The International Regulatory Framework of mass Disruption

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1 Introduction

The exponential progress in technology is pushing the world inexorably towards the dawn of autonomous shipping. Advances in broadband capacity, big data, high-speed processing, and rapid interconnectivity are enabling more shipboard automated systems to be remotely controlled. Research and development will presumably continue at an uninterrupted pace until the unmanned ship finally becomes a commercial reality.

Just as advocates of the development of maritime autonomous surface ships or “mass” submit that such ships hold great potential for even safer seas, cleaner oceans, and more efficient shipping, pragmatists firmly point out that the disruptive nature of this advanced technology will bring wide-ranging implications upon society, economy, environment, law, and policy for many years to come.

As technology companies team up with maritime partners, so has the shipping sector rapidly begun to realize that some of the most difficult challenges it faces are understanding the nature of this disruptive technology and the effects of its integration with existing shipping infrastructures, operations, and processes. The development of maritime autonomous technologies need to be guided by an international regulatory framework that will ensure such applications will only serve to enhance the interest of the greater safety of life, property, and the environment. To be sure, a myriad other issues need to be answered such as security, pollution, liability, compensation, ethics, education, training, testing, data transfer, cybersecurity, systems architecture, communications, connectivity, reporting, artificial intelligence, among others.

Lachs, J., gave an admonition some five decades ago that the “great acceleration of social and economic change, combined with that of science and technology, have confronted law with a serious challenge: one it must meet, lest it lag even farther behind events than it has been wont to do.”[[1]](#footnote-1) Keeping law and policy abreast and in pace with science and technology has always been a challenge, and the advances in autonomous transport technology are no exception.

The International Maritime Organization (imo), being the United Nations specialized agency responsible for the safety and security of shipping and the prevention of pollution by ships, has decided to address this issue squarely and proactively and take the first important steps in a long and comprehensive process towards developing a solid international regulatory framework for mass. imo’s senior technical body – the Maritime Safety Committee (msc) – commenced work in 2018 to determine how mass operations may be addressed in international maritime agreements and instruments.

This chapter browses through some of the salient issues and questions posed by leading academics and researchers regarding the space that mass is anticipated to occupy in the international legal framework for shipping. Using imo meeting documents, it then recounts decision points, workflows, and timelines from the inception of the regulatory scoping exercise to its current state of animated suspension due to the pandemic.

2 mass Disruption

Despite these benefits, mass, in particular those with no crew on board, will also fundamentally disrupt the current international regulatory frameworks, including those covering safety, security, environmental protection, and liability, compensation and insurance. Though the regulatory frameworks governing the maritime industry have adapted well over time to accommodate new technologies, they were never drafted to consider ships with no crew on board.[[2]](#footnote-2)

Disruptive technologies, according to Kostoff and others, “can be considered scientific discoveries that break through the usual product/technology capabilities and provide a basis for a new competitive paradigm.”[[3]](#footnote-3) Having been operated by humans on board for millennia since the dawn of sea transport, it is only a matter of time before the industry sees the first maritime autonomous surface ship (mass) enter into commercial service. Once it becomes mainstream, the unmanned vessel will represent a paradigm shift only rarely seen in the shipping industry. As Van Hooydonk wrote, the “impact on the shipping industry of the replacement within the proximate future of the hard work” of seafarers by computers and “shore-based vessel controllers has the potential to change the social and economic parameters of the shipping industry as much as the introduction of steel construction and steam propulsion did in the nineteenth century.”[[4]](#footnote-4)

The disruption wrought by the idea of mass is already being felt in many sectors of the industry. Its science fiction novelty has captured the imagination of stakeholders representing every facet of the maritime sector, not the least those in maritime law, policy, and regulation. It has led law and policy researchers and academics to ask a plethora of questions on its potential impact and speculate on how it fits within the international maritime regulatory framework. It has, if you will, caused disruption in the academic community as well.

Chircop observes that “international maritime conventions are largely premised on a human presence on board.”[[5]](#footnote-5) It comes as no surprise that the most commonly debated issue in the context of mass relates to situating the concept of an unmanned ship in maritime law. An oft-asked question relates to whether mass can be defined as ships under maritime law. Writing about a case involving a jet-ski before the Bournemouth Crown Court, Shaw’s reflection may just as well have been made in the context of autonomous vessels -

The answer to the question ‘what is a ship?’ in the context of maritime law has exercised the minds of jurists for many years. No comprehensive definition has ever been produced, and the ever-changing shapes of the craft created by the ship-building and offshore oil industries have presented yet more challenges for lawyers.[[6]](#footnote-6)

Being the constitution of the oceans, the United Nations Convention on the Law of the Sea, 1982, is often the first destination in any search for a universal definition of a ship or vessel. One is inevitably drawn to articles 91 (Nationality of ships) and 94 (Duties of the flag State),[[7]](#footnote-7) neither of which offer a definition, and instead leaves this task to be resolved at the imo[[8]](#footnote-8) (as the competent international organization) as well as in the domestic law of the contracting state.[[9]](#footnote-9) Others take the absence of an explicit definition of vessel or ship to mean that mass fall within the concept of ships in the Law of the Sea Convention.[[10]](#footnote-10)

