BEYOND LIABILITY: THE CASE FOR DIGITAL PERSONHOOD OF AI VESSELS IN MARITIME LAW AND SUSTAINABILITY GOVERNANCE

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ABSTRACT

The emergence of Maritime Autonomous Surface Ships (MASS) poses challenges to the cornerstones of international maritime law, especially in apportioning liability and guaranteeing compliance with sustainability requirements. Current regimes under UNCLOS, SOLAS, COLREGS, and MARPOL assume human agents like owners, operators, or master leaving accountability gaps when decision-making devolves into autonomous artificial intelligence (AI). This investigation explores whether vessels operating through AI ought to be endowed with a semblance of digital personhood, a legal entity that grants limited rights and obligations as an innovative solution to fill such gaps.

The article uses doctrinal and comparative legal analysis, invoking admiralty law's acknowledgment of ships as quasi-persons in in rem actions, corporate personhood regimes, and EU discourses of electronic legal persons. It addresses four core questions: whether the ship-as-person model applies to MASS; whether digital personhood can advance enforcement of IMO's 2023 GHG Strategy, MARPOL Annex VI, and regional carbon markets; whether for charterparties, marine policy, arbitration, and port state control the changes are significant; and whether risks of not awarding AI ships any personality except as mere owner utilities are incurred.

Focusing on international, European, and selected Indian regimes, and limiting its purview to legal analysis bereft of empirical modeling, the value addition of the research is to conceptualize digital personhood as the tool for integrating sustainability governance into admiralty law. The paper concludes by proposing step-wise reforms, including recognizing AI subjects in the context of admiralty arrest, adapting port state control inspections for algorithmic accountability, and integrating AI compliance obligations into International Maritime Organization documents.

Keywords: Maritime Autonomous Surface Ships (MASS); Digital Personhood; Admiralty Law; Sustainability Governance; International

Maritime Law; Port State Control; International Maritime Organization (IMO).

INTRODUCTION

The rapid emergence of Maritime Autonomous Surface Ships (MASS) is transforming the commercial shipping which prompts the need for addressing the unique challenges in the AI - driven vessels[1].Commercial shipping is rooted in conventions which were designed for ships operated by humans like-UNCLOS, SOLAS, COLREGS, and MARPOL[2].These conventions aren't not enough to address the challenges posed by the AI driven vessels. The development of AI-based operations also brings with it an immediate set of questions about liability, responsibility, and policing when decision-making is placed in software algorithms but not human persons.

Existing global trends most particularly the IMO 2023 Greenhouse Gas (GHG) Strategy and implementation of the European Union's Emissions Trading System (EU ETS) in shipping—shows the need to implement proper mechanisms to ensure all ships, including Maritime Autonomous Surface Ships (MASS), comply with international sustainability standards. As it is, there are no stipulations found in existing legislation to accommodate MASS, which creates gaps subject to compromising climate management and operation safety. Modern maritime law treats ships as "quasi-persons" for certain purposes of law, like admiralty arrest, but it is unclear whether such a classification might or should extend to ships running with artificial intelligence.

The lack of digital personhood of AI-run ships raises questions about the efficacy of international obligations of sustainability, the character of contractual relationships, including charterparties, insurance, and port state control, and the possible perils of treating AI ships as merely tools of their owners[3].

[1]IMO, 'Autonomous Shipping' (International Maritime Organization, updated 2024) https://www.imo.org/en/MediaCentre/HotTopics/Pages/Autonomous-shipping.aspx

[2] United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 3 (UNCLOS); International Convention for the Safety of Life at Sea (SOLAS) (adopted 1 November 1974, entered into force 25 May 1980); International Regulations for Preventing Collisions at Sea (COLREGs) (adopted 20 October 1972, entered into force 15 July 1977); International Convention for the Prevention of Pollution from Ships (MARPOL) (adopted 17 February 1973, entered into force 2 October 1983)

[3] IMO, 'Symposium on Maritime Autonomous Surface Ships 2025' (International Maritime Organization, 2025) https://www.imo.org/en/About/Events/Pages/MASS-Symposium-2025.aspx

LEGAL PERSONHOOD AND VESSELS: A CONCEPTUAL FRAMEWORK OF MARITIME LAW

Under comparative legal traditions, non-human entities, such as corporations, are classified as "legal persons," and consequently, are afforded rights and liabilities of a distinct nature from their human members. This legal fiction enables the ability of corporations to own property, form contractual relationships, and be liable, and consequently promote commercial certainty and efficient risk allocation. An analogy to ships, although not a complete legal person, was also thought historically to be a juridical entity or "semi-person" under Admiralty law. This status is best exemplified under in rem proceedings whereby the vessel becomes the defendant and may be arrested to enforce maritime claims, a principle maintained in classic English cases of The Bold Buccleugh[4].

