design

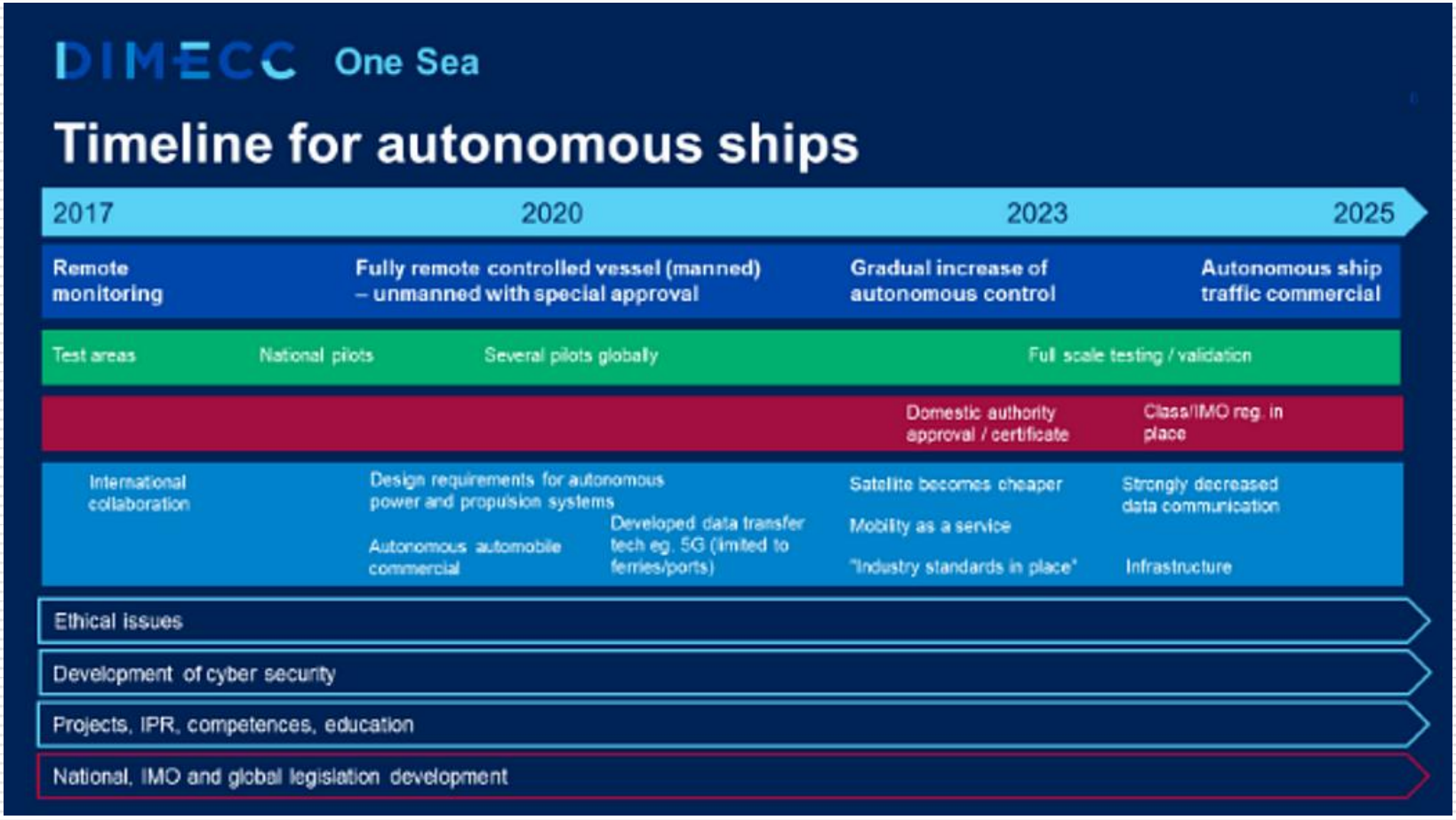
- Redundancy

  (Hardware redundancy, software redundancy)
- Failed-safe design
- Maintain normal functions via reconfiguration

What we are worrying about ?
(from shipping company ‘s view point)

