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UNCLOS, IMO and Maritime Autonomous Surface Ships

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1. Overview of MASS
2. Legal Implications
3. Regulatory Developments at the IMO
4. Implications for UNCLOS

1. OVERVIEW OF MASS

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- Maritime Autonomous Surface Ships (MASS) can be defined as "ships which, to a varying degree, can operate independently of human interaction."
- Four degrees of Autonomy:
  - Degree One: Ship with automated processes and decision support
  - Degree Two: Remotely Controlled Ship with Seafarers on board
  - Degree Three: Remotely Controlled Ship without Seafarers on board
  - Degree Four: Fully autonomous Ship
- But note variations in class definitions

1. OVERVIEW OF MASS

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From **Lloyd's Register:**

AL 0 Manual – No autonomous function. All action and decision making performed manually (NB systems may have level of autonomy, with human in the loop.), i.e., human controls all actions.

AL 1 On-board decision support – All actions taken by human operator, but decision support tool can present option or otherwise influence the actions chosen. Data is provided by systems on board.

AL 2 On/off board decision support – All actions taken by human operator, but decision support tool can present options or otherwise influence the actions chosen. Data may be provided by systems on or off-board.

AL 3 Active human in the loop – Decisions and actions are performed with human supervision. Data may be provided by systems on or off-board.

AL 4 Human in loop/supervisory – Decisions and actions are performed autonomously with human supervision. High impact decisions are implemented in a way to give human operators the opportunity to intercede and over-ride.

AL 5 Fully autonomous – Rarely supervised operation where decisions are made entirely and actioned by the system.

AL 6 Fully autonomous – Unsupervised operation where decisions are made entirely and actioned by the system during the mission.

1. OVERVIEW OF MASS

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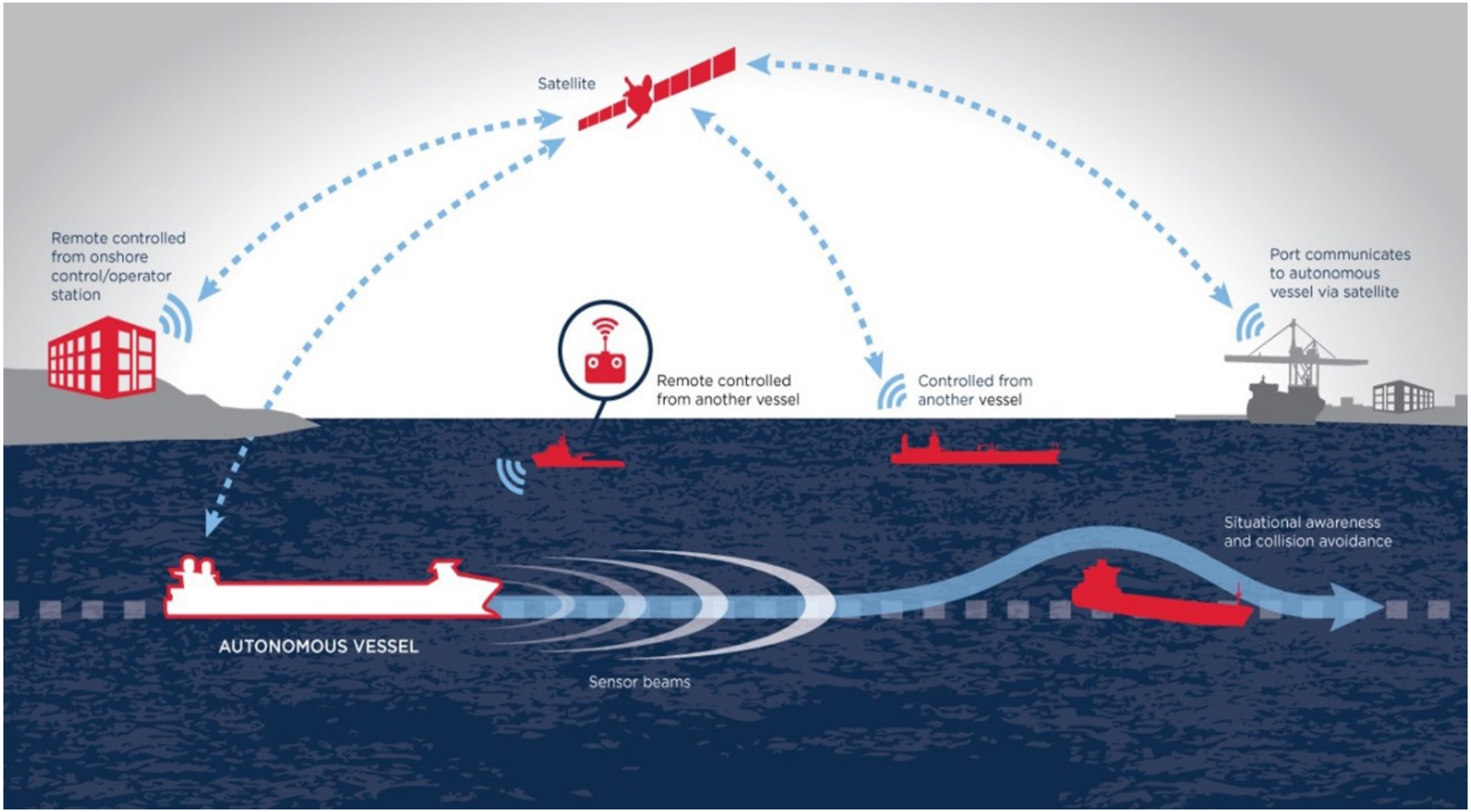