Juristic Status of Ships: The Indian Perspective

The Indian admiralty jurisprudence also conforms to this comparative template in treating ships as "semi-persons" for the purposes of enforcement. In the case of M.V. Elisabeth v. Harwan Investment [5], the Supreme Court reinforced that ships should be amenable to jurisdiction and liability so that there are effective remedies available under international shipping law. This approach sees to the pragmatic efficiency of making vessels responsible, irrespective of the physical location of the owner, so that remedies are afforded to claimants .

The Admiralty (Jurisdiction and Settlement of Maritime Claims) Act, 2017

India also modernized its admiralty law through the Admiralty Act, 2017, by replacing earlier colonial laws and in accordance with international conventions. Section 5[6] empowers designated High Courts to seize ships within Indian waters for the purpose of enforcing maritime claims, subject to statutory safeguards including the "reason to believe" test.

In Rem Proceedings and Liability

The Indian admiralty law still utilized in rem actions, where the vessel becomes the defendant. Such actions allow for the arrest and eventual sale of ships to give security for the claim,

[4] 7 Moo PC 267, 13 ER 884 (PC)
[5] AIR 1993 SC 1014
[6] The Admiralty (Jurisdiction and Settlement of Maritime Claims) Act, 2017

including for situations of dubious or foreign ownership. Proceeds from sale are divvied up along lines of predeterminant prioritization, with primacy to maritime liens and statutory claims over and above the usual creditors.

Vessels and Corporations in Indian Jurisprudence

Unlike corporations, who enjoy full legal personhood (by virtue of contractual capacity and right to sue), ships are not given any more than a restricted juridical status. Their legal personhood is thus limited to liability and enforcement and not to rights or agency. However, vessel registration, nationality, and mortgage forms ratify an independent legal identity of vessels within maritime commerce .

Expansion to AI-Driven Vessels.

Legal status of ships as semi-persons provides a conceptual grounding for the debate about Maritime Autonomous Surface Ships (MASS). Even though the Admiralty Act of 2017 does not refer to AI-automated ships, its functional framework of liability allows for its accommodation. Just as ships can be arrested irrespective of the participation of owners, the same autonomous ships can be made liable for torts, contractual breaches, and liens. Even so, apportionment of responsibility between owners, operators, software creators, and systems providers is still a contentious matter requiring legislative definition.

Indian courts, following the pragmatic approach of M.V. Elisabeth, would be able to interpret "vessel" to encompass ships being run by AI under existing legal fictions, but statutory reform and international harmonization (with IMO instruments like SOLAS and the Arrest Convention) will ultimately be essential.

Multilateral Behavior of India and Present Problems

The Admiralty Act 2017 was modelled on the Brussels and Geneva shipping arrest conventions, with wide international compatibility despite India's non-signature. This compatibility reinforces India's position in world shipping whilst safeguarding both creditors and shipowners through procedures of protection (e.g., release on alternate security, wrongful arrest prevention). In the future, India’s admiralty law will confront new challenges introduced by autonomous navigation technologies, environmental protection imperatives, and transnational disputes. The flexibility of the statutory framework, combined with the judiciary’s openness to

evolving interpretations, indicates that the legal system is ready to gradually extend the idea of legal personhood to AI-operated vessels.

THE ACCOUNTABILITY VOID IN MARINE ACTIVITIES: THE PERILS OF REFUSING LEGAL STATUS TO AI SHIPS

The introduction of Maritime Autonomous Surface Ships (MASS) presents a serious challenge to international shipping law. Substituting for human participation in navigation, command, and compliance, ships commanded by computerized artificial intelligence sail the seas with or without human supervision. This incongruity gives rise to an accountability gap, where no specific person or entity is held responsible for such scenarios as collisions, releases of pollution, or international commitment breaches

Collision and Navigation: Requirements Under COL

These International Regulations for Preventing Collisions of Vessels at Sea (COLREGS), established under the aegis of the International Maritime Organization (IMO), lay down extensive rules for navigation designed especially for human seafarers[7].

