

Maritime Autonomous Surface Ships: select regulation and liabilities

OceansTrends 2018, World Maritime University, Malmö
29 – 30 August 2018

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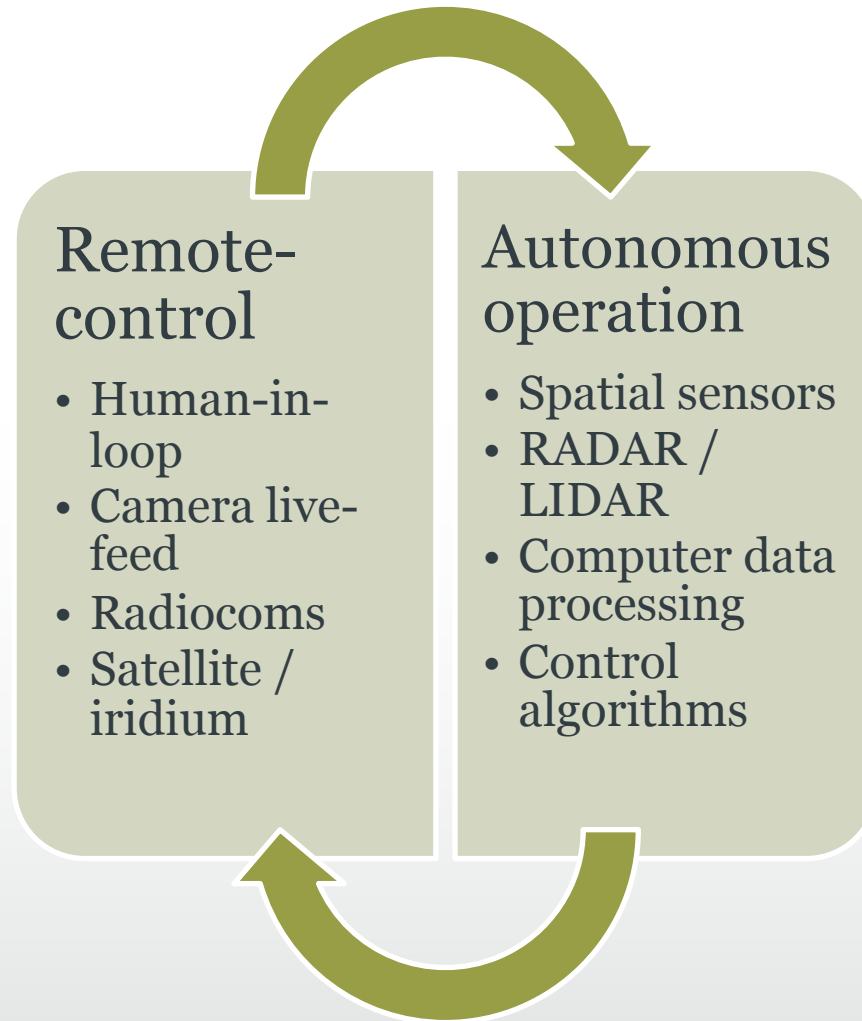
Fundamental questions

- Can MASS and their operators comply with international (IMO) regulations?
- How will *liability* be impacted by unmanned and autonomous operations?

What are we talking about?

- **Unmanned** : lack of crew on board
- **Automated**: functionality without human input
- **Autonomous** : *decision-making / problem-solving* capability without human input

Unmanned control methods



The “existing regulatory framework”

- International law of the sea
 - UN Law of the Sea Convention 1982 (UNCLOS)
- IMO Regulations
 - Convention on the Safety of Life at Sea 1974 (SOLAS)
 - Convention of Standards of Training, Certification and Watchkeeping (STCW)
 - The International Convention for the Prevention of Pollution from Ships, 1973 (MARPOL)
 - International Regulations for Preventing Collisions at Sea 1972 (COLREG)
- Civil Liability Conventions
 - International Convention on Salvage 1989
 - Limitation of Liability for Maritime Claims Convention 1976
 - Nairobi Convention on the Removal of Wrecks
 - International Convention on Civil Liability for Oil Pollution Damage (CLC)
- Domestic Legislation
 - 46 USC - Shipping
 - Inland Navigational Rules Act 1980