While a definition of ship or vessel is conspicuously absent in unclos, one can find definitions in many other treaties. There seems to be general agreement that the definitions available are sufficiently broad in their formulation as to accommodate autonomous vessels. For instance, Daum and Stellpflug point out that the “focus on ‘a means of transportation’ as the essential characteristic of a vessel” in the definition in the Convention on the International Regulations for Preventing Collisions at Sea, 1972 (colreg s) brings mass squarely within its ambit.[[11]](#footnote-11) They posit a similar situation in the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (London Convention), Convention for the Protection of the Marine Environment of the North-East Atlantic (ospar), Seamen’s Articles of Agreement Convention, 1926 (ilo c-22), and the United Nations Convention on Conditions for Registration of Ships (unccros). Chircop also reviewed a whole list of treaties and found that “for the purpose of the discussion of autonomous ships the difference is immaterial and none of the definitions provided (in those treaties) pose a problem for the consideration of autonomous vessels as ‘ships’.”[[12]](#footnote-12) Others have added the Hague and the Hague-Visby Rules,[[13]](#footnote-13) and the Protocol Against the Smuggling of Migrants by Land, Sea and Air[[14]](#footnote-14) to this list.

Subsuming mass within the definition of a vessel or ship in scores of treaties is a relatively agreeable exercise compared to testing it against numerous other provisions contained in those and other instruments that are predicated on the presence of seafarers on board ships. One such instrument is the International Convention for the Safety of Life at Sea (solas), considered the most important maritime safety treaty at imo. The Convention is filled with required redundancies or duplications that rely on physical human intervention designed to increase reliability and resilience in case of failure, accident, or emergency.

For instance, chapter V (Safety of Navigation) of solas provides that the crew must be ready to switch to the auxiliary steering gear and manually maneuver the impaired vessel in case of failure of the main steering gear.[[15]](#footnote-15) This is obviously impossible in a totally unmanned mass, where all systems will operate through electrical impulses rather than any physical human intervention. Human intervention is also related to actual situational awareness and monitoring on board all systems on board as well as the environment surrounding the ship. How far have electronics systems advanced in terms of approximating the powers of human multisensory observation? Some put forward periodically unattended machinery spaces as an example of the “optional replacement of the physical watchkeeping of the crew in the engine room by various forms of sensor equipment and alarms.”[[16]](#footnote-16) Others counter that the unmanned engine room only works because the onboard crew are on call to “guarantee a prompt response to emergency situations and a continuous monitoring of the engine.”[[17]](#footnote-17)

Chapter v of solas also includes explicit requirements for ships to be sufficiently and efficiently manned in accordance with a minimum safe manning document issued by the maritime administration. This provision attracts divergent opinions from mass scholars. Some see minimum safe manning as “the ultimate legal provision of the need to man the ships under the existing legal framework on international maritime law.”[[18]](#footnote-18) Others point out that,

solas relies on states to ensure the safe manning of their ships. There is no minimum number of persons required to be on board so long as the primary safety concern is met. It can therefore be argued that a crew numbering zero is technically “adequate” provided the operation is safe.[[19]](#footnote-19)

Indeed, the implementation of minimum safe manning requirements varies widely between States. States such as the UK, Australia, Canada, Hong Kong, and Bermuda practice a discretionary or subjective regime where ship operators are able to propose manning levels depending on the specific particulars of the ship in question. Singapore, the USA, New Zealand, and South Africa follow a prescriptive regime using formulae designed to provide an objective determination of minimum safe manning levels.[[20]](#footnote-20)

There is also a fair amount of contention surrounding the idea that maritime authorities might approve “equivalents”[[21]](#footnote-21) that unmanned ships may propose in complying with existing standards and instruments without having to wait for mass-specific amendments. Some are of the opinion that human presence is a strict requirement in important provisions under conventions such as colreg, stcw, and solas.[[22]](#footnote-22) Others expect the maritime authority to allow for decision support systems, such as “technically extended sensory organs”[[23]](#footnote-23) that serve as equivalent to the colreg-mandated lookout and “continuously sense the contacts around the ship’s operating domain and initiate best possible options”[[24]](#footnote-24) for the mass.

Because mass is still in its infancy, it is impossible to imagine ships without humans on board. Who will port state control inspectors expect to meet, consult, query, and converse with during random inspections?[[25]](#footnote-25) How about shore-based operators? Can a shore-based operator or the ship’s onboard control system “assume the duties of a traditional crew?”[[26]](#footnote-26) Is stcw applicable to them?[[27]](#footnote-27) The fully unmanned mass represents such a radical paradigm shift that there can be endless discussion and speculation on how the international framework should react, adjust, and adapt.

