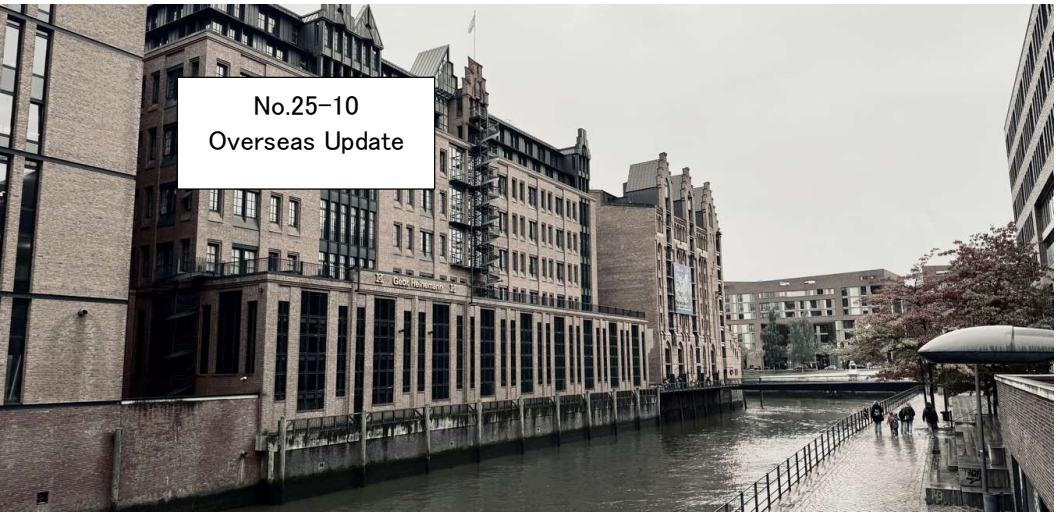

European Maritime Safety and Security Report

The Japan Association of Marine Safety London Research Office

No.25-10 MASS North Sea MoU Symposium Report Latest Developments in Autonomous Vessel Policy among North Sea Coastal Nations

Introduction

On October 14, 2025, I attended MASS North Sea MoU Symposium held at the National Oceanography Centre in Southampton, United Kingdom.

As reported in previous reports, Maritime Autonomous Surface Ships (MASS) technology has been steadily advancing toward practical implementation, driven by developments in AI and sensing technologies, enhancements in communication infrastructure, and regulatory reviews in various countries. However, challenges that require consideration on both the technical and regulatory fronts, such as cybersecurity, human factors, and liability frameworks, remain, and international discussions are ongoing. [1]

Venue: National Oceanography Centre (NOC)

Against this backdrop, the North Sea MASS MoU (Memorandum of Understanding) [2], the subject of this report, began with its signing by four countries, the United Kingdom, Belgium, Denmark, and the Netherlands, in November 2023. Norway subsequently joined in May 2024 [3],expanding the cooperative framework. France

and Germany have also since joined, bringing the framework to seven countries as of the time of this symposium.

This Memorandum of Understanding (MoU) aims to facilitate knowledge and information sharing among participating countries to enable the safe operation of Maritime Autonomous Surface Ships (MASS),including remotely controlled, autonomously navigating, and unmanned vessels—in the North Sea, and to support international operations despite differences in national regulations and requirements. Specifically, it seeks to develop, where possible, common understandings and coherent policies on key issues such as remote operation centres, jurisdiction, and liability, and to address these issues jointly. As this is a Memorandum of Understanding, it does not create any legal rights or obligations and is not legally binding.

Hosted by the UK Maritime and Coastguard Agency (MCA), the symposium brought together maritime authorities, industry stakeholders, and academic institutions from the member countries. The programme was structured as follows:

(1) Reports from MoU Partners

Mr Sifis Papageorgiou (Norwegian Maritime Authority) presented the history and work of the MASS North Sea Memorandum of Understanding and the group's future ambitions.

France (Ms Marie Bathilde, Ministry of Ecological Transition, Biodiversity, Forestry, Sea and Fisheries) and Germany (Ms Christiane Stumpp, Federal Ministry of Transport / Ms Corinna Schug, Federal Maritime and Hydrographic Agency) shared their experiences of joining the MoU.