Compliance and seaworthiness

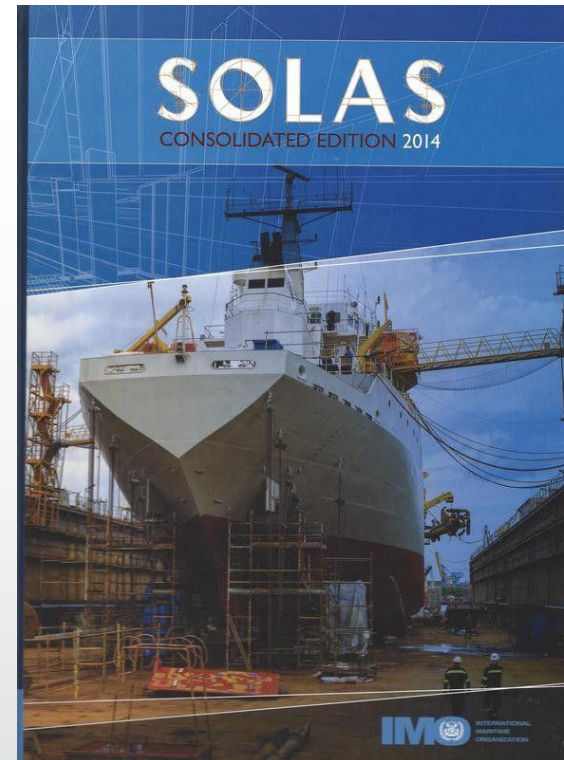
Article 94(3) UNCLOS

(3) Every State shall take measures ... to ensure safety at sea with regard, ... to:

- (a) the **construction**, equipment and **seaworthiness** of ships;
- (b) the **manning** of ships... and the **training** of crews;
- (c) the use of signals, the maintenance of communications and the **prevention of collisions**.

Construction and equipment

- International Convention for the Safety of Life at Sea (SOLAS)
 - Chapter II-1 (Construction – Subdivision and stability, machinery and electrical installations)
 - Chapter II-2 (Fire protection)
 - Chapter III (Life saving appliances)
 - Chapter IV (Radiocommunications)
 - Chapter V (Navigation)
 - ...