One view is that a new international legal framework for mass should be built from the ground up. According to Pritchett,

Instead of attempting the extraordinary task of revising existing law to be more accommodating to [mass], new legal instruments should be created specifically for, and applying only to, the new class of vessels … Creating a comprehensive body of law that is targeted at [mass] operations will allow the necessary forethought to be put into how we want these systems to operate. Failure to proactively make changes to accommodate [mass] will allow a series of laws that was never designed to apply to such technology to hamper its advancement.[[28]](#footnote-28)

The following proposal from Bergström and others suggests a more encapsulated approach that involves the adoption of a code specifically designed for mass.

It is thought that unmanned ships may enable safer, cost-efficient and environmentally friendly maritime transport. However, the origins of existing maritime rules and regulations come from an era before the introduction of such disruptive technologies. To enable the design and operation of unmanned ships from a design for safety and overall regulatory perspectives, several performance driven regulatory challenges have to be addressed. Along these lines, this work suggests the introduction of a new regulatory framework for unmanned ships, namely the ‘Unmanned Ship Code’ (usc). Our proposal takes under consideration the recently introduced imo code on the safety for ships operating in polar waters (Polar Code). This means that usc is fundamentally performance driven, goal-based and supplements existing conventional regulations.[[29]](#footnote-29)

Ringbom echoes the call for a move towards goal-based standards for mass. Under this approach, the “statutory rules only outline the objectives to be achieved and certain functional requirements, as well as a verification process.” The details for “achieving those objectives and requirements to flag states, classification societies, and ship designers and builders.”[[30]](#footnote-30) Zampella’s proposed solution is the adoption of a new solas chapter that will provide “a technical regulatory framework tailored to the specific needs of unmanned vessels, from their construction requirements to the standards of operation, particularly considering their classification as one of the possible categories of ship navigating the oceans.”[[31]](#footnote-31)

Timbrell calls for alterations that will allow for the application of collision regulations to mass – a change that he believes should “take place quickly though through a Convention and not be left to gradual change through the Courts.”[[32]](#footnote-32) Mindful that extensive amendments to the international regulatory framework will take years, Jordan endorses the development of soft law or para-droit in the interim.[[33]](#footnote-33)

3 The imo Regulatory Scoping Exercise

While the above proposed approaches differ, the one common denominator is that each of them acknowledge the importance of the imo as the venue and forum for discussions and negotiations on the international regulatory framework for mass. As will be seen in this section, the imo has in fact taken a measured and deliberate approach. It recognizes the need to be proactive – to control the lag between technology/science and policy/law, and to provide a practicable tentative framework that will promote the conduct of testing, research, and development in a safe and controlled manner. Yet it is mindful that an unnecessary rush can only be counterproductive – what the international maritime community needs are the proper tools and procedures to initiate considered and rational amendments to imo instruments as and when appropriate.

To lay a solid foundation for future action on the regulatory framework as it relates to mass, the imo commenced a regulatory scoping exercise.

3.1 Maritime Safety Committee

Being the senior committee at imo, and the body primarily responsible for the Organization’s work program as it relates to safety and security, including keeping solas and related instruments up-do-date, it falls squarely on the Maritime Safety Committee (msc) to lead the review of imo instruments to determine how these apply to maritime autonomous surface ships.

3.1.1 98th Session of the Maritime Safety Committee (msc 98)

A joint proposal submitted by Denmark, Estonia, Finland, Japan, the Netherlands, Norway, the Republic of Korea, the United Kingdom, and the United States gave impetus to the inclusion of maritime autonomous surface ships in the work programme of the imo. Document msc 98/20/2 “Maritime Autonomous Surface Ships: proposal for a regulatory scoping exercise” was submitted jointly on 27 February 2017 by the aforementioned countries for consideration at the 98th meeting of the imo’s Maritime Safety Committee (msc) held from 7 to 16 June 2017. msc 98/20/2 prefaced that because the “use of Maritime Autonomous Surface Ships (mass) creates the need for a regulatory framework for such ships and their interaction and co-existence with manned ships,” it becomes incumbent upon the msc “to undertake a regulatory scoping exercise to establish the extent of the need to amend the regulatory framework to enable the safe, secure and environmental operation of mass within the existing imo instruments.”[[34]](#footnote-34)

The co-sponsors expressed concern that a lack of clarity in the international legal framework vis-à-vis mass could compromise or delay the development and adoption of relevant technological solutions for use on board ships. Through msc 98/20/2, they listed the objectives of the proposed regulatory scoping exercise (rse) as:

1 identifying imo regulations which, as currently drafted, preclude unmanned operations;

2 identifying imo regulations that would have no application to unmanned operations (as they relate purely to a human presence on board); and

3 identifying imo regulations which do not preclude unmanned operations but may need to be amended in order to ensure that the construction and operation of mass are carried out safely, securely, and in an environmentally sound manner.[[35]](#footnote-35)