Human-Centric Assumptions, COLREGS requires ships to keep a vigilant lookout (Rule 5), to travel at a reasonable speed (Rule 6), and to assess the danger of collision (Rules 7–8)[8]. Each of these responsibilities rests ultimately on human seamanship, perception, and judgment. Autonomous ships, however, rely on sensors, machine-learning applications, and algorithms to perform these functions. To what extent autonomous reactions adequately fulfill the responsibilities of COLREGS is legally not resolved .

Rule 2 (Responsibility) also presents a significant difficulty, since it dictates the rule of "nothing in these Rules shall exonerate any vessel, or the owner, master, or crew thereof, from the consequences[9]" of not using appropriate precautions in accordance with the "ordinary practice of seamen." Translating this standard of human subjectivity to machine language is inherently challenging, and courts would find it difficult to judge whether an AI's action

[7] International Maritime Organization (IMO), *Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGS*
[8] COLREGS, Rules 5–8
[9] COLREGS, Rule 2

constitutes an "ordinary seafaring judgment."

Contamination and Environmental Obligations: MARPOL and UNCLOS

The International Convention for the Prevention of Pollution from Ships (MARPOL) and the United Nations Convention on the Law of the Sea (UNCLOS) lay down vessel obligations for the prevention of marine pollution and the protection of the marine environment.

Both treaties define "ship" broadly enough to include "autonomous ships" perhaps, but not explicitly to include AI vessels. Thus, both do not foresee the introduction of AI ships and therefore create areas of interpretation.

Artificially intelligent autonomous ships autonomously make choices about fuel use, ballast water treatment, and waste disposal over-the-side. In cases when such choices are at odds with MARPOL mandates, the absence of a human operator frustrates enforcement actions.

In UNCLOS, flag States have an obligation to ensure ships under its flag comply with international standards (Articles 91–94). [10]But the measures of enforcement are human-centric. It becomes a difficult question of how a flag State would be able to "monitor" an automated machine's thought process in real time. It provides weak liability and weakens environmental protection.

Why Current Models of Liability Fail Shipowner-Based Liability

Classical shipping liability maintains that the shipowner bears final responsibility for the conduct of the master and crew. Shipowners are vicariously liable for workers' negligence on the basis that they are in control of the vessel's actions.

This argument is vitiated in the case of MASS. The owner may not be in control of choices taken by artificial intelligence, particularly in a scenario of software providers' or operators' control of navigation. Strict liability upon the owner in such scenarios may be held unfair and commercially unreasonable.

Courts will be slow to impose liability on owners if they did not cause and also were unable to

[10] United Nations, *United Nations Convention on the Law of the Sea* (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397, arts 91–94

prevent the AI's independent actions.

Product Liability

Shipboard Artificial Intelligence systems are not inert commodities, but rather dynamic systems in continuous evolution that tend to become "black boxes."

- Defect Identification: Classical product liability looks to a defect in design, manufacturing, or warnings. But for AI systems, unwary behavior can arise from the learning process of the system instead of an identifiable defect.

- Causation: It's not easy to show a causal link between a defined software error and the accident, and with so many parties concerned, of developers, hardware suppliers, integrators, and shipowners .

- Legal Certainty: Victims may encounter challenges in obtaining compensation, as both shipowner liability and product liability do not provide a definitive course of action. This diminishes trust in the capacity of maritime law to dispense justice.

Risks of Denying Legal Recognition to AI Ships

If AI-ships are not afforded any kind of legal status, the results are imminent:

1. Lack of Accountability for Navigation and Safety

   Collisions, groundings, or navigational errors can create an uncertain responsible party.Admiralty courts traditionally rely on in rem actions (proceedings against the vessel). If an AI vessel lacks juridical recognition, arrest and sale remedies cannot be applied, undermining creditor and victim protection[11].

2. Weak Environmental Enforcement

   MARPOL or UNCLOS violations may well go unpunished if liability can be imputed to no internationally recognised entity[12].This jeopardizes protection of the marine

[11] *The Bold Buccleugh* (1851) 13 ER 884
[12] UNCLOS, arts 192–194

environment, an area of increasing international focus.