(2) IMO MASS Code and Legal Framework

Dr Katrina Kemp (MCA) reported on the progress of the non-mandatory IMO MASS Code and its development status, including the next steps for the Experience Building Phase, as well as the roadmap from adoption in 2026 to the entry into force of the mandatory code in 2032. Dr Frank Stevens (Erasmus School of Law) discussed legal aspects of MASS, while Dr Iva Parlov (BI Norwegian Business School) addressed MASS and the Law of the Sea (UNCLOS). Nick Fleming (BSI Standards) presented on standards, regulations and MASS definitions.

(3) Industry Showcase

Four companies, Uncrewed Survey Solutions, XOcean, Oshen, and Exail, presented their technologies and results from demonstration projects.

(4) Academic and Industry Presentations

In addition to the National Oceanography Centre and MAHI (Pieter-Jan Note), Dr Erik Røsæg (University of Oslo) reported on COLREG compliance and MASS.

(5) Breakout Sessions

Breakout sessions were held under four themes: IMO definitions, terms and their practical application; security and cybersecurity (led by the UK Department for Transport); the human

element and training (Lloyds Register and the Danish Maritime Authority); and assuring autonomy, testing, and testbeds (the National Physical Laboratory and the University of York).

This report is based on the above program and summarizes, from my perspective, themes that I considered particularly noteworthy from the day's discussions. While not a comprehensive record, I hope it will serve as a reference for future discussions.

Historical Background of the North Sea MASS MoU

International discussions on autonomous vessels began at IMO in 2017, and the Regulatory Scoping Exercise (RSE) examining the applicability of existing conventions was completed in 2021[4]. North Sea coastal nations advanced regional cooperation in parallel, contributing to the accumulation of knowledge for international standardization.

Latest Developments in the IMO MASS Code

At the symposium, Dr Katrina Kemp of the UK MCA reported on the progress of MASS Code development at IMO.

IMO established the MASS agenda at the 98th Maritime Safety Committee (MSC 98) in 2017 and initiated the Regulatory Scoping Exercise (RSE) to examine operational methods for MASS regarding safety, security, and environmental aspects. The RSE was completed in May 2021, and agreement was reached on developing a code to address MASS. Note that the RSEs by the Legal Committee (LEG) and Facilitation Committee (FAL) were completed in 2022.

The MASS Code currently under development is goal-based and targets cargo ships over 500 gross tonnage (GT). At MSC 110, 22 chapters were finalized, including certificates and surveys, approval processes, software principles, communications, radiocommunications, special measures for enhanced maritime security, and search and rescue. Additionally, at MSC-MASS ISWG4, discussions were held on Chapter 15 (manning, training, and watchkeeping) and coordination with STCW.

As for the future roadmap, completion of the non-mandatory code is scheduled for MSC 111 in May 2026, after which national authorities may apply it at their discretion. The Experience Building Phase (EBP) will also be discussed at that session. Subsequently, development of the mandatory code will begin in 2028, with entry into force expected in 2032.

National Regulatory Approaches

・France: Risk-Based Dual System

France has adopted an innovative, risk-based dual system that categorizes autonomous vessels according to vessel size and risk level. Small, low-risk vessels can operate as "Maritime Drones" under a registration-only system, while larger vessels are classified as "MASS" and subject to the same authorization regime as conventional vessels.

This dual system achieves a balance between promoting innovation and ensuring safety by creating an environment where startups and research institutions can rapidly test prototypes while maintaining safety standards for large vessels.

・Germany: Three-Tier Structure System

Germany clearly classifies MASS-related regulations into three tiers: Certification, Operation Permits, and Equipment Approval. The maritime safety division handles certification, the Federal Waterways and Shipping Administration handles operation permits, and the Federal Maritime and Hydrographic Agency (BSH) handles equipment approval.

While developing a comprehensive national legal framework, Germany has adopted a "facilitative and innovation-focused" approval process until a complete framework is established. A notable feature is its stance of actively reflecting industry needs while not preempting international regulatory processes.

・United Kingdom: Innovation Hub-Led Approach

The UK has adopted a strategy of promoting industry-academia-government collaboration through the establishment of the UK Maritime Innovation Hub and positioning Plymouth as the National Maritime Autonomy Hub. MCA's Gwilym Stone emphasized in his closing address the policy of comprehensively advancing the safety and regulatory aspects of autonomous vessel technology through integration of industry, academia, and government.

The UK plays a leading role in IMO MASS Code development and emphasizes ensuring consistency between domestic systems and international standards. Through the development of test waters, establishment of standardization and certification systems, and provision of industry-academia-government collaboration platforms, the UK contributes to advancing MASS implementation across the North Sea region of Europe.

