

**14<sup>th</sup> Cooperation Forum**  
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# **1982 UNCLOS, MASS and IMO Instruments**

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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

- 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

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.

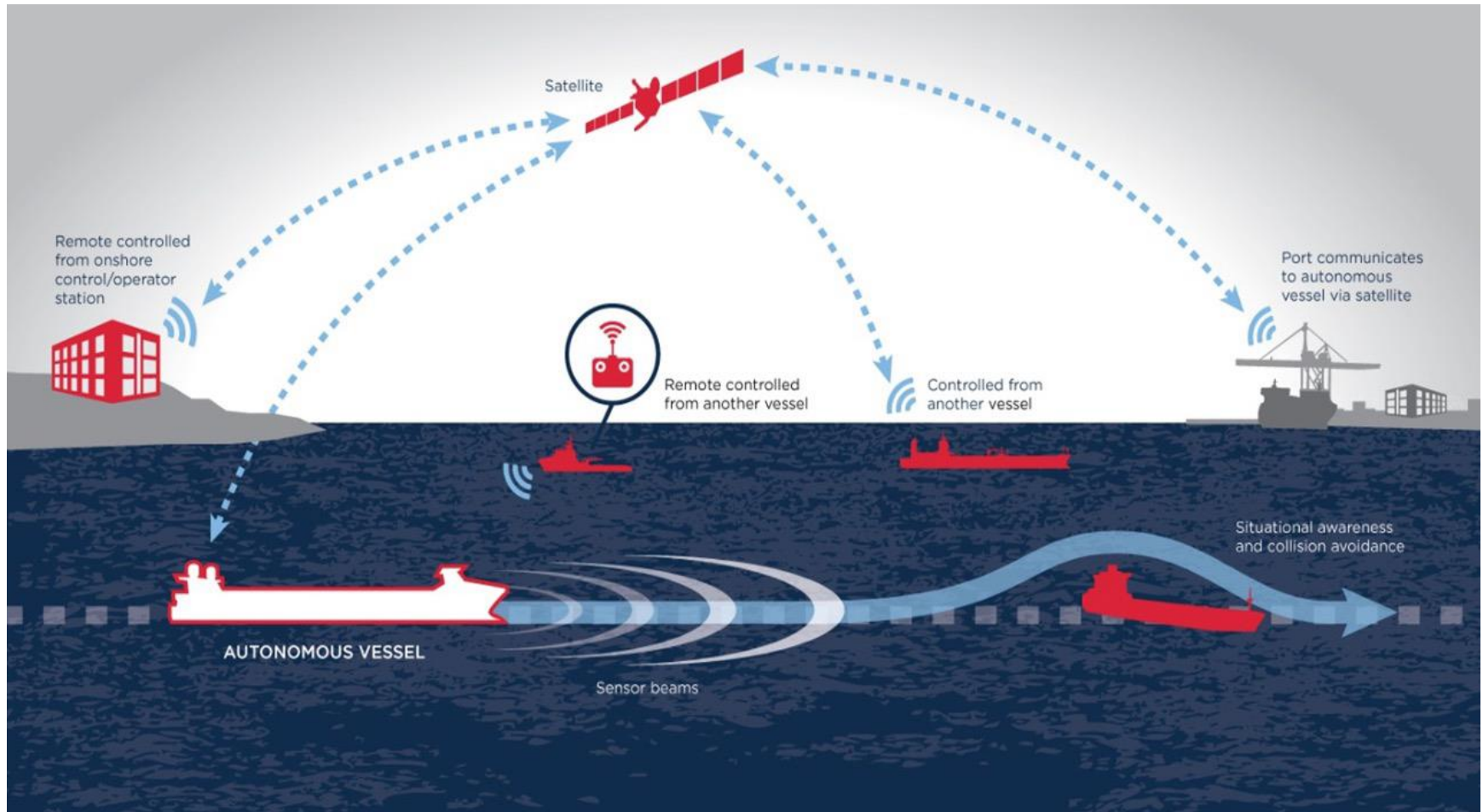
**AL 3 Active human in the loop** – Decisions and actions are performed with human supervision. Data may be provided by systems on or off-board.

