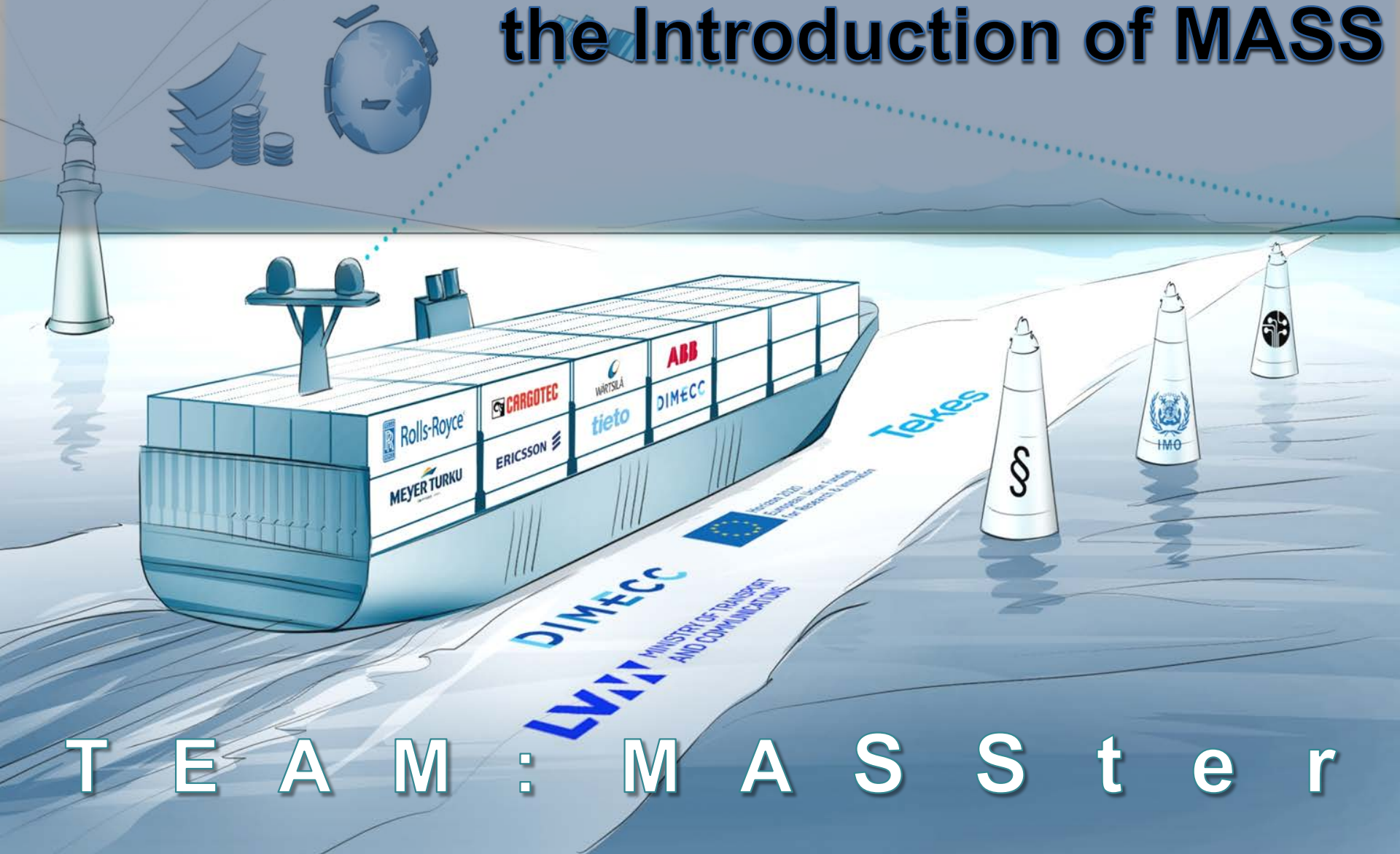


Proposals for Direction of Solutions to SOLAS Regulations that Preclude the Introduction of MASS



Contents

1. Purpose & Background
2. What's MASS?
3. SOLAS Regulations to be Reviewed
4. How to Solve?
5. Conclusion & Discussable Issues

1. Purpose & Back ground³

Among the regulations of SOLAS Chapter 5,

- **In terms of human factors, we identified **regulations** that may **preclude** the introduction of **MASS****
- **Therefore, this team proposes **solutions** for each regulation in accordance with **levels of autonomy****

