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| DISCUSSION PAPER |

**IMPLICATIONS**

**of**

**MARITIME AUTONOMOUS SURFACE SHIPS**

**FROM A**

**VTS PERSPECTIVE**

Working Paper Edition 1.0

APRIL 2022

Revisions to this IALA Document are to be noted in the table prior to the issue of a revised document.

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| --- | --- | --- |
| Date | Page / Section Revised | Requirement for Revision |
| 7 Oct 2021 | Working paper edition 0.1 | First Draft (VTS51) |
| xx Apr 2022 | Working paper edition 1.0 |  |
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# DOCUMENT PURPOSE

The purpose of the discussion paper is to assist the Committee achieve a common understanding of MASS and its implications on the provision of VTS by clearly and concisely identifying:

* Trends and opportunities presented by MASS.
* Issues / challenges for the management of ship traffic in a VTS area.
* Options, policies, and strategies for VTS to embrace / influence MASS.
* Implications for the regulatory and legal framework for VTS.
* Implications for IALA Standards relating to VTS.

The document supports IALA’s *Strategic Vision* and *Current Drivers and Trends* by providing a means to assist the Committee:

* Monitor the advent of MASS and its associated implications for VTS.
* Strategically plan for MASS and determine new work programme tasks associated with the preparation of new/amended IALA guidance.
* Develop guidance to assist authorities ensure the safety and efficiency of vessel movements in the VTS area, recognising:
  + The advent of MASS and their interaction with conventional manned vessels within VTS areas.
  + The interaction process of autonomous vessels with conventional traffic.
  + The information flow between MASS and shore authorities; and
  + The related information exchange with conventional traffic.

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| **Note**  The advent of MASS will be ongoing for many years and it is intended that this document will be reviewed and updated, as appropriate by the VTS Committee to reflect:   * Amendments to IALA policy documents, including:   + *Strategic Vision.*   + *Current Drivers and Trends*.   + *Position on the Development of Marine Aids to Navigation Services 2019.* * Outcomes from the MASS Task Force. * New / revised IMO instruments specifically related to MASS.   It is not the intention for this document to address the issues/implications identified. This will be achieved through new/amended work programme tasks adopted by the Committee. |

# EXECUTIVE SUMMARY

The advent of MASS will have significant implications for how VTS contributes to the safety of life at sea, safety and efficiency of navigation and the protection of the environment within the VTS area by mitigating the development of unsafe situations.

This includes how VTS will interact with conventional ships, autonomous ships and control centres (remote and/or local) to mitigate the development of unsafe situations through:

* Providing timely and relevant information on factors that may influence the ship's movements and assist onboard decision-making.
* Monitoring and managing ship traffic.
* Responding to developing unsafe situations.

A key consideration in moving forward will be balancing the benefits derived from new and advancing technologies with safety, efficiency, protection of the environment and security concerns will be a primary consideration for VTS as MASS transitions from ‘local’ trial environments to operational scenarios.

1. **Issues / challenges for the management of ship traffic in a VTS area**

The implications for VTS have been identified with regards to the advent of MASS, noting the assumptions described in Section 3.3, include.

| **Degree of autonomy[[1]](#footnote-1)** | **Implications for VTS** |
| --- | --- |
| **Degree one**  Ship with automated processes and decision support | **Minimal** - There is a need to monitor advances in the automated process and decision support onboard |
| **Degree two**  Remotely controlled ship with seafarers on board | * Managing ship traffic comprising both MASS and conventional ships * Digital interaction with ships, RCCs and other stakeholders to:   + Exchange information   + Provision of advice, warning, and instruction * Managing Interaction with multiple RCCs * Operational and procedural changes associated with the above * Provision of advice, warning, and instructions to the RCC with responsibility for the vessel. * Communications and interaction with participating ships (Voice / data exchange). This may include communications between ships (MASS and Traditional). |
| **Degree three**  Remotely controlled ship without seafarers on board | * As above, plus: * Emerging situation where ship needs to be contained / controlled to mitigate incident (national gov’t, VTS, other agencies) |
| **Degree four**  Fully autonomous ship | As above, plus:   1. Operational and procedural changes associated managing Degree four MASS 2. VTS should be able to request that the RCC retakes control of the MASS 4, changing its operational status to MASS 3 |

1. **Embracing and Influencing the development of mass**

To facilitate strategically planning for MASS and ensure VTS continues to contribute to safety of life at sea, safety and efficiency of navigation and the protection of the environment within the VTS area by mitigating the development of unsafe situations the following strategies have been adopted:

* ***Discussion Paper*** - The purpose of the discussion paper (this document) is to assist the Committee:
  + Achieve a common understanding of MASS by providing a mechanism to monitor the advent of MASS and its associated implications for VTS.
  + Strategically plan for MASS and determine new work programme tasks associated with the preparation of new/amended IALA guidance.
* ***Case Studies*** - The ongoing use of ‘Case Studies’ to assist gaining a greater understanding of MASS and its implications by monitoring their development/outcomes and identifying opportunities for involvement/engagement. A copy can be download from - <https://www.iala-aism.org/technical/mass/>
* ***Position Paper*** - Preparation of a concise “Position Paper’ to articulate and communicate the Committee’s opinion and intentions on key considerations for the management of ship traffic to ensure the safety and efficiency of ship movements by mitigating the development of unsafe situations are considered in the IMO’s preparation of a mandatory instrument to address MASS operations.
* ***Fast Tracking Adoption of New/Revised IALA Guidance*** - Two new Tasks already adopted:
  + Ensuring VTS Guidance Documents evolve with the Advent of Mass
  + Digital VTS Communications
* ***IALA Policy Documents*** - Key documents associated with the IALA Strategic Vision 2018-2026 should be regularly reviewed by the VTS Committee with a view to recommending updates to reflect the advent of MASS and provide the policy framework to facilitate embracing these developments, including:
  + Position on the Development of Marine Aids to Navigation Services 2019
  + Current Drivers and Trends:

1. **Implications for the regulatory and legal framework for VTS**

Current expectations are there are no implications for the IMO regulatory regime for VTS with the advent of MASS, noting:

* The IMO Regulatory Scoping Exercise completed in May 2021 (Section 3.1.1) did not identify any implications associated with SOLAS regulation V/12 (Vessel Traffic Services).
* IMO Resolution A.1158(32), adopted by the IMO Assembly in December 2021, has ‘future proofed’ the Guidelines as much as possible to accommodate new trends, such as the development, adoption and implementation of Maritime Service Portfolios, e-navigation and other evolving instruments aimed at the facilitation of safe, secure, and efficient maritime traffic

1. **Implications for IALA Standards relating to VTS -** The implications for IALA Standards relating to VTS with the advent of MASS are significant, noting the role of IALA in contributing significantly to the development of internationally harmonized guidance for vessel traffic services (Refer Section 3.6).

# DISCUSSION

IALA’s *Current Drivers and Trends* document serves as guidance as to how IALA can reach its strategic goals with a long-term horizon and perspective. Nine trends and developments have been identified to “*be monitored closely and when required, appropriate action should be taken such as an adjustment of the priorities and/or structure of the organization”*.

The “*Development of autonomous, automated and unmanned vessels*” is one of these nine trends and developments*.* Key aspects and implications identified with regards to MASS include:

* *“The further development of autonomous vessels could lead to increased safety and efficiency*
* *Today some vessels are to some extend semi-automated or semi-autonomous*
* *The development is expected to continue with unmanned vessels as the ultimate stage*
* *The trend will have an implication on the infrastructure and lead to fewer human errors*
* *It will also require reliable and resilient Position, Navigation and Timing (PNT) and connectivity in terms of integrated and corresponding systems and machine-readable signals in cases where no crew are present”*

Recognising VTS will have a key role in the advent of MASS this document has been prepared to collate opinions and ideas as a basis for informed discussion on the advent of MASS and achieve a common understanding of MASS and its implications for VTS.

## Overview

### IMO Framework

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| This section is intended to provide a brief history of the IMO developments regarding MASS and the status of change/s.  As such, this section is to be updated following relevant IMO meetings (e.g. MSC). |

In 2017, following a proposal by a number of Member States, IMO's Maritime Safety Committee (MSC) agreed to include the issue of marine autonomous surface ships on its agenda. This was in the form of a regulatory scoping exercise (RSE) to determine how the safe, secure and environmentally sound operation of Maritime Autonomous Surface Ships (MASS) may be introduced in IMO instruments.

The exercise involved assessing a substantial number of IMO treaty instruments under the remit of the MSC and identifying provisions which applied to MASS and prevented MASS operations; or applied to MASS and do not prevent MASS operations and require no actions; or applied to MASS and do not prevent MASS operations but may need to be amended or clarified, and/or may contain gaps; or have no application to MASS operations.

At the 103rd Session of the MSC in May 2021 the outcome from the RSE was approved, disseminated by means of MSC.1/Circ.1638, and Member States and international organizations invited to submit output proposals on the best way forward to address MASS in the IMO regulatory framework to this session, considering the outcome of the RSE, including:

* The outcome highlighted a number of high-priority issues, cutting across several instruments, that would need to be addressed at a policy level to determine future work.

These involve the development of MASS terminology and definitions, including an internationally agreed definition of MASS and clarifying the meaning of the term “master”, “crew” or “responsible person”, particularly in Degrees Three (remotely controlled ship) and Four (fully autonomous ship).