In their submission, the co-sponsors noted that it is imperative that mass be included within the existing international regulatory framework while both construction and operation are still in their infancy world-wide. They also underscored the importance of undertaking the regulatory scoping exercise in order to provide a common appreciation of the standards that would become necessary to ensure safety in mass operations.[[36]](#footnote-36)

The International Transport Workers’ Federation (itf), an international labor federation with observer status at imo, added to the proposals contained in msc 98-20-2 by submitting that the msc work programme should encompass and include, *inter alia*, “a precise definition of what is meant by an ‘autonomous ship’” and should cover different levels of autonomy on board ships, whether “partially manned or unmanned, that depend upon remote shore-based operators for control of a ship.”[[37]](#footnote-37) Additionally, the Philippine delegation intervened during the deliberations of the msc’s 98th session with an appeal for the body to consider humanitarian and social aspects in the development of the regulatory framework for mass.[[38]](#footnote-38)

At the end of its 98th meeting, the Maritime Safety Committee indicated in its 28 June 2017 committee report that the output “‘Regulatory scoping exercise for the use of Maritime Autonomous Surface Ships (mass)’, with a target completion date of 2020” would be included in the provisional agenda of its next meeting (msc 99).[[39]](#footnote-39)

This was reinforced in the imo strategic plan adopted at the imo’s 30th Assembly at the end of the year, which included “Integrate new and advancing technologies in the regulatory framework” as one of the Strategic Directions for the period 2018 to 2023. In particular, it lists “Regulatory scoping exercise for the use of Maritime Autonomous Surface Ships (mass)” as a specific output. The strategic plan expresses that imo “will strive towards a legal framework that accommodates new and advancing technologies and approaches” while at the same time balancing their benefits “against safety and security concerns, the impact on the environment and on international trade facilitation, the potential costs to the industry, and finally their impact on personnel, both on board and ashore.”

3.1.2 99th Session of the Maritime Safety Committee (msc 99)

The work on autonomous ships began in earnest in 2018, with the creation of a Working Group on mass at msc 99 to meet from 17–23 May and deliver a report before the end of the session. The Working Group met under the following terms of reference:

1 develop a framework for the regulatory scoping exercise, including aims and objectives, methodology, instruments, type and size of ships, provisional definitions and different types and concepts of autonomy, automation, operations and manning to be considered;

2 develop a plan of work for the regulatory scoping exercise, including timelines, deliverables and priorities, involvement of other committees and intersessional arrangements;

3 consider the need to establish a mechanism for sharing information and lessons learned and liaise with other international organizations to share up-to-date information on mass, and advise, as appropriate;

4 consider the need for a correspondence group and develop draft terms of reference, as appropriate.[[40]](#footnote-40)

Chaired by Sweden,[[41]](#footnote-41) in attendance in the Working Group were no less than 42 member States, one associate member, and 20 observer delegations. The group was commendably productive vis-à-vis its ambitious terms of reference and laid the groundwork for and formulated the framework within which the regulatory scoping exercise continues to be undertaken today. The group specified that the aim of the exercise “is to determine how safe, secure and environmentally sound Maritime Autonomous Surface Ships (mass) operations might be addressed in imo instruments,” while its objective “is to assess the degree to which the existing regulatory framework under its purview may be affected in order to address mass operations.” It was also this first working group that gave the working definition of mass as “a ship which, to a varying degree, can operate independent of human interaction.”[[42]](#footnote-42) Even more importantly, the working group provided the now-ubiquitous delineation of the four degrees of autonomy of mass, though these underwent some minor modifications by the Correspondence Group.[[43]](#footnote-43)

In its report to the Maritime Safety Committee, the Working Group proposed that the regulatory scoping exercise follow a two-step process. The first step would entail the identification of imo instruments which, as currently drafted, (i) apply to mass and preclude mass operations; or (ii) apply to mass and do not preclude mass operations and require no actions; or (iii) apply to mass and do not preclude mass operations but may need to be amended or clarified, and/or may contain gaps; or (iv) have no application to mass operations. Following this would be the second step, which calls for an analysis to identify the most appropriate way of addressing mass operations through, (i) equivalences as provided for by the instruments or developing interpretations; and/or (ii) amending existing instruments; and/or (iii) developing new instruments; or (iv) none of the above, as a result of the analysis. In Appendix 1 of the report, the Working Group identified a preliminary list of fourteen mandatory maritime safety and security instruments to be covered by the regulatory scoping exercise.[[44]](#footnote-44)

msc 99 endorsed the report and recommendations of the Working Group and took a number of associated decisions and actions. One was the establishment of a Correspondence Group on mass, coordinated by Finland, and assigned with the mandate to test and suggest improvements to the regulatory scoping exercise framework and methodology proposed by the Working Group. Another was to fix 2020 as the target year for completion of the regulatory scoping exercise, in the face of calls to push it back to 2023.[[45]](#footnote-45) msc 99 also laid down a number of guiding principles to be observed in the course of regulatory scoping exercise. These include the following -