Construction and equipment

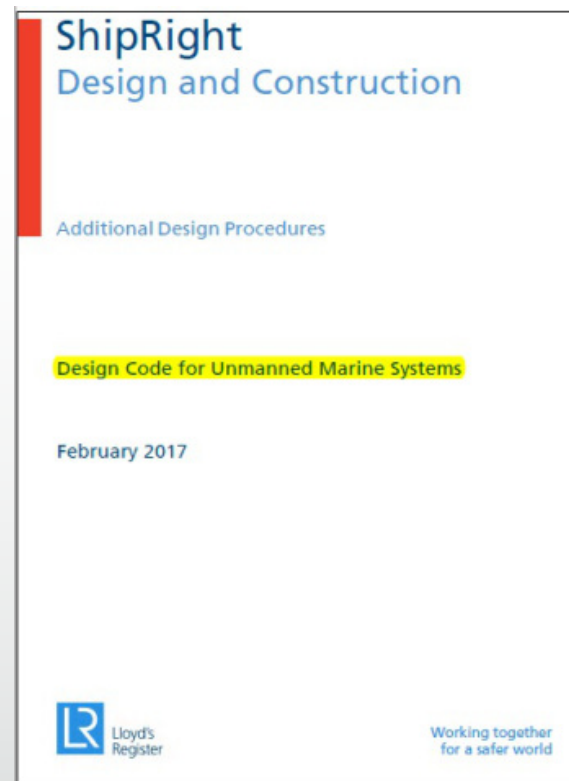
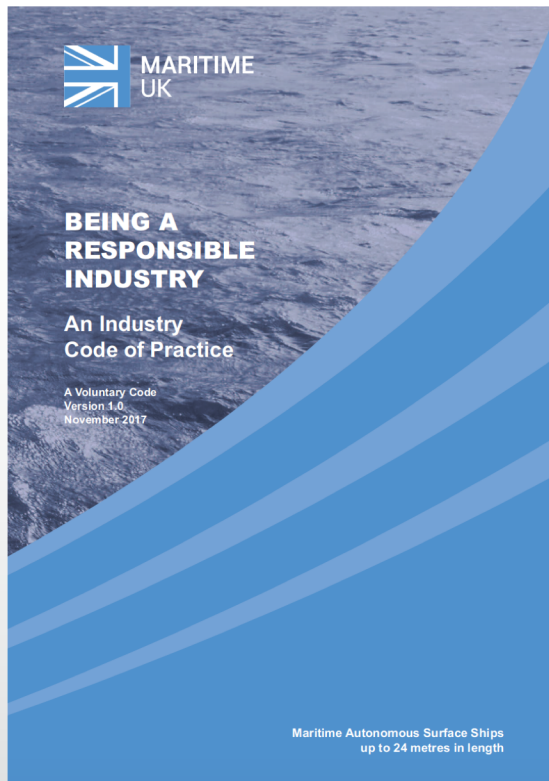
- SOLAS Chapter V (Navigation)
 - Regulation 15 – *Principles relating to bridge design*
- All decisions are made for the purpose of applying the requirements of Regulations 19, 22, 24, 24, 25 and 28 and which effect bridge design – the design of the navigational systems and equipment on the bridge shall be taken with the aim of:
 1. Facilitating the tasks to be performed by the bridge team and the pilot in making a full appraisal of the situation and in navigating the ship safely under all operational conditions
 2. ...
 3. Enabling the bridge team and the pilot to have convenient and continued access to essential information which is presented in a clear and unambiguous manner, using standardized symbols and coding systems for controls and displays.

Construction and equipment

- International Convention for the Safety of Life at Sea (SOLAS)
 - Chapter IV (Radiocommunications)
 - Reg 16:
 1. “Every ship shall ***carry, personnel*** qualified for distress and safety radiocommunication purposes to the satisfaction of the Administration.” ...
 - See also the Part VIII STCW Code (Watchkeeping)

Construction and equipment

- International Convention for the Safety of Life at Sea (SOLAS)
 - Bespoke regulation for autonomous systems?



Regulation V/14: Ships' manning

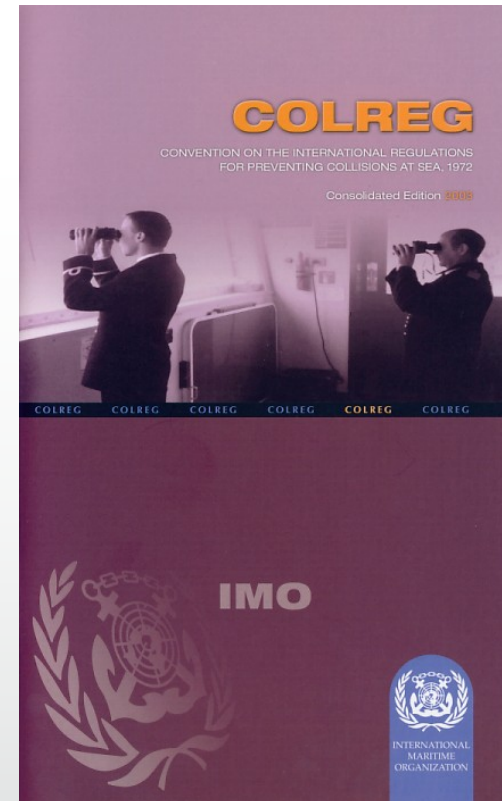
- “1. Contracting Governments undertake, each for its national ships to maintain / adopt measures to ensure that from the point of view of safety of life at sea, all ships shall be ***sufficiently and efficiently manned.***”
- “2. For every ship ... the Administration shall:
 - Establish appropriate minimum safe manning following a transparent procedure, taking into account the relevant guidance adopted by the Organization
 - Issue an appropriate **safe manning document** as evidence of the minimum safe manning considered necessary
- **Resolution A.1047(27) Principles of Safe Manning**