3. Victim Compensation Shortfalls

   Injured parties, whether other shipowners, seafarers, or coastal nations, can be left uncompensated, defeating maritime fairness and justice.

Regulatory arbitrage

They can take advantage of loopholes within national and international law, flagging AI ships under "flags of convenience" to avoid liability or regulation. This resembles past shipping regulation difficulties but with greater consequences owing to the newness of AI. On the other hand, uncertainty over the law might deter prudent investment in autonomous shipping technology, hindering innovation for fear of runaway liability exposure.

DIGITAL PERSONHOOD OF AI VESSELS IN MARITIME LAW

The arrival of Maritime Autonomous Surface Ships (MASS) has precipitated debate on whether MASS should be granted legal personhood as of right. Ancient shipping law already treats ships as being of a kind of "semi-personhood" through the legal fiction of in rem liability, where the vessel may be arrested and brought to court without its owner[13].Arguing on this basis, scholars have proposed granting a kind of digital personhood to ships so crewed and operated by AI—not to grant them full "electronic personhood" as sometimes mooted in broader AI law, but a different juridical status of a lesser kind to meet shipping needs.

The Implications of Personhood

The conferral of legal personhood on artificial intelligence vessels would be to refer to them not simply as mere lifeless objects of property, but as legal subjects of shipping deals and disputes. It would not be to refer to AI vessels as equal to humans and businesses, but it would establish a different type of legal entities for the purposes of:

Liability apportionment means that loss damages from collisions, oil leakage, or any other kind of shipping accident can be directly imputed on the vessel[14].They include the perpetuation of

[13] *The Bold Buccleugh* (1851) 7 Moo PC 267
[14] Baris Soyer and Andrew Tettenborn (eds), *Maritime Autonomous Surface Ships: Law and Liability* (Informa Law 2022)

the ancient admiralty custom of arresting ships directly without reference to ownership status at the moment of arrest. Effectively, digital personhood would be an operational legal tool providing a means of not jeopardizing accountability or compensation arrangements with a move to ships in full autonomy.

Comparative Insights.

Around the world, legal systems are grappling with the question of granting independent legal status to artificial intelligence systems. In the European Union, the European Parliament debate on robotics and AI law looked at the possibility of creating "electronic persons" to fill liability gaps generated by AI systems' autonomy. The emphasis was not on granting rights, but on ensuring responsibility—a model also from maritime law. Scholars, such as Andrea Bertolini, argue legal personhood could be a liability shielding device, similar to corporate personhood separating shareholders from corporate liability.

Maritime-Specific Implications

Digital personhood encompasses numerous ramifications for maritime practice:
-Shutting the Accountability Hole – With fewer and fewer humans to supervise, it becomes harder to hold crew, masters, or owners directly responsible for errors in autonomous decision-making[15]. Absent personhood, a collision caused by the boat's AI may land in a legal gray area.
-Strengthening In Rem Jurisdiction – Codification of law would give an assurance to courts anywhere in the world to still possess in rem jurisdiction, and to arrest and judicially sell MASS just like regular ships. This eliminates the challenges of enforcing when ownership structures are unclear or foreign.

-Enabling Insurance and Liability Regimes – In providing a specified juridical personality to AI ships, insurers are able to develop customised policies treating the ship in its own right as the insured risk-bearer, therefore providing certainty for compensation claim.

-Enhancing Regulation Compliance – Statutory recognition would necessitate AI vessels to operate within the confines of UNCLOS, SOLAS, MARPOL, and COLREGS.This may involve integrating compliance procedures in their software, so that ships with self-navigating

[15] IMO, 'Regulatory Scoping Exercise for the Use of Maritime Autonomous Surface Ships (MASS)' (2021)

capabilities keep a record of navigational data for purposes of transparency and subsequent-incident investigation.

By establishing a distinct boundary between digital personhood, liability-focused, and extended rights-based electronic personhood, shipping law can encourage innovation but also provide protection to the violated parties simultaneously.