1. OVERVIEW OF MASS

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Pros	Cons
• Efficient - Lighter build, better navigation - Responds to crew shortages - Crew savings • Environmental benefits – greener? - lower energy energy use/emissions - No garbage/sewage discharges • Safer - Human error as the major factor in accidents is removed - Less attractive to pirates	• Costs • Constraints for at sea maintenance • Situation awareness and interaction with crewed vessels • Regulatory constraints • Shore-based crew may not have navigational training • Port inspections • Cyber Security • Insurance (temporary)

2. LEGAL IMPLICATIONS OF MASS

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- International regulation of shipping is governed by the 1982 UN Convention of the Law of the Sea (UNCLOS) and applicable instruments adopted by the International Maritime Organization (IMO)
- UNCLOS is a framework convention, and its provisions are implemented through specific operative provisions in IMO Conventions and their Annexes
- UNCLOS has numerous provisions requiring States to "take account of", "conform to", "give effect to" or "implement" the relevant provisions in the:
  - "applicable international rules and standards",
  - "generally accepted international regulations, procedures and practices", etc.
- **UNCLOS & IMO Conventions/Annexes are largely based on a human presence on board ships – to what extent can these instruments be interpreted to apply to MASS, or do they need to be updated?**

MAJOR IMO CONVENTIONS

IMO 1948 Convention	Convention on the International Maritime Organization
FAL 1965	Convention on Facilitation of International Maritime Traffic
LL 1966	International Convention on Load Lines [+ LL Prot 1988]
TONNAGE 1969	International Convention on Tonnage Measurement of Ships
INTERVENTION 1969	International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties [+ Intervention Prot 1973]
CLC 1969	International Convention on Civil Liability for Oil Pollution Damage [+ CLC Prots. 1976, 1992]
STP 1971	Special Trade Passenger Ships Agreement [+ SPACE STP 1973]
NUCLEAR 1971	Convention relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material
FUND 1971	International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage [+ FUND Prots. 1976, 1992, 2000, 2003]
CSC 1972	International Convention for Safe Containers
COLREG 1972	Convention on the International Regulations for Preventing Collisions at Sea
LC 1972	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter [+ LC Prot 1996]
MARPOL 1973/1978	International Convention for the Prevention of Pollution from Ships [+ MARPOL Prot 1997]
SOLAS 1974	International Convention for the Safety of Life at Sea [+ SOLAS AGR 1996 (Ro-Ro Passenger Ships), SOLAS Prots. 1978, 1988]
PAL 1974	Athens Convention relating to the Carriage of Passengers and their Luggage by Sea [+ PAL Prots. 1976, 1990, 2002]
IMSO C 1976	Convention on the International Maritime Satellite Organization [+ INMARSAT OA (Operating Agreement) – superseded by 1998 Amendments to IMSO C 1976]
LLMC 1976	Convention on Limitation of Liability for Maritime Claims [+ LLMC Prot 1996]
SFV 1977	Torremolinos International Convention for the Safety of Fishing Vessels [+SFV Prot 1993, Cape Town Agreement 2012]
STCW 1978	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers [+STCW-F 1995 (for Fishing Vessel Personnel)]
SAR 1979	International Convention on Maritime Search and Rescue
SUA 1988	Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation [+ SUA PROT 1988 (Fixed Platforms on the Continental Shelf), SUA 2005]
SALVAGE 1989	International Convention on Salvage
OPRC 1990	International Convention on Oil Pollution Preparedness, Response and Co-operation [+ OPRC/HNS 2000]
HNS 1996	International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea [+ HNS Prot 2010]
AFS 2001	International Convention on the Control of Harmful Anti-Fouling Systems on Ships
BUNKERS 2001	International Convention on Civil Liability for Bunker Oil Pollution Damage
BWM 2004	International Convention for the Prevention of Pollution from Ships [+ MARPOL Prot 1997]
Nairobi WRC 2007	Ballast Water Management Convention
HK Convention 2009	Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships

Figure 2. **Chronological Listing of the IMO Conventions; List based on instruments listed in the Status of Treaties database on IMO GISIS**

3. REGULATORY DEVELOPMENTS AT IMO

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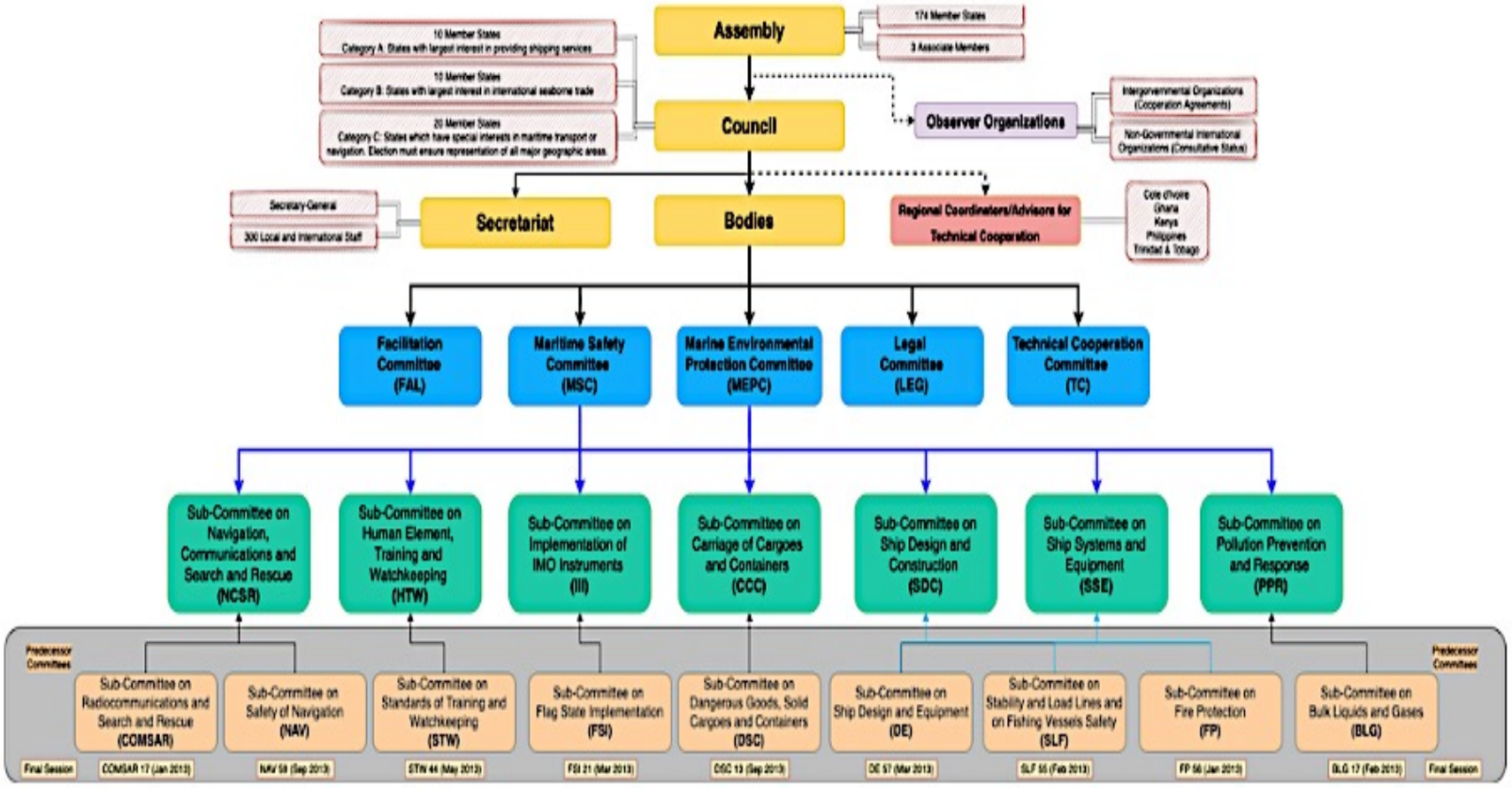

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MSC.1/Circ.1638
Annex, page 30