1. the work on mass should be user-driven and not technology-driven

2. given the different interpretations of mass, clear definitions were needed as a priority in order to move forward with the exercise

3. definitions should be broad and provisional to avoid limiting the exercise

4. the exercise should not be considered as a drafting exercise

5. the result of the exercise should establish which regulations, as written, applied already to mass and which regulations might be in conflict with mass, and should identify the relevant gaps to ensure that the safety, security and protection of the marine environment would be maintained[[46]](#footnote-46)

3.1.3 100th Session of the Maritime Safety Committee (msc 100)

The 100th session of imo’s Maritime Safety Committee took place from 3 to 7 December 2018. Four main items occupied the meeting’s agenda on mass: the report of the Correspondence Group established by msc 99, development of interim guidelines for mass trials, the mass Working Group for msc 100, and the intersessional meeting of the Working Group on mass. The Correspondence Group reported that it was in agreement with the scoping exercise framework and methodology previously agreed at msc 99. It also reported that while a number of proposals to expand the degrees of autonomy were considered, the Group consensus was that it was advisable to retain the four degrees already agreed at msc 99,[[47]](#footnote-47) albeit with some minor proposed modifications.

As with its previous session, msc 100 established the mass Working Group. The Group was instructed to finalize the framework for the regulatory scoping exercise and also consider principles for the development of interim guidelines for mass trials.[[48]](#footnote-48) To support active participation by member States and observer organizations in the regulatory scoping exercise, it was agreed at the Working Group meeting that a web platform in the form of a mass module in imo’s Global Integrated Shipping Information System (gisis) would be developed by the Secretariat. It was also agreed that a clear distinction would be made between the first step and the second step of the scoping exercise.[[49]](#footnote-49)

Pursuant to its mandate to identify possible principles for consideration when developing guidelines on mass trials, the Working Group proposed that the Guidelines should be a single document that is, *inter alia*, applicable to all entities involved (public as well as private), generic, goal-based, and neither exceedingly technical nor prescriptive. The Guidelines should also encourage information sharing, include a reporting mechanism to relevant coastal state(s), and promote safe, secure, and environmentally sound mass operations.[[50]](#footnote-50)

msc 100 approved the Working Group’s report in general, to include the proposed principles for developing interim guidelines for mass trials. Additionally, the Committee endorsed an intersessional meeting of the mass Working Group to be held from 2 to 6 September 2019, that is, between the 101st and 102nd sessions of the msc. The intersessional meeting would be set aside to allow the Group to review the results of the first step of the regulatory scoping exercise and then subsequently to commence with the second step.

Of special interest was the note that mepc took cognizance of msc’s invitation[[51]](#footnote-51) for mepc to commence its own scoping exercise. mepc 73 decided that the Committee would review instruments under its purview some time in the future, after “significant progress had been made by msc on the regulatory scoping exercise.”[[52]](#footnote-52)

Finally, msc 100 reiterated msc 99’s decision to set May 2020, i.e., the Committee’s 102nd session (msc 102), as the target timeframe for final consideration of the regulatory scoping exercise.[[53]](#footnote-53)

3.1.4 101st Session of the Maritime Safety Committee (msc 101)

The 101st session of the Maritime Safety Committee (msc 101) met from 5 to 14 June 2019. msc 101 convened the mass Working Group and instructed it to review the status of the regulatory scoping exercise, prepare terms of reference for the intersessional Working Group on mass, and finalize the draft interim guidelines for mass trials.[[54]](#footnote-54)

The Working Group gave a positive update on the mass module created in imo’s gisis that has proven useful in encouraging member-state participation in the regulatory scoping exercise.At same time, the Group highlighted the importance of active participation by imo members and observers as well as the need for more volunteers to undertake an initial review of some instruments.[[55]](#footnote-55)

For the Intersessional Working Group on mass (iswg-mass), the Working Group put forward terms of reference that further elaborated on the iswg’s mandate to finalize the first step and commence the second step of the regulatory scoping exercise. Specifically, the iswg would be expected to consider how the outcome of the second step should be reported to msc 102 and develop guidance for use by Member States in the second step. The Group also reviewed and finalized the draft interim guidelines for mass trials.[[56]](#footnote-56)

The Maritime Safety Committee gave its general approval to the report of the mass Working Group, adopted the terms of reference for the iswg-mass and approved the final version of the Interim guidelines for mass trials.[[57]](#footnote-57) msc 101 also set the tentative dates of the next two sessions of the Committee. msc 102 was scheduled for 13–22 May 2020 while msc 103 was to take place some time in November 2020.[[58]](#footnote-58)