Challenges

Notwithstanding its advantages, the concept of digital personhood for artificial intelligence vessels presents several legal and policy challenges. The determination of the threshold of autonomy that justifies personhood remains unresolved.This raises the question of whether digital personhood should apply only to fully autonomous ships or also to semi-autonomous vessels that are controlled remotely. Since maritime law is inherently international, it is essential that flag states and global conventions work in harmony to avoid conflicting rules. A further concern is that granting personhood might unintentionally shield shipowners or operators from liability, which could weaken accountability.Consequently, although this notion presents a promising approach to addressing the accountability gap, it necessitates meticulous calibration to reconcile innovation with justice.

SUSTAINABILITY GOVERNANCE & DIGITAL PERSONHOOD

UNCLOS

The regulatory architecture for maritime sustainability begins with UNCLOS's broad environmental obligations. States are obliged under Article 192 to "protect and preserve the marine environment," and under Article 194(2) to ensure that "the measures taken … shall include those necessary to prevent, reduce and control pollution of the marine environment from any source."[16]The International Tribunal for the Law of the Sea has reinforced these obligations through advisory opinions emphasizing states' due diligence responsibilities in preventing marine environmental harm.[17] UNCLOS, however, does not directly regulate

[16]United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397 (UNCLOS) arts 192, 194(2).
Full text of UNCLOS including Articles 192 and 194 (PDF):
https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdfun

[17] Responsibilities and Obligations of States with Respect to Activities in the Area (Advisory Opinion) ITLOS Case No 17 (1 February 2011).

greenhouse gas (GHG) emissions from ships; rather, that role is delegated to the IMO and its instruments.[18]

IMO GHG 2023 Strategy, MARPOL Annex VI, and EU ETS

The IMO's 2023 GHG Strategy, adopted via MEPC.377(80) expands the ambition of prior strategies by promoting "stronger measures," signalling that the IMO expects member States to prepare for trading or levy mechanisms.[19] The Strategy establishes enhanced ambition levels for 2030 and 2050, moving beyond the previous strategy's carbon intensity reduction targets to include absolute emission reduction goals. Yet scholars criticize the Strategy's lack of binding obligations which include observations like that "the 2023 GHG Strategy … offers few specifics from a legal point of view," noting the continued reliance on voluntary measures and the absence of mandatory enforcement mechanisms.[20] Strategy for reliance on equity principles without clear enforcement pathways, arguing that the differentiated treatment of developing states creates implementation uncertainties.[21]

MARPOL Annex VI[22] remains the primary binding instrument, setting EEDI (Energy Efficiency Design Index), SEEMP (Ship Energy Efficiency Management Plan), and emissions standards for NOx, SOx, and particulate matter.[23] The Annex establishes technical and operational measures including the Carbon Intensity Indicator (CII) and Enhanced Ship Energy Efficiency Management Plan (SEEMP Part III). Compliance is enforced via flag states and port state control, though Annex VI lacks a carbon credit scheme or robust punitive enforcement mechanisms beyond detention and certification withdrawal. Regionally, the EU's inclusion of shipping in the Emissions Trading System (ETS) from 2024 represents harder enforcement,

Official advisory opinion by the International Tribunal for the Law of the Sea (ITLOS): https://www.itlos.org/fileadmin/itlos/documents/cases/case_no_17/17_adv_op_010211_en.pdfitlos

[18] Ibid.

[19] International Maritime Organization, 'Resolution MEPC.377(80): 2023 IMO Strategy on Reduction of GHG Emissions from Ships' (adopted 7 July 2023). https://www.imo.org

[20] Bilgili et al., Journal for the Study of Law, Politics and Society (2023).

[21] Dominioni, Goran, Dirk Heine, and Beatriz Martinez Romera. 'Regional Carbon Pricing for International Maritime Transport: Challenges and Opportunities for Global Geographical Coverage.' Carbon & Climate Law Review, 12.2 (2018): 140-158.

[22] https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx

[23] MARPOL Annex VI, Protocol of 1997 to Amend the International Convention for the Prevention of Pollution from Ships (adopted 26 September 1997, entered into force 19 May 2005). https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx

applying to vessels over 5,000 gross tonnage on voyages within EU ports.[24] This creates tension between the IMO (favouring global uniform rules) and regional regimes like the EU ETS, raising coherence and jurisdictional questions about overlapping regulatory frameworks and potential market distortions.[25]

Digital Personhood: holding carbon credits, direct sanctions, climate damage liability

One proposal treats AI-controlled vessels as juridical entities capable of holding carbon credit accounts and being fined. Exploring AI personhood supplements liability regimes via enhanced vicarious responsibility, potentially creating new pathways for environmental accountability.[26] This concept builds on existing maritime law traditions of ship personification while extending them to encompass digital agency and autonomous decision-making capabilities.