**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



# 1. OVERVIEW OF MASS

Pros	Cons
<ul style="list-style-type: none"><li>• Efficient<ul style="list-style-type: none"><li>- Lighter build, better navigation</li><li>- Responds to crew shortages</li><li>- Crew savings</li></ul></li><li>• Environmental benefits – greener?<ul style="list-style-type: none"><li>- lower energy energy use/emissions</li><li>- No garbage/sewage discharges</li></ul></li><li>• Safer<ul style="list-style-type: none"><li>- Human error as the major factor in accidents is removed</li><li>- Less attractive to pirates</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Costs</li><li>• Constraints for at sea maintenance</li><li>• Situation awareness and interaction with crewed vessels</li><li>• Regulatory constraints</li><li>• Shore-based crew may not have navigational training</li><li>• Port inspections</li><li>• Cyber Security</li><li>• Insurance (temporary)</li></ul>

## 2. LEGAL IMPLICATIONS OF MASS

- 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?**



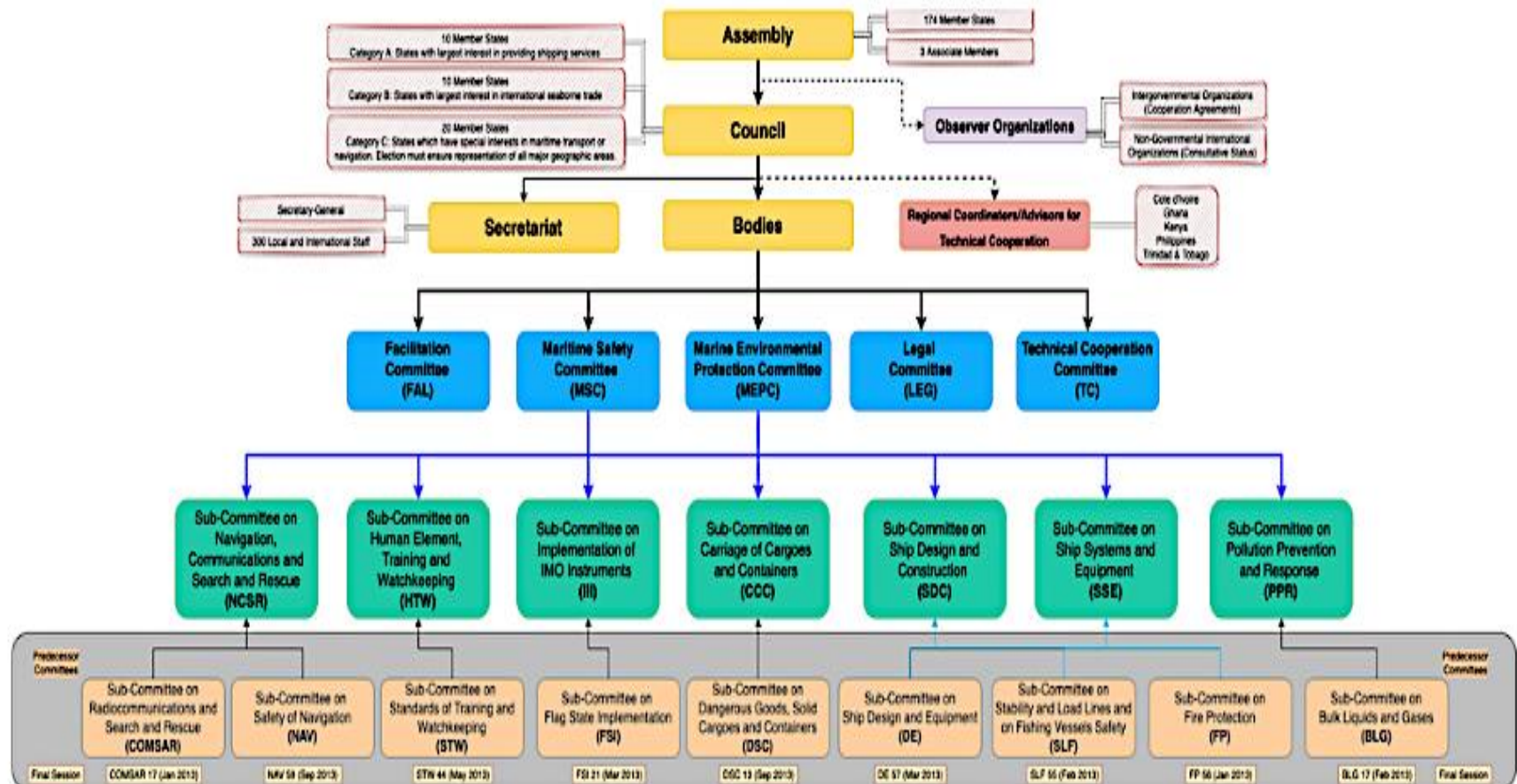
## MAJOR IMO CONVENTIONS

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

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



### 3. REGULATORY DEVELOPMENTS AT IMO

2017

- MSC agreed to include MASS on its Agenda
- MSC, Legal Committee & Facilitation Committee agreed to commence a regulatory scoping exercise
- MEPC has yet to consider the impact of MASS on IMO Conventions under its purview

2019

- MSC adopted [Interim Guidelines for MASS Trials](#)
- “At least the same degree of safety, security, and protection of the environment as provided by the relevant instruments”
- Scope of application of mandatory instruments should be determined by flag State, taking into account several factors

2021

- IMO completed regulatory scoping exercise on MASS to assess how MASS could be regulated

### 3. REGULATORY DEVELOPMENTS AT IMO

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.	<ul style="list-style-type: none"> <li>New terms and definitions</li> <li>New requirements for automated processes and decision support system</li> </ul>