3.1.5 Intersessional Working Group on Maritime Autonomous Surface Ships (iswg-mass)

The iswg-mass convened itself from 2 to 6 September 2019 to review the results of the first step of the regulatory scoping exercise, develop guidance on the second step for imo members and observers, and develop a format for the report on the second step to be submitted to msc 102.[[59]](#footnote-59) In its report to the Maritime Safety Committee, the iswg presented the findings of the first step of the regulatory scoping exercise. It is contained in seven pages that summarize the Group’s discussions and observations of the reports provided by volunteering Member States that conducted a first step review of the instruments listed in section 3.1.2 above.[[60]](#footnote-60) The summary on each instrument during the first step includes notes, recommendations, potential gaps, themes, and other relevant findings. Each section concludes with the Group’s decision on whether the second step for that instrument could commence. Having presented its findings, the Group’s report declared the first step to have concluded and subsequently the second step of the regulatory scoping exercise to have commenced. It was agreed that volunteering Member States would lead the second step of the scoping exercise.[[61]](#footnote-61)

In anticipation of the end of the two-step regulatory scoping exercise at msc 102, the Group also agreed that the format and content of its final report to the Maritime Safety Committee should include:

1 a background section, among others including the process followed during the regulatory scoping exercise (rse);

2 information for all degrees of autonomy for every instrument expected to be affected by mass operations under the purview of the Maritime Safety Committee;

3 the most appropriate way(s) of addressing mass operations in those instruments, as appropriate;

4 identification of themes and/or potential gaps that require addressing;

5 identification of possible links between instruments;

6 identification of priorities for further work, including terminology and the order in which instruments could be addressed taking into account common themes and potential gaps; and

7 references to the material produced before and during the rse, in particular imo documents.[[62]](#footnote-62)

The iswg concluded its report by underscoring the need to convene the mass Working Group at msc 102, in view of work that needs to be undertaken to finalize the regulatory scoping exercise.[[63]](#footnote-63)

3.1.6 102nd & 103rd Sessions of the Maritime Safety Committee (msc 102 & msc 103)

The 102nd session of the Maritime Safety Committee (msc 102) was originally scheduled for 13–22 May 2020. Due to the ongoing covid-19 pandemic, however, the meeting was postponed for six months. msc 102 eventually took place six months later, from 4–11 November 2020, but not at imo Headquarters in London. For the first time in imo’s history, msc met by remote video link.

The limited time available and the obvious challenges presented in holding a meeting across the world’s different time zones meant that more than half of the substantive agenda items originally tabled for consideration at msc 102 had to be postponed. The regulatory scoping exercise for mass was among them. It meant that the consideration of reports and discussion of submitted documents would be deferred until msc 103.[[64]](#footnote-64)

One of the documents for consideration was a status report of the scoping exercise prepared by the imo Secretariat and submitted at the end of January 2020, shortly before the pandemic broke. The status report indicated that by 15 November 2019 all volunteering States were ready with the first phase of the second step of the scoping exercise. This first phase was an preliminary analysis of the most appropriate way(s) of addressing each degree of autonomy by indicating whether this/these would be through, (i) equivalences as provided for by the instruments or developing interpretations, and/or (ii) amending existing instruments, and/or (iii) developing new instruments, or (iv) none of the above as a result of the analysis.[[65]](#footnote-65)

The Secretariat’s submission further reported that imo members were provided the opportunity between 16 November and 13 December 2019 to comment on the preliminary analysis. Following this, volunteering member States were expected to consider the comments and introduce amendments or modifications where appropriate. These revised versions were then to be submitted by mid-February 2020 and made available to imo members in preparation for what was meant to be a May 2020 msc 102 meeting.[[66]](#footnote-66)

msc 102’s postponement, followed by the subsequent deferment to msc 103 of consideration of all documents in the agenda pertaining to mass, meant that the conclusion of the regulatory scoping exercise would be delayed by at least one year. msc 103 is scheduled to take place by remote video conference from 5–14 May 2021.[[67]](#footnote-67) For consideration at msc 103 will be 30-odd submitted documents that were deferred from msc 102.[[68]](#footnote-68) These include the Secretariat’s status report of the scoping exercise, the iswg-mass report, and submissions by member States on the second step of the exercise.[[69]](#footnote-69) On top of this, msc 103 will also have to consider new mass-related documents that members would submit before a March 2021 deadline as well as the final report to be submitted by the mass Working Group that msc 103 is expected to convene during its session in May 2021.