Instrument: SOLAS chapter IV – Radiocommunications

Degree of autonomy	The most appropriate way(s) of addressing MASS operations (I, II, III, IV)	Reason for selecting the most appropriate way(s) of addressing MASS operations	Potential gaps/themes that require addressing
Degree One	**II**	Potential gaps may be addressed by amending existing instrument, possibly as they are introduced.	• New terms and definitions • New requirements for automated processes and decision support system
Degree Two	**II, III**	Since remotely controlled operations have not been a part of this instrument, *developing a new instrument* would be the most appropriate way to address the requirements for remote control centres. In addition, necessity for new requirements and frequencies could be addressed by developing new instrument as well.	• New terms and definitions • Requirements for remote control stations' technical issues • Functional and maintenance requirements
Degree Three	**III**	Since remotely controlled operations have not been a part of this instrument, *developing a new instrument* would be the most appropriate way to address the requirements for remote control centres. In addition, necessity for new requirements and frequencies could be addressed by developing a new instrument as well.	• New terms and definitions • Requirements for remote control stations' technical issues • Functional and maintenance requirements • Radio watch requirements and radio personnel • Distress, safety and urgency calls and related requirements
Degree Four	**III**	Since fully autonomous ships with most probably having main control centre ashore have not been foreseen in this instrument, *developing new instrument* would be the most appropriate way to	• New terms and definitions Requirements for main control stations' technical issues • Functional and maintenance requirements • Radio watch requirements and radio personnel

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3. REGULATORY DEVELOPMENTS AT IMO

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3. REGULATORY DEVELOPMENTS AT IMO

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- Joint MSC/LEG/FAL Working Group on MASS
  - Established as a cross-cutting mechanism to address common high-priority issues identified by the RSE for the use of MASS conducted by the three committees
  - JWG developed a table (a living document) to identify preferred options for addressing common issues
    - Role of MASS Master and crew
    - Responsibilities of MASS master and crew
    - Competencies required for MASS master and crew
    - Identification and meaning of term “remote operator” and their responsibilities
  - JWG developed a draft work plan

4. IMPLICATIONS FOR UNCLOS?

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- The IMO did not consider UNCLOS in its RSE
- Legal Committee noted in 2021:
  - "While UNCLOS was not considered as part of the LEG RSE, as it is not an IMO convention, MASS will need to operate within the legal framework set out in UNCLOS. As a result, UNCLOS will need to be considered in IMO's future work on MASS, particularly if IMO develops an instrument regulating MASS operations (LEG.1/Circ.11, 15 Dec 2021)."
- Joint Working Group agreed on organizing a seminar on legal issues, including UNCLOS, to be considered for the development of a MASS Code and MASS-related measures

4. IMPLICATIONS FOR UNCLOS?

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- Under both UNCLOS and IMO conventions it is the **flag State** that has primary responsibility to ensure that ships flying its flag comply with the applicable rules and regulations on the safety of navigation and ship-source pollution
- Therefore, the **flag State** that must have primary responsibility to ensure that MASS comply with the IMO Conventions and UNCLOS
- The IMO can impose obligations on the **flag State** to be in constant communication with MASS flying their flag, and to ensure that MASS are continuously under the control of persons who are serving as the “master” and “crew” of the vessel
- The IMO can also impose regulations to ensure that the authorities of the **flag State** are able to communicate with other ships and coastal authorities with regard to the passage of MASS flying their flag

4. IMPLICATIONS FOR UNCLOS?

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- MASS raises issues for **coastal States** and **port States** under UNCLOS and how they can communicate with, and if necessary, exercise enforcement jurisdiction over MASS exercising rights of passage in waters under their sovereignty or national jurisdiction:
  - Safety of life at sea
  - Prevention of collisions
  - Prevention, reduction and control of marine pollution
  - Maintenance of communications by radio
- Can the IMO amend the relevant laws and regulations on these four matters to take MASS into account to protect the interests of (a) other ships; and (b) port States and coastal States?