Degree Two	II, III	<p>Since remotely controlled operations have not been a part of this instrument, <i>developing a new instrument</i> would be the most appropriate way to address the requirements for remote control centres.</p> <p>In addition, necessity for new requirements and frequencies could be addressed by developing new instrument as well.</p>	<ul style="list-style-type: none"> <li>New terms and definitions</li> <li>Requirements for remote control stations' technical issues</li> <li>Functional and maintenance requirements</li> </ul>
Degree Three	III	<p>Since remotely controlled operations have not been a part of this instrument, <i>developing a new instrument</i> would be the most appropriate way to address the requirements for remote control centres.</p> <p>In addition, necessity for new requirements and frequencies could be addressed by developing a new instrument as well.</p>	<ul style="list-style-type: none"> <li>New terms and definitions</li> <li>Requirements for remote control stations' technical issues</li> <li>Functional and maintenance requirements</li> <li>Radio watch requirements and radio personnel</li> <li>Distress, safety and urgency calls and related requirements</li> </ul>
Degree Four	III	Since fully autonomous ships with most probably having main control centre ashore have not been foreseen in this instrument, <i>developing new instrument</i> would be the most appropriate way to	<ul style="list-style-type: none"> <li>New terms and definitions</li> <li>Requirements for main control stations' technical issues</li> <li>Functional and maintenance requirements</li> <li>Radio watch requirements and radio personnel</li> </ul>

I:/Circ/MS/1/MS/1-Circ.1638.docx

### 3. REGULATORY DEVELOPMENTS AT IMO

2021

- **MSC** commenced work on the development of a goal-based instrument regulating the operation of MASS
  - The best way to address MASS in the IMO regulatory framework
  - The ultimate goal would be the preparation of a mandatory instrument to address MASS operations

2022

- **Road map for developing a goal-based Code**
  - A non-mandatory Code is to be adopted in 2024 while a mandatory MASS Code is to be developed in 2025, for entry into force on 1 January 2028
- **Establishment of a MASS Correspondence Group**
  - To develop a non-mandatory MASS code for cargo ships with a view to considering application to passenger ships
- **Establishment of a Joint MSC/LEG/FAL Working Group**

### 3. REGULATORY DEVELOPMENTS AT IMO

- 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?