If recognized, an AI vessel could maintain an emissions ledger, redeem allowances, or face penalties directly, shortening enforcement chains and reducing reliance on human intermediaries. The vessel's AI systems could automatically monitor emissions, trade carbon credits, and ensure compliance with environmental regulations through integrated sensor networks and blockchain-based transaction systems. In climate damage suits, this would enable plaintiffs to sue the AI vessel directly for emissions breaches, potentially streamlining litigation by eliminating complex chains of corporate liability. Warnings are also there that emergent decision-making may "break the chain of causation linking the act with the last human agent," creating novel questions about foreseeability and legal responsibility when AI systems make autonomous environmental compliance decisions.[27] There are also observations as to whether AIs could even claim defenses akin to "insanity" in the event of system breakdowns, exploring whether technical malfunctions could constitute legitimate legal defenses similar to human incapacity.[28] Legal personhood must not grant unaccountable immunities, arguing that any recognition of AI legal status must be accompanied by robust accountability mechanisms and

[24] Regulation (EU) 2023/957 of the European Parliament and of the Council of 10 May 2023 amending Directive 2003/87/EC.
https://eur-lex.europa.eu
[25] Ringbom, Henrik. (2020). Autonomous Ships and the Law. https://doi.org/10.4324/9781003056560
[26] ResearchGate Project, Applying the ePerson in a Maritime Context (2021) 33–34 https://www.researchgate.net/ .
[27] Magdalena Szewczyk, Autonomous Ships and P&I Insurance: Legal and Practical Challenges under English Law (PhD Thesis, Northumbria University 2021).
[28] Hanna Stones, Smart Ships: Should They Be Held Liable? (LLM Thesis, Bournemouth University 2020).

human oversight requirements.[29]

COMMERCIAL & ADMIRALTY LAW IMPLICATIONS

Charterparties & Contracts

If AI vessels gain personhood, they could contract directly like corporations, entering into voyage charters, time charters, and bareboat charters as principals rather than mere objects of contractual arrangements.[30] This would fundamentally alter maritime commercial relationships, allowing vessels to negotiate freight rates, delivery terms, and performance obligations autonomously. Yet scholars caution that legal personhood should not be conflated with accountability, emphasizing that recognition of legal capacity must not shield human operators from responsibility for AI actions.[31] A hybrid model, with AIs as agents rather than principals, is seen as doctrinally stable, preserving existing contractual frameworks while accommodating technological advancement.

Port State Control & Customs

Current port state control (PSC) and maritime regulations assume a human master or officer, but MASS (Maritime Autonomous Surface Ships) create enforcement gaps when no crew is present for inspection, documentation review, or corrective action orders.[32] If a MASS arrives without a master, PSC regimes would struggle to assign liability for offenses like emissions exceedance, illegal discharges, customs violations. The default is to target the owner, operator, or charterer, but establishing who exercised control at the relevant moment may be contested in AI systems.

If a vessel is a legal person, PSC could impose inspections, fines, detention, or deny entry directly on the vessel. The AI becomes a direct regulatory subject, sidestepping opaque control chains. Without personhood, authorities must trace responsibility through layers of software, remote supervision, owners, or AI vendors.

[29] Robinson D, et al, Legal Personhood of Autonomous Systems (ResearchGate Preprint 2022) https://www.researchgate.net/.
[30] Common law doctrine of contractual capacity.
[31] Pagallo U, Vital, Sophia & Co: Philosophies—The Quest for the Legal Personhood of Robots (MDPI 2018).
[32] Port State Control conventions (UNCLOS, MARPOL, SOLAS).