3.2 Legal Committee

The Legal Committee is the imo body mandated to deal with any legal matters within the purview of the Organization. The Legal Committee is also responsible for updating a number of conventions, and is therefore an important actor in the context of regulations for autonomous ships. The imo’s list of outputs for the 2020–2021 biennium indicates “Regulatory scoping exercise and gap analysis of conventions emanating from the Legal Committee with respect to maritime autonomous surface ships (mass)” as a deliverable with 2022 as the target.[[70]](#footnote-70) It was in fact noted as early as during msc 98 that the msc scoping exercise “would be an initial step and it may also be necessary to undertake similar work under the other Committees.”[[71]](#footnote-71)

The delegations of Canada, Finland, Georgia, the Marshall Islands, Norway, the Republic of Korea, Turkey, cmi, ics, and P&I Clubs submitted a joint document during the 105th session of the imo’s Legal Committee (leg 105, held from 23 to 25 April 2018) proposing that the Committee undertake its own mass regulatory scoping exercise. The proposal stated that a review and analysis of instruments under the purview of the Legal Committee would allow it to help imo appreciate “the full range of regulatory implications arising from mass and plan appropriately to accommodate this new and advancing technology into an effective international regulatory framework.”[[72]](#footnote-72) Adopting the proposal, the Legal Committee agreed to include “Regulatory scoping exercise and gap analysis of conventions emanating from the Legal Committee with respect to Maritime Autonomous Surface Ships (mass)” as part of its agenda, with 2022 as its target completion year. Additionally, the Committee invited members to provide proposals and comments on the subject for consideration at leg 106 for consideration, with appropriate reference to the work at msc 99 and msc 100.[[73]](#footnote-73)

The 106th session of the Legal Committee took place from 27 to 29 March 2019. Recalling the decision at leg 105 to introduce a regulatory scoping exercise to the work of the Committee, leg 106 reviewed a number of documents and submissions from imo members as well as the Secretariat. The Committee resolved to observe some guiding principles such as to follow a common approach as other imo committees and adopt the same methodology used by the msc, and consider any potential adverse effects the deployment of mass may have on seafarers. The Committee established its own leg Working Group on mass with the mandate to, *inter alia*

1 finalize the list of leg instruments to be included in the leg regulatory scoping exercise;

2 finalize the framework, methodology, plan of work and procedures for the leg regulatory scoping exercise;

3 consider and recommend if an intersessional correspondence group on maritime autonomous surface ships should be established and, if so, develop draft terms of reference for the correspondence group; and

4 if time permitted, test the methodology on selected articles of leg conventions.[[74]](#footnote-74)

The Working Group identified twenty-three instruments emanating from the Legal Committee, nineteen of which are conventions under the Committee’s direct and exclusive purview, two of which the Committee shares cognizance with other imo committees, and a further two that are joint treaties with imo and other UN bodies.[[75]](#footnote-75)

In terms of the framework, methodology, plan of work and procedures for the regulatory scoping exercise, the Working Group recommended that the Committee adopt the msc methodology, including the two-step process, with some minor refinements. On the issue of a proposed intersessional correspondence group to advance the work on mass, the Group reported that the creation of such a body would not be necessary considering that the web platform in gisis was more than sufficient to facilitate the required tasks. In fact, the Group successfully tested the methodology using gisis.[[76]](#footnote-76)

As in the case of the Maritime Safety Committee, the Legal Committee has had to cancel its original schedule for the 107th session because of the covid-19 pandemic. leg 107 was eventually held via remote video conferencing from 27 November to 11 December 2020. At its remote session, the Committee agreed to postpone consideration of the agenda item on mass and all associated documents to leg 108.[[77]](#footnote-77)

The 108th session is scheduled for 26 to 30 July 2021, with discussions and comments on mass submissions to the Legal Committee still allowed in the imo’s gisis web platform until June.”[[78]](#footnote-78) Following a review of the discussion related to the scoping exercise in gisis so far, imo Secretariat identified the role and responsibility of the master, the role and responsibility of the remote operator, questions of liability, definitions/terminology of mass, and certificates to be among the potential common gaps and themes.[[79]](#footnote-79)

3.3 Facilitation Committee

The 43rd session of the Facilitation Committee (fal 43), which convened from 8–12 April 2019, considered, *inter alia*, document fal 43-19-2 submitted by the Secretariat containing a recommendation to include mass on the agenda of the next fal session (fal 44).[[80]](#footnote-80)

Noting the progress of the mass regulatory scoping exercise in both the Maritime Safety Committee (msc) and the Legal Committee (leg), the Facilitation Committee (fal) approved the establishment of a mass Working Group at fal 44, scheduled to meet from 20 to 24 April 2020. The Committee took lessons from both msc and leg in drawing up the terms of reference for the Working Group. As practiced in msc, the fal Working Group was directed to adopt the two-step methodology. Like leg, the Facilitation Committee decided to forgo an intersessional Working Group on mass to instead optimize the use of the gisis web platform for discussion and exchange of views. The Working Group was expected to “complete the work at fal 44 and not in two sessions, as was initially proposed, because only one instrument, the fal Convention, was being reviewed.”[[81]](#footnote-81) Having been scheduled to meet from 20 to 24 April 2020, however, meant that fal 44 would be postponed to 28 September to 2 October 2020 as a result of the covid-19 pandemic. As a result, fal 44 decided, inter alia, to also postpone the consideration and completion of the fal mass regulatory scoping exercise to fal 45,[[82]](#footnote-82) scheduled for 1–4 June 2021.[[83]](#footnote-83)