- 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?

- 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

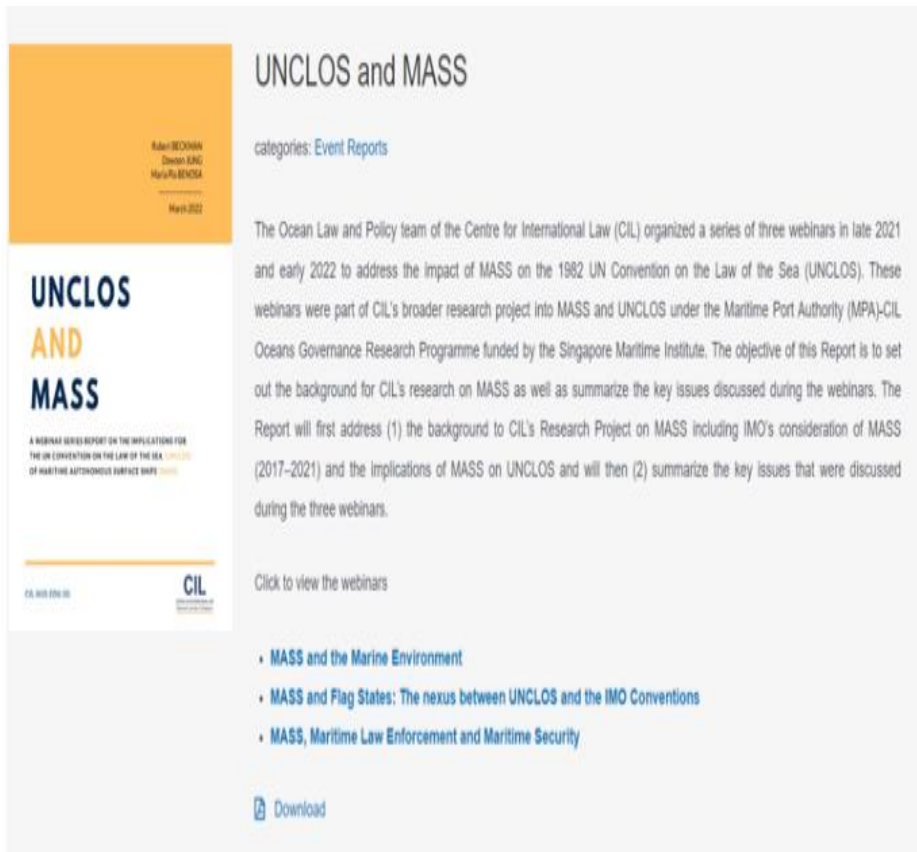


## 4. IMPLICATIONS FOR UNCLOS?

- 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

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



The screenshot shows the cover and content page of a report titled "UNCLOS and MASS". The cover features an orange header with the title "UNCLOS AND MASS" in large, bold, black letters. Below the title, it says "A WEBINAR SERIES REPORT ON THE IMPLICATIONS FOR THE UN CONVENTION ON THE LAW OF THE SEA (UNCLOS) OF MARITIME AUTONOMOUS SURFACE SHIPS (MASS)". The content page has a white background with the title "UNCLOS and MASS" in a large, black, sans-serif font. Below the title, it says "categories: Event Reports". The main text describes the report's purpose: "The Ocean Law and Policy team of the Centre for International Law (CIL) organized a series of three webinars in late 2021 and early 2022 to address the impact of MASS on the 1982 UN Convention on the Law of the Sea (UNCLOS). These webinars were part of CIL's broader research project into MASS and UNCLOS under the Maritime Port Authority (MPA)-CIL Oceans Governance Research Programme funded by the Singapore Maritime Institute. The objective of this Report is to set out the background for CIL's research on MASS as well as summarize the key issues discussed during the webinars. The Report will first address (1) the background to CIL's Research Project on MASS including IMO's consideration of MASS (2017-2021) and the implications of MASS on UNCLOS and will then (2) summarize the key issues that were discussed during the three webinars." Below the text, there is a link "Click to view the webinars" and a list of topics: "• MASS and the Marine Environment", "• MASS and Flag States: The nexus between UNCLOS and the IMO Conventions", and "• MASS, Maritime Law Enforcement and Maritime Security". At the bottom, there is a "Download" button.