1. Purpose & Back ground⁴

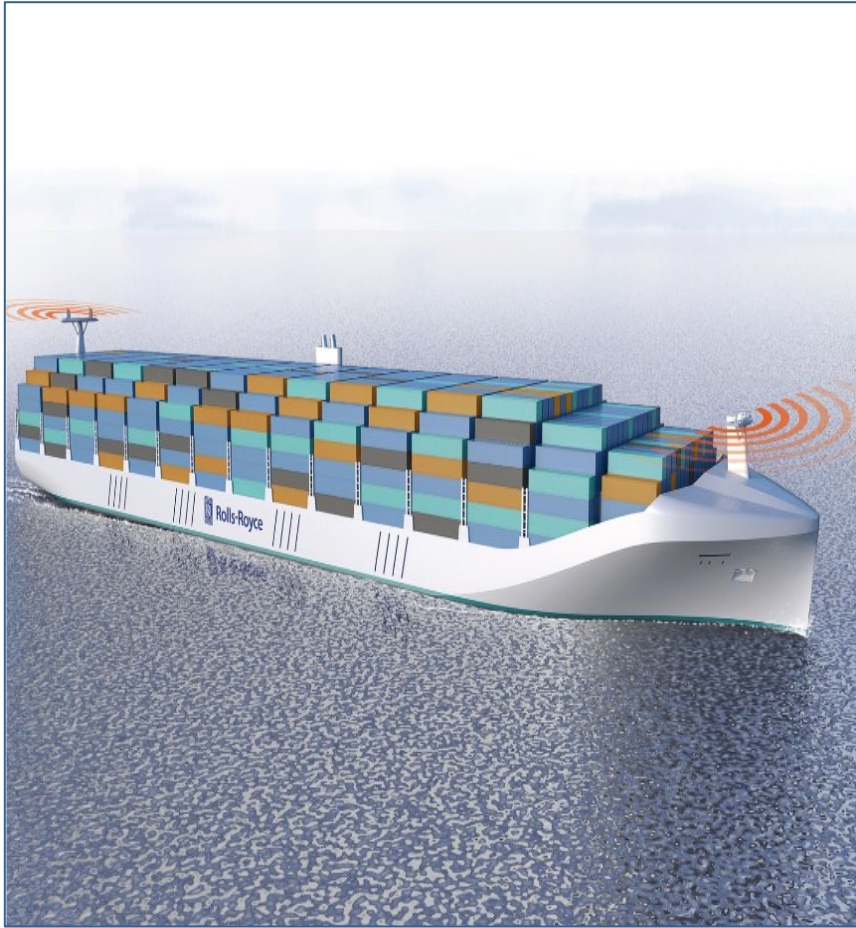


Challenges for Introduction of MASS

1. Purpose & Back ground⁵



2. What's MASS?



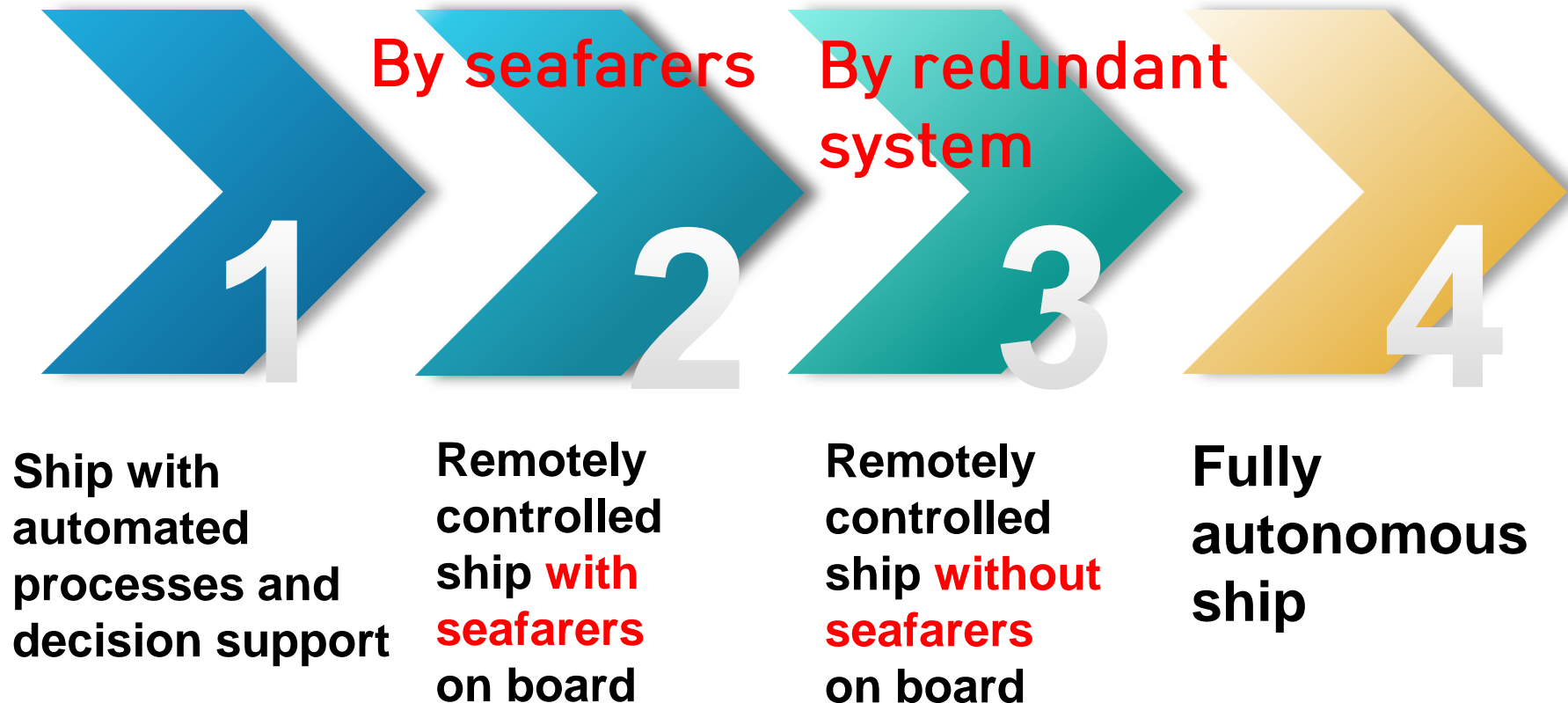
Maritime Autonomous Surface Ship (MASS)

Ships with decision support systems that permit taking over control and/or management of the system or ship, **irrespective of whether control is exerted from on board or off-board**