CIL RESOURCES ON UNCLOS, IMO & MASS

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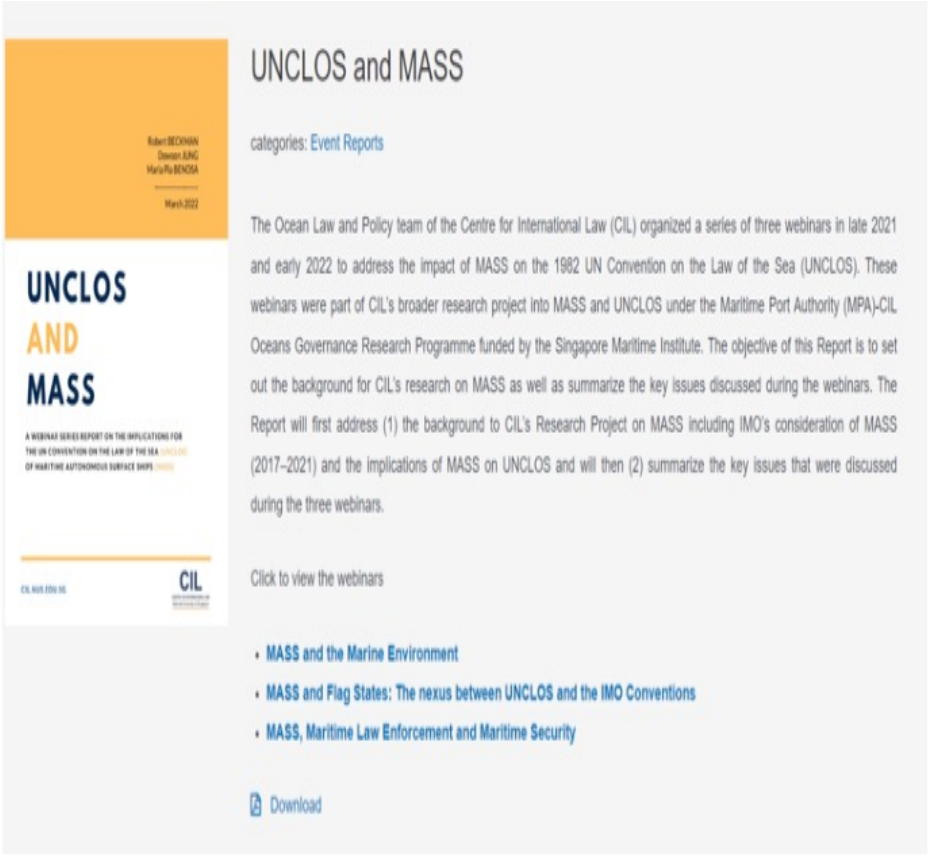
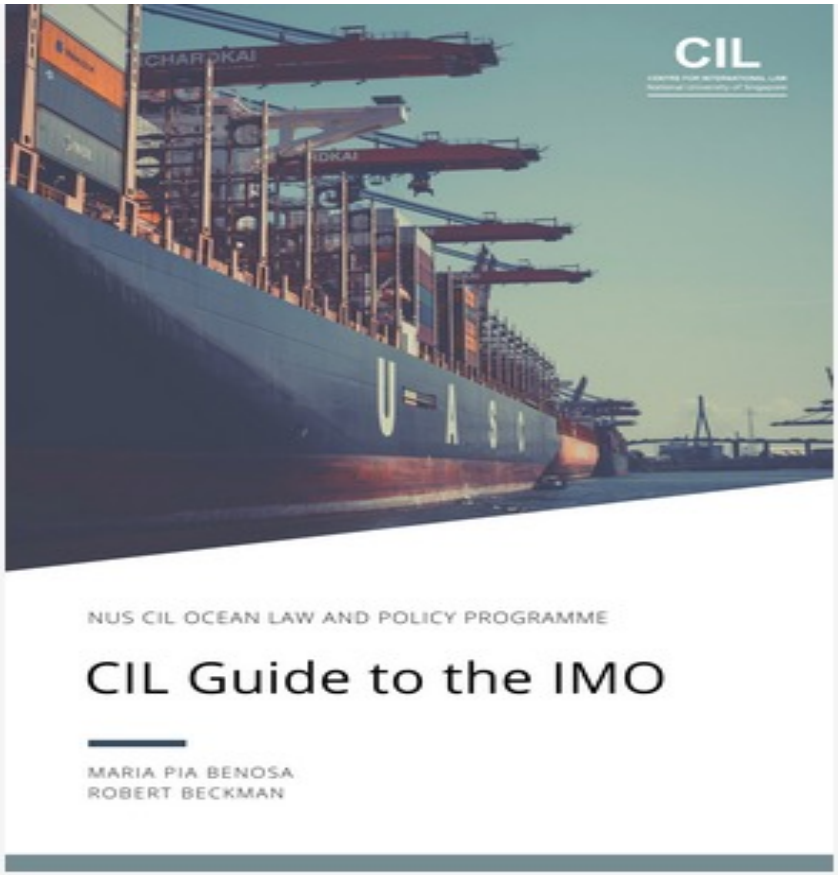
- CIL's Research on UNCLOS, IMO & MASS is done pursuant to the MPA-CIL Oceans Governance Research Programme funded by the Singapore Maritime Institute





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Thanks for your attention!

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