International Legal Issues and Academic Discussion

At this symposium, legal scholars including Dr Frank Stevens of Erasmus School of Law and Dr Iva Parlov of BI Norwegian Business School raised important points regarding the relationship between MASS and international law.

・Legal Status of the Master

UNCLOS Article 94 requires flag states to ensure that vessels are under the command of a master and officers. Questions were raised about the legal appropriateness of calling supervisors at Remote Operation Centers (ROCs) Masters. Concerns were expressed about the risk of inappropriate legal implications for individuals with roles and responsibilities different from the traditional concept of a ship's master.

・Flag State Jurisdiction and "Genuine Link"

The 1982 United Nations Convention on the Law of the Sea (UNCLOS) requires a "genuine link" between the flag state and the vessel. Discussions addressed jurisdictional issues when ROCs are located in third countries other than the flag state, allocation of responsibility in case of accidents, and the need to develop frameworks for bilateral agreements and diplomatic protection.

・Data Logging and Accident Investigation

Draft Chapter 9.8bis of the IMO MASS Code establishes requirements for appropriate record-keeping for accident investigation. Requirements include application of Voyage Data Recorder (VDR) requirements to MASS, ensuring electronic storage and readability of data, and establishing means for data protection and recovery after accidents.

Industry Showcase & Networking

The symposium featured reports from several companies regarding their milestones toward the commercialization of autonomous navigation technology.

Company	Key Highlights / Features
Uncrewed Survey Solutions (USS)	Capable of 24-hour remote operations. Diesel-electric design reduces CO_2 emissions by 97%.

Company	Key Highlights / Features
X Ocean	Achieved a cumulative navigation distance of approximately 1.85 million km via USVs. Active in surveys for offshore wind and subsea cable maintenance.
Oshen	Its small observation platform C-STAR has achieved more than 50 days of continuous operation, including missions penetrating the eyewall of a Category 5 hurricane.
Exail	The DriX O-16 completed an autonomous voyage from France to Portugal. It crossed the Strait of Gibraltar, highlighting regulatory challenges such as STCW compliance.
MAHI	Achieved the world's first Atlantic crossing by a solar-powered USV.

Industry reports underscored that while technical feasibility has been largely demonstrated, the primary challenges remain institutional. These include the complexity of certification and permitting for cross-border operations, discrepancies in national regulatory regimes, and the lack of established insurance frameworks. These issues are precisely what the North Sea MASS MoU seeks to address through knowledge sharing and the development of common policies. Consequently, industry feedback reinforced the strategic importance of the MoU's initiatives.

Cybersecurity Challenges

In a workshop led by Matthew Parker and Tolly Robinson at the UK Department for Transport, participants discussed the importance of cybersecurity for MASS.

Vulnerabilities specific to remotely operated vessels were identified, including cyberattacks and physical intrusion risks to Remote Operation Centers (ROCs), misuse of access privileges by former employees, and cascading failures through connected devices. In light of developments in IMO MASS Code Chapter 22 (the chapter on security), the urgent need to establish global minimum standards including ports and digital infrastructure was emphasized.

Conclusion

Participation in this symposium provided an overview of the current landscape of autonomous vessel policies among the North Sea coastal nations. First, the expansion of regional cooperation was notable. The growth from a four-country framework in 2023 to a seven-country framework in just two years demonstrates that the need to harmonize regulations to enable cross-border MASS operations is widely recognized. The MoU serves as a mechanism for bridging regulatory differences and developing common approaches. Furthermore, presentations from France and Germany demonstrated a commitment to adapting their national systems flexibly, drawing upon the experiences and precedents set by existing member states.

The industry showcase reported commercial-level operational track records, primarily in surveying and marine observation, confirming that technical feasibility has largely been demonstrated. By contrast, discussions on cybersecurity and human factors in the breakout sessions made clear that challenges remain on the regulatory and operational fronts.

In the legal sessions, active discussions addressed alignment with UNCLOS and COLREG, underscoring that how to position MASS within the framework of international law remains an important issue.

This symposium offered a valuable opportunity to examine frameworks for problem-solving and societal implementation through cross-border tripartite cooperation among industry, academia, and government.

As preparations intensify for the Experience Building Phase (EBP) of the IMO MASS Code, it is evident that regional initiatives like the North Sea MASS MoU play a pivotal role. By accumulating practical experience ahead of global standardization, these regional frameworks serve as essential conduits, informing and shaping the development of international regulatory standards with real-world insights.

View of the waterfront from the venue

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