2. What's MASS?

Levels of Autonomy

* MSC 99-WP. 9-Report of the Working Group



3. SOLAS Regulations to be Reviewed



**SOLAS
CH V
Reg. 14**



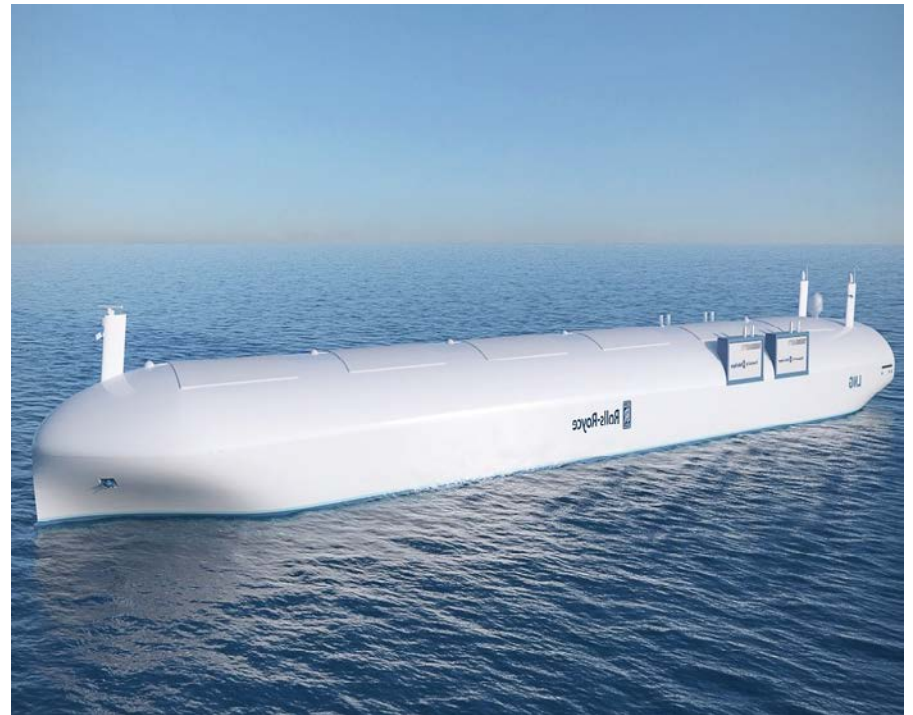
**SOLAS
CH V
Reg. 24**



**SOLAS
CH V
Reg. 31**

3. SOLAS Regulations to be Reviewed

Background of Scoping Issues: Existence of Seafarers



Reg. 14

Ship's manning

Regulation 14

Ships' manning

1 Contracting Governments undertake, each for its national ships, to maintain, or, if it is necessary, to adopt, measures for the purpose of ensuring that, from the point of view of safety of life at sea, all ships shall be sufficiently and efficiently manned. ‡

'all ships shall be sufficiently and efficiently manned'

Reg. 24

Use of heading and/or track control systems

Regulation 24

Use of heading and/or track control systems

1 In areas of high traffic density, in conditions of restricted visibility and in all other hazardous navigational situations where heading and/or track control systems are in use, it shall be possible to establish manual control of the ship's steering immediately.

**to establish manual
control of the ship's
steering immediately**

Reg. 31

Danger messages

Regulation 31
Danger messages

'The master of every ship'

1 The master of every ship which meets with dangerous ice, a dangerous derelict, or any other direct danger to navigation, or a tropical storm, or encounters sub-freezing air temperatures associated with gale force winds causing severe ice accretion on superstructures, or winds of force 10 or above on the Beaufort scale for which no storm warning has been received, is bound to communicate the information by all means at his disposal to ships in the vicinity, and also to the competent authorities. The form in which the information is sent is not obligatory. It may be transmitted either in plain language (preferably English) or by means of the International Code of Signals.

'is bound to communicate the information by all means at his disposal to ships in vicinity, and also to the competent authorities'

4. How to Solve?

step1 • revised manning regulation
***slight reduction in seafarers**



SOLAS
CH V
Reg. 14

step2 • working aside from controlling operation in vessel
• working in the remote control room
***seafarers on board don't control vessel**

step3 • working in the remote control room only
***no seafarers on board**

4. How to Solve?

step1 • maintain current regulation



SOLAS
CH V
Reg. 24

**step2 • authorize the steering control to the vessel
→ manual steering**

***seafarers remain partially on board**

***steering in remote control room generally**

step3 • steering in remote control room

***impossible manual control of steering**

4. How to Solve?

step1 • maintain current regulation



SOLAS
CH V
Reg. 31

step2 • top operator in remote control room → captain
• remote control room - danger message
• seafarers on board - danger message
(remote control is in trouble)

*** recognize danger information in remote control room**

step3 • top operator in remote control room → captain
• remote control room - danger message
• redundant system - danger message
(remote control is in trouble)

4. How to Solve?

Summary

SOLAS

Reg.	Levels of autonomy	Application to MASS	Way for applying to MASS	Directions
V / 14	1	△	revision	reduction in seafarers
	2	X	enactment	1. working aside from controlling operation in vessel 2. working in the remote control room
	3	X	enactment	working in the remote control room

SOLAS

Reg.	Levels of Autonomy	Application to MASS	Way for Applying to MASS	Directions
V / 24	1	O	remain	maintain current regulation
	2	X	enactment	authorize the steering control to the vessel → manual steering
	3	X	enactment	steering in remote control room
V / 31	1	O	remain	maintain current regulation
	2	X	enactment	<ol style="list-style-type: none"> remote control room - danger message seafarers on board - danger message
	3	X	enactment	<ol style="list-style-type: none"> remote control room - danger message redundant system - danger message

5. Conclusion & Discussable Issues

Amendment: ___ regulation in SOLAS

Ex.

1 Contracting Governments undertake, each for its national ships, to maintain, or, if it is necessary, to adopt, measures for the purpose of ensuring that, from the point of view of safety of life at sea, all ships shall be sufficiently and efficiently manned.

SOLAS Chap. V Reg. ____

Current regulation

STEP 1

STEP 2

STEP 3

SOLAS Chap. V Reg. ____ Amendment

Proposal

5. Conclusion & Discussable Issues

- **Definition and qualification** of 'Seafarers' in step 2
- **Work** of 'Seafarers' in step 2
- **Concept, Composition, and Performance Requirements** of remote control center
- Can a personnel who supervises a ship from a remote control room be considered a ' **Master** ' ?
- Can the remote control room be considered a ' **Bridge** '?

Thank you