UNCLOS and MASS

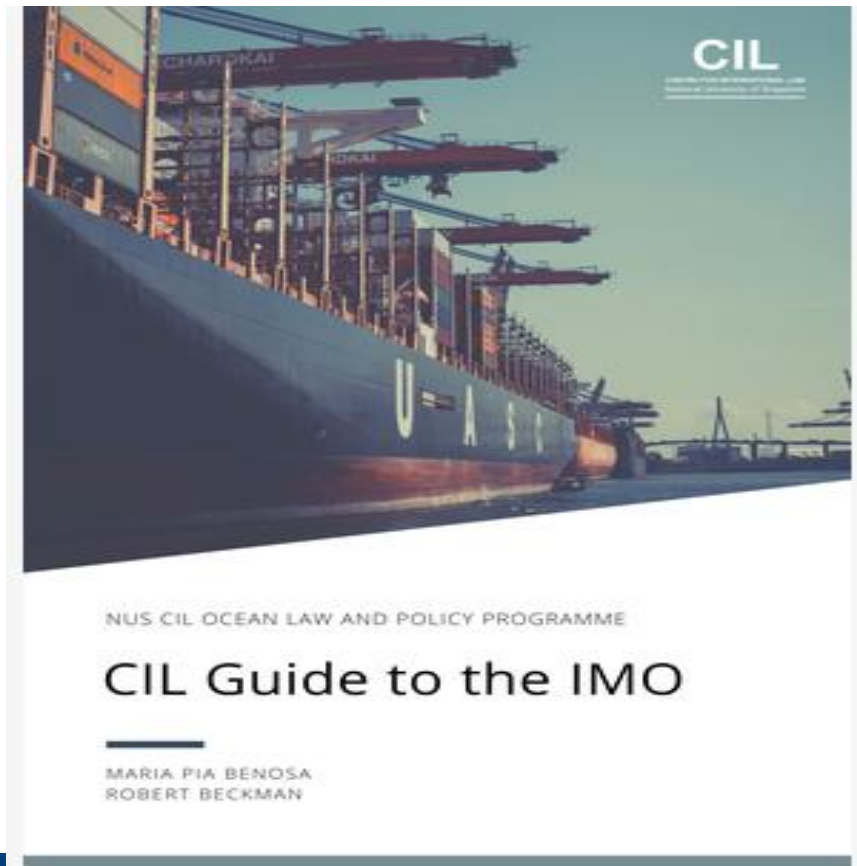
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Click to view the webinars

- MASS and the Marine Environment
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The screenshot shows the cover of a report titled "CIL Guide to the IMO". The cover features a large, stylized image of a container ship at a port. The title "CIL Guide to the IMO" is prominently displayed in a large, black, sans-serif font. Above the title, it says "NUS CIL OCEAN LAW AND POLICY PROGRAMME". Below the title, the authors' names "MARIA PIA BENOSA" and "ROBERT BECKMAN" are listed. The CIL logo is in the top right corner.

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NUS CIL OCEAN LAW AND POLICY PROGRAMME

CIL Guide to the IMO

MARIA PIA BENOSA  
ROBERT BECKMAN

**Thanks for your attention!**

**Dr. Tara Davenport**

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