C) Collision Avoidance

The International Regulations for Preventing Collisions at Sea (COLREG), 1972

Overview

- Part A - General
- Part B – Steering and Sailing Rules
- Part C – Lights and Shapes
- Part D – Sounds and Light Signals
- Part E - Exemptions

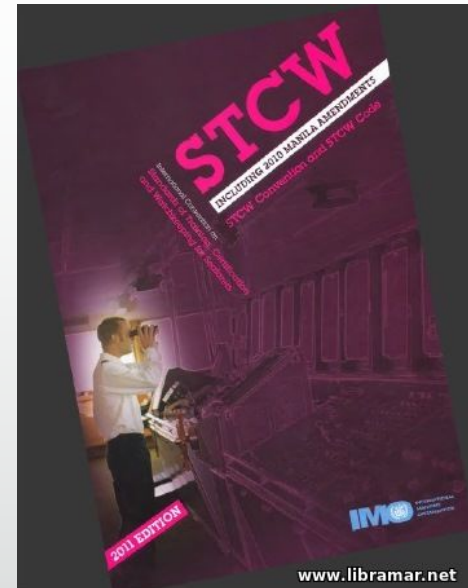


Rule 2 (Responsibility)

- “(a) Nothing in [the] Rules shall exonerate any vessel or master...from the consequences of any neglect to comply with [the] Rules or ... any precaution required by the ordinary practice of seaman or by ... special circumstances...”
 - Overarching standard of seamanship
 1. Deviation from the directions sometimes mandatory
 2. Need for real-time human judgement
 - Autonomous and unsupervised ships probably cannot comply
 - Remote controlled ships probably can

Personnel training : “the human element”

- International Convention on Standards for Training, Certification and Watchkeeping for Seafarers (STCW) Chapter VIII (Watchkeeping)
 - Article III
 - The Convention shall apply to “seafarers *serving on board* seagoing ships...”.
 - Literally, the STCW Convention finds no application to shore-based personnel
- New regime needed for:
 - Remote controllers
 - Pre-programmers
 - Pilots



Liability ...?

- Remote control operations
 - Controller and owner liable for any COLREG breaches
 - Strict liabilities unaffected
 - Global limitation
- Autonomous operation
 - Contrary to COLREG?
 - Exemptions?
 - Statutory presumptions of fault?

A new role for (EU) product liability?

- **Directive EU 85/374** on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products
 - Article 1
 - *The producer shall be liable for damage caused by a defect in his product.*
 - Article 2
 - *For the purpose of this Directive 'product' means all movables, ... 'Product' includes electricity.*
 - Sensors?
 - Data processing units”?
 - Software / algorithms?

A new role for (EU) product liability?

- **Directive EU 85/374**

- Article 6

- *1 . A product is defective when it does not provide the safety which a person is entitled to expect, taking all circumstances into account, including :*

- *(a) the presentation of the product ;*
- *(b) the use to which it could reasonably be expected that the product would be put ;*
- *(c) the time when the product was put into circulation.*

- *Collin Gee v DePuy [2018] EWHC 1208 (QB)*

- *Testing and inspection practices*
- *The costs of alternative design*
- *Compliance with industry standards and applicable regulations*

A new role for (EU) product liability?

- **Directive EU 85/374**

- Article 7

- 1 . The producer shall not be liable as a result of this Directive if he proves:

- (d) that the defect is due to **compliance** of the product with **mandatory regulations** issued by the **public authorities**

- (e) that the state of scientific and technical knowledge at the time when he put the product into circulation was not such as to enable the existence of the defect to be discovered ;

Concluding thoughts

- Unmanned technology is a reality
- IMO scoping regulatory scoping exercise a big step forward
- Existing legal framework presents challenges
 - Important distinction between remote control (unmanned) and autonomous operation
 - Clarifications, supplementations and amendments needed
- Shift in focus of civil liability?
- **Integrated approach essential!**

Thank you

- For slides and more information, please contact R.Veal@soton.ac.uk