* Other key issues include addressing the functional and operational requirements of the remote-control station/centre and the possible designation of a remote operator as seafarer.
* Further common potential gaps and themes identified across several safety treaties related to provisions containing manual operations and alarms on the bridge; provisions related to actions by personnel (such as firefighting, cargoes stowage and securing and maintenance); watchkeeping; implications for search and rescue; and information required to be on board for safe operation.
* The Committee noted that the best way forward to address MASS in the IMO regulatory framework could, preferably, be in a holistic manner through the development of a goal-based MASS instrument. Such an instrument could take the form of a “MASS Code”, with goal(s), functional requirements and corresponding regulations, suitable for all four degrees of autonomy, and addressing the various gaps and themes identified by the RSE.

At MSC 104 (4-8 October 2021), the Committee took the following decisions:

* requested the Chair to prepare, together with the Secretariat and in consultation with the submitters of the proposals and commenting documents (see paragraph 15.6) and the former Chair of the MASS Working Group, a road map, including scope, steps and timelines, as well as the coordination of work with other IMO bodies, taking into account the documents submitted and comments made at this session and the outcome of the RSE (MSC.1/Circ.1638), for detailed consideration at MSC 105, to be submitted well in time for the next session to enable comments;
* included in the biennial agenda of the Committee for 2022-2023 and the provisional agenda for MSC 105 a new output on "Development of a goal-based instrument for maritime autonomous surface ships (MASS)", with a target completion year of 2025, taking into account that the title of this output may be adjusted based on the review of the road map at MSC 105;
* agreed that the first step in this new output would be the finalization of a road map to have a common understanding of the following steps; and, time allowing, the Committee could also embark on the development of instruments already at MSC 105;
* agreed that the ultimate goal would be the preparation of a mandatory instrument to address MASS operations; and
* agreed to re-establish the Working Group on MASS at MSC 105 to commence the work on the new output, including finalization of the aforementioned road map.

MSC105 is scheduled to be held 20-29 April 2022.

A draft road map for the development of a goal-based instrument for MASS will be considered at MSC105 (*MSC 105/7*). Three key parts to the roadmap include:

* development of the content of the instrument(s), including consideration of common issues and framework of the MASS instrument(s) and development of provisions of MASS instrument(s);
* amendment process for the entry into force of the instrument(s) (if it is a mandatory instrument, amendments to existing conventions; if non-mandatory, through MSC circulars); and
* amendments to existing conventions that are necessary for MASS (for example, COLREG to address issues identified, STCW to potentially address remote operator).

Key elements of the draft roadmap include:

| **Date** | | **Items** |
| --- | --- | --- |
| **2022** | **April** | * Consideration of key principles and common understanding   + decision on a mandatory or non-mandatory Code as a first step, and whether non-mandatory instruments (recommendations/guidelines) should be developed1 in the interim   + preliminary discussion on how the instrument would be given effect   + purpose and objectives for the new instrument   + common understanding of what is meant by goal-based instrument * Consideration, finalization, and agreement of this roadmap * Commence consideration of the common potential gaps and/or themes identified during the Regulatory Scoping Exercise (RSE) (MSC.1/Circ.1638, section 5) starting with the high priority items (MSC.1/Circ.1638,paragraphs 6.11.1 to 6.11.3). These include but are not limited to:   + consideration, together with relevant documents, whether to amend the definition for MASS and degrees of autonomy (including the respective definition)   + meaning of the terms master, crew or responsible person   + remote control station/centre   + determination of the remote operator as a seafarer |
|  | **November** | * Commence consideration of the scope and framework of the mandatory and/or non-mandatory instrument to be developed * Commence development of provisions for a goal-based instrument * Consider the procedures for amending existing IMO instruments * Consider the need and timing to:   + involve sub-committees   + initiate overall coordination with other committees   + liaise with other international organizations such as ILO, ISO, IHO, IALA, IMSO |
| **2023** | **1st half** | * Continue the development of the new instrument   + continue to review the scope and framework   + develop provisions for a goal-based instrument, taking into account the input from sub-committees, as appropriate |
| **2024** | **1st half** | * Decision on the means to adopt the mandatory instrument (Code): implementation through one Convention or through several conventions. |
|  | **2nd half** | * Finalization and approval of the new instrument * Finalization and approval of amendments to existing instruments necessary for the entry into force of the new instrument |
| **2025** | **1st half** | * Adoption of the new instrument * Adoption and/or final approval of amendments to existing instruments necessary for the entry into force of the new instrument |
| **2028** | **January** | Entry into force date of 1 January 2028 means adoption on 1 July 2026 at the latest (first half of 2026) |

### Expected Time frame