Traditional PSC procedures under MARPOL, SOLAS, and STCW assume human decision-makers capable of immediate response to deficiencies. Legacy frameworks of SOLAS, MARPOL, port state control conventions use anthropocentric terms like “master,” “officer,” and “crew.” Retrofitting them to non-human agents would require interpretive expansion or formal amendment. Some commentary suggests that port state regimes should be reinterpreted more functionally to cover non-human control systems[33]. If vessels gain personhood, PSC could directly fine or detain them, issuing electronic notices and monetary penalties to the vessel's digital legal entity rather than seeking human representatives. Some argues for functional reinterpretation of PSC conventions, proposing that AI systems could serve as the "responsible person" for PSC purposes while maintaining connection to human accountability chains.[34]

Admiralty Enforcement: from in rem to algorithm arrest

In admiralty law, vessels may be arrested in rem to secure claims, treating the ship itself as the defendant in maritime lien actions. Landmark cases like The Bold Buccleugh[35] established ship personification in maritime lien enforcement, where Lord Campbell famously stated that "the ship is the debtor" and can be proceeded against directly.[36] This legal fiction allows creditors to arrest vessels regardless of changes in ownership or management. U.S. law requires physical arrest for jurisdiction, as established in cases like The Ship "Commerce," where the Supreme Court emphasized that maritime jurisdiction depends on the court's power over the res (the vessel itself).[37] Antw analysis of arrest procedures demonstrates how maritime law has long treated vessels as quasi-legal entities capable of bearing obligations and being subject to legal process.[38]Yet AI modules and certificates could eventually be treated as intangible maritime property, raising questions about how to arrest algorithms, databases, or digital systems that constitute the vessel's "intelligence." Stones explores "algorithm arrest" for smart ships, proposing mechanisms for securing jurisdiction over AI systems through digital asset freezing

[33] Paulius Deguara, Artificial Intelligence and Maritime Law: Challenges of MASS Regulation (Research Paper, 2022).
[34] Paulius Deguara, Artificial Intelligence and Maritime Law: Challenges of MASS Regulation (Research Paper, 2022).
[35] The Bold Buccleugh (1851) 7 Moo PC 267.
[36] The Bold Buccleugh (1851) 7 Moo PC 267.
[37] U.S. Supplemental Admiralty Rules, Rule C; The Ship "Commerce" (1823). The Ship ‘Commerce’ 14 US (1 Wheat) 382 (1816).
[38] W. Tetley, Arrest, Attachment and Related Maritime Law Procedures, Tulane Maritime Law Journal (1999).

or code impoundment, though noting significant technical and legal barriers.[39]

Insurance & Arbitration

If vessels become juridical persons, they could be insured independently, potentially holding their own hull and machinery policies, P&I coverage, and specialized cyber-risk insurance for their AI systems. This raises fundamental challenges for underwriting AI risks, including questions about risk assessment, premium calculation, and claims handling when the insured party is an artificial entity. These tensions in maritime insurance law, noting that traditional marine insurance principles assume human agency in risk management and loss prevention.[40]The International Group of P&I Clubs has considered autonomous vessel risks in their recent reports, identifying coverage gaps for AI-related incidents, cyber attacks on vessel systems, and liability for autonomous navigation decisions.[41] In arbitration, if AI gains party status, procedural reforms would be needed to validate awards, including questions about AI capacity to agree to arbitration, participate in proceedings, and comply with awards. Warns of AI personhood acting as potential liability shields, where corporate entities might use AI personification to distance themselves from responsibility for automated decisions are also there.[42]

RISKS, CRITIQUES & ACCOUNTABILITY GAPS

Over-Legalising AI

Critics caution against creating autonomous "black box" legal actors that operate without sufficient transparency or human oversight. The complexity of AI decision-making processes, particularly in machine learning systems, may make it impossible to understand or predict how legal obligations will be interpreted and executed. Personhood attribution must remain constrained by accountability safeguards, arguing that any legal recognition must be accompanied by explainability requirements, human oversight mechanisms, and clear liability trails back to human actors.[43]

[39] Hanna Stones, Smart Ships: Should They Be Held Liable? (LLM Thesis, Bournemouth University 2020).
[40] Magdalena Szewczyk, Autonomous Ships and P&I Insurance: Legal and Practical Challenges under English Law (PhD Thesis, Northumbria University 2021).
[41] International Group of P&I Clubs, 'Position Paper on Maritime Autonomous Surface Ships' (2022).
[42] Pagallo U, Vital, Sophia & Co: Philosophies—The Quest for the Legal Personhood of Robots (MDPI 2018).
[43] Robinson D, et al, Legal Personhood of Autonomous Systems (ResearchGate Preprint 2022) https://www.researchgate.net/.