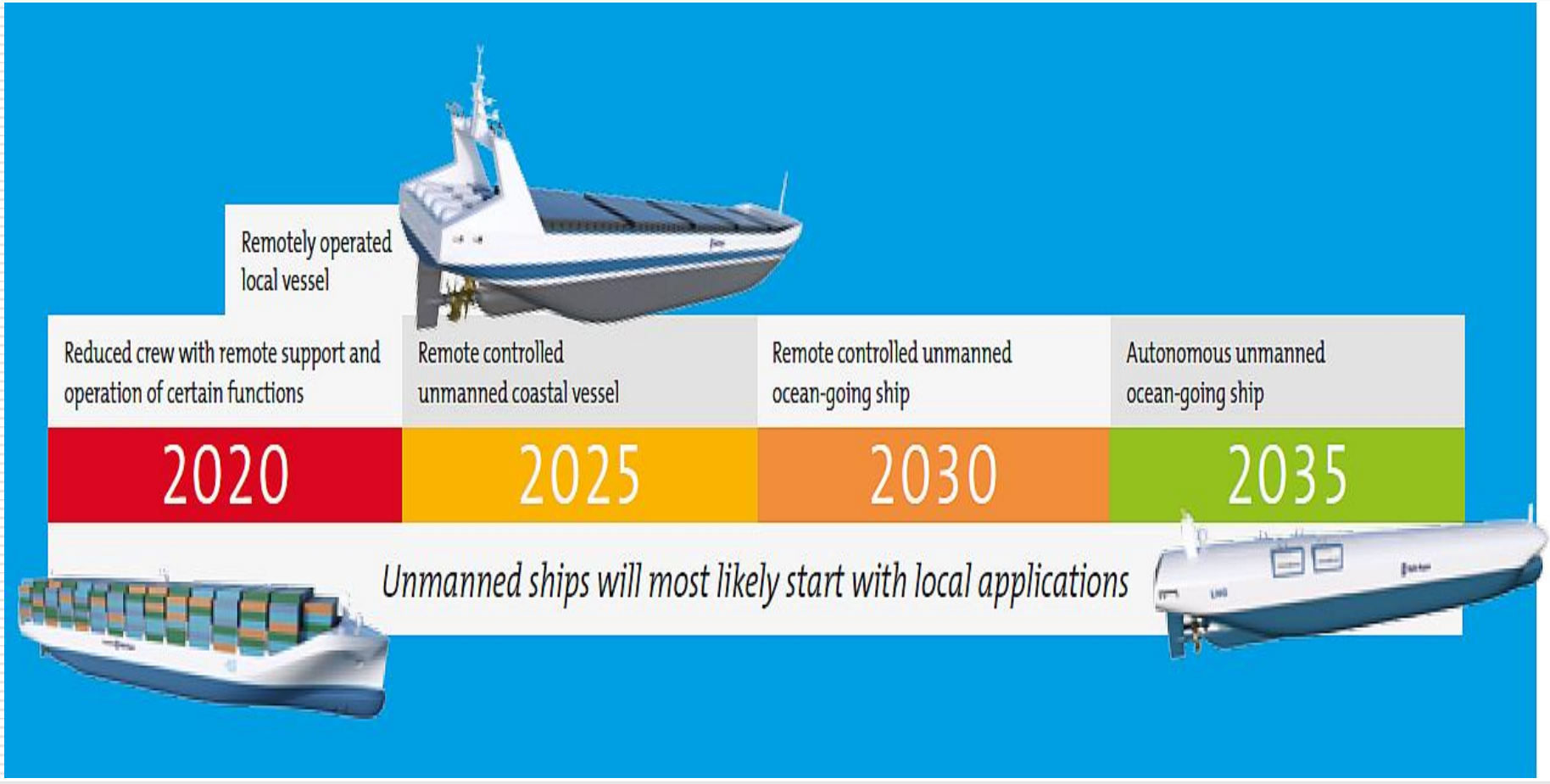
- Seafarers may lose their job
- Reliability problems such as engine trouble, may become loose cannon (ship may be in danger when unexpected faults occurred)
- Cyber security threats
- Insurance issues

Timeline for autonomous ships



Ref. : ONE SEA – AUTONOMOUS MARITIME ECOSYSTEM INTRODUCED ROADMAPS TO AUTONOMOUS SHIPPING , https://www.oneseaecosystem.net/category/news/ , 2016.

Timeline for autonomous ships



Ref. : Autonomous ships, The next step (*Rolls-Royce*) 2018.

Impacts to the shipping

- Maintenance and repair works are carried out on shore, supported by Smart logistics
- Dynamic positioning is important for auto-berthing (DP + CA)
- high-end professionals/personnel are needed for efficient remote supervision and management
- Educational subjects for navigation and marine engineering need to re-adjust

Different stages for intelligent ship development

- Primary stage : Hardware and software improvement , (Auto data-collecting, data-mining, self-diagnosis, machine learning,… so as to provide suggestions for decision making).
- Intermediate stage : Partially autonomous and remotely operated
- Maturity stage : Fully autonomous and remotely operated

Some suggestions

- Communication and connectivity are the minimum threshold for data mining and intelligent management
- Good intelligent management software may improve shipping's efficiency and therefore increase the competitiveness of shipping company
- Smart logistics provide important support to ship's maintenance and repair works on shore, for maintaining ship's safe cruising

Some suggestions (continued)

- Data mining, self-diagnosis, health monitoring and management skills are important tools for transition from current shipping to intelligent shipping
- Smart cargo handling is also important for harbor management in the face of autonomous ships
- Autonomous ships are also suitable for harbor boats, boats for offshore wind power maintenance, coast guard ships, Navy…


Thank you very much for
your attention !