Finland volunteered to lead an initial review of the fal Convention. Since the review covered only a single convention, the initial work was already finished even before fal 44 was postponed. Some preliminary findings relate to identification of the master for facilitation purposes, stowaways, refugees, persons rescued at sea, basic accommodation facilities on board unmanned ships, among others. The full report will be considered at fal 45.[[84]](#footnote-84)

4 Conclusion

imo’s regulatory scoping exercise is only the beginning of a response to the challenges in introducing and incorporating disruptive technology – in this case, mass – within an existing and already-functioning framework. msc 99 made it amply clear that imo does not intend to rush to undertake a drafting exercise, but rather to engage in a true scoping exercise. The regulatory scoping exercise would provide the information and foundation necessary to guide the work of the different concerned committees and subcommittees as and when they determine that particular instruments need to be amended. The results of the regulatory scoping exercise should be taken into account and used as a basis for approximating the impact of mass and to act, draft, or adjust accordingly, to allow “unmanned ships to come within the ambit of the existing framework, with some important modifications.”[[85]](#footnote-85)

The regulatory scoping exercise should also help clarify numerous issues in order to settle many doubts and uncertainties expressed in certain quarters. Among these relate to fundamental questions that accompany the emergence of mass. What problem is autonomous shipping really trying to solve? How realistic and feasible are its potential benefits? How ready is the public for autonomous ships? Even as innovation in autonomous systems progresses and its integration continues, it is understandable that there are stakeholders that feel that mass decisions at imo “are being imprudently rushed”[[86]](#footnote-86) by other interests and that,

Regulation in the marine autonomy sphere is pushed forward primarily by companies that prefer to have quantifiable regulatory risks to attract investors rather than feeling exposed to the potentially more extensive general liability regime and with unspecified regulatory obstacles that may prohibit the manufacture, sale, and use of their products.[[87]](#footnote-87)

ap Moeller-Maersk’s ceo is recorded as having said that “[e]ven if the technology advances, I don’t expect we will be allowed to sail around with 400-meter long container ships, weighing 200,000 tonnes without any human beings on board.” He added that, “I don’t think it will be a driver of efficiency, not in my time.”[[88]](#footnote-88)

One of the proposed benefits of mass is eliminating the human element in shipboard operations, often touted as the direct cause of around 80% of accidents. However, some question whether the deployment of mass merely transfers the risk from humans on board to humans ashore faced with even greater difficulties in assessing and tackling imminent accidents and disasters at sea.[[89]](#footnote-89) Not being “on board, the shore-based vessel controller will be unable to react with the same intuitive feel for the situation … Indeed, because the operator will be dependent on the satisfactory operation of all the sensors on board and the transmission systems, new kinds of dangers will arise.”[[90]](#footnote-90) it-related failures could arise in areas such as navigation, communications, and collision avoidance as well as lead to vulnerability to cyberattacks.[[91]](#footnote-91)

The broader acceptance of mass can only be realized when the maturity of technological applications are accompanied by social acceptance. There are those who already fear that mass equals mass unemployment, or at the very least a reconfiguration of education, training, and skills requirements. As for ferries and cruise ships, “[w]ill passengers want to sail in a ship which is not in the oaken hands of a bearded and weather-beaten captain and without a crew that can ensure order and safety?”[[92]](#footnote-92) It is also not unreasonable to assume that “societal acceptance is higher for accidents caused by humans than for accidents caused by machines”[[93]](#footnote-93) and that the “general public [will not] be receptive to the idea of a chemical tanker navigating in international waters autonomously.”[[94]](#footnote-94) Communities, politicians, and environmentalists cannot be expected to be especially welcoming of mass navigating along their coasts and calling at their ports.

It is speculated that the advancements in mass technology will proceed at a much slower pace than expected[[95]](#footnote-95) and there is scepticism whether the next two decades will see more than 1,000 fully autonomous ships commissioned in the international maritime trade.[[96]](#footnote-96) It might be argued that we are not as yet on the cusp of unmanned and autonomous shipping, but that we are certainly moving in that direction. In the meantime, the absence of universal standards governing the development of relevant technologies could never be in the best interest of the maritime public. If left unresolved, such a vacuum could instead be filled by unilateral, national, or regional regulation. Such a development would certainly undermine the important work of imo toward global implementation of universal standards. A sound international regulatory framework is the best insurance against the disruptive potentials of mass technology.

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41. Sweden has continued to chair subsequent meetings of the mass Working Group. [↑](#footnote-ref-41)
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    Degree two: *Remotely controlled ship with seafarers on board*. The ship is controlled and operated from another location. Seafarers are available on board to take control and to operate the shipboard systems and functions.

    Degree three: *Remotely controlled ship without seafarers on board*. The ship is controlled and operated from another location. There are no seafarers on board.

    Degree four: *Fully autonomous ship*. The operating system of the ship is able to make decisions and determine actions by itself. [↑](#footnote-ref-43)
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