Labour Concerns

Automation challenges human crew protections under the Maritime Labour Convention (2006)[44], which establishes comprehensive rights for seafarers including living conditions, hours of work, and repatriation obligations.[45] The transition to autonomous vessels threatens to eliminate traditional maritime employment while creating new categories of shore-based technical operators. The Viking Line case[46] illustrates tensions between labour rights and economic freedoms in shipping, where the European Court of Justice balanced collective bargaining rights against freedom of establishment, establishing precedents relevant to automation disputes.[47] The ITF has raised alarms over job displacement, publishing policy papers warning that unrestricted automation could eliminate hundreds of thousands of maritime jobs while concentrating technical expertise in developed nations.[48]

Fragmentation & Conflict

Disparate recognition of AI personhood risks fragmentation, where vessels might be legal persons in some jurisdictions but not others, creating complex conflicts of laws problems. A vessel recognized as a legal entity under one flag state's laws might not have standing to contract or be sued in ports where AI personhood is not recognized. The jurisdictional conflicts between IMO global rules and the EU ETS overlay, demonstrates how regional regulations can create compliance complexities for international shipping.[49] Similarly examined, jurisdictional fragmentation in maritime law, showing how different legal traditions and regulatory approaches can undermine the uniformity that makes international shipping efficient.[50]

Denial of Personhood

When personhood is denied, causation and liability chains become highly complex, leaving accountability gaps that strict liability or insurance may not fully solve. Without legal personhood, AI vessels remain legal objects rather than subjects, requiring complex tracing of

[44] Maritime Labour Convention (adopted 23 February 2006, entered into force 20 August 2013). https://www.ilo.org/global/standards/maritime-labour-convention/lang--en/index.html
[45] Maritime Labour Convention (adopted 23 February 2006, entered into force 20 August 2013). https://www.ilo.org/global/standards/maritime-labour-convention/lang--en/index.htm
[46] ITF v Viking Line ABP (C-438/05, ECJ 2007).
[47] ITF v Viking Line ABP (C-438/05, ECJ 2007).
[48] International Transport Workers' Federation (ITF), 'Automation and Future of Seafaring Jobs: Policy Brief' (2021).
[49] Ringbom, Henrik. (2020). Autonomous Ships and the Law. https://doi.org/10.4324/9781003056560
[50] Trevisanut, Netherlands Yearbook of International Law (2012).

responsibility through multiple layers of manufacturers, operators, programmers, and owners. This complexity can delay legal proceedings, increase litigation costs, and potentially leave victims without adequate remedies when autonomous systems cause harm.

CONCLUSION & RECOMMENDATIONS

Despite the challenges and uncertainties, the doctrine of digital personhood offers a coherent architecture for bridging accountability gaps in maritime sustainability, commercial law, and liability regimes. The maritime domain already abstracts legal personality (ships, registration, in rem liability). Extending that to AI vessels is a plausible extension and not a radical rupture.

However, such personhood must be hedged with legal safeguards: minimum capital or insurance thresholds, reverse liability piercing, rights to oversight and audit, and statutory definitions of defensible exceptions. The success of personhood depends on recognition across jurisdictions (IMO, EU, national law) and careful doctrinal reform: MARPOL Annex VI enforcement, charterparty capacity rules, admiralty statutes to permit algorithm arrest, insurance regulation of autonomous risk.

I strongly recommend that :

• Propose to the IMO a protocol or guideline recognizing AI vessels, defining their rights, liabilities, registry, compliance, and enforcement modalities.

• Draft amendments to MARPOL (especially Annex VI) and SOLAS to explicitly refer to autonomous decisions, emissions ledger obligations, and algorithmic compliance.

• Advocate for national admiralty acts to empower courts to freeze or disable AI control modules, seize registry certificates, or restrain algorithmic functionality even apart from arresting physical vessels.

• Promote recognition of AI vessel personhood across states (flag, port, coastal) to avoid jurisdictional fragmentation and liability voids.

• Encourage P&I and marine insurers to develop risk models for AI vessel underwriting, mandatory capital reserves, disclosures, and exception regimes.

• Advance transitional or hybrid models (agent, trustee, limited personhood) as interim steps to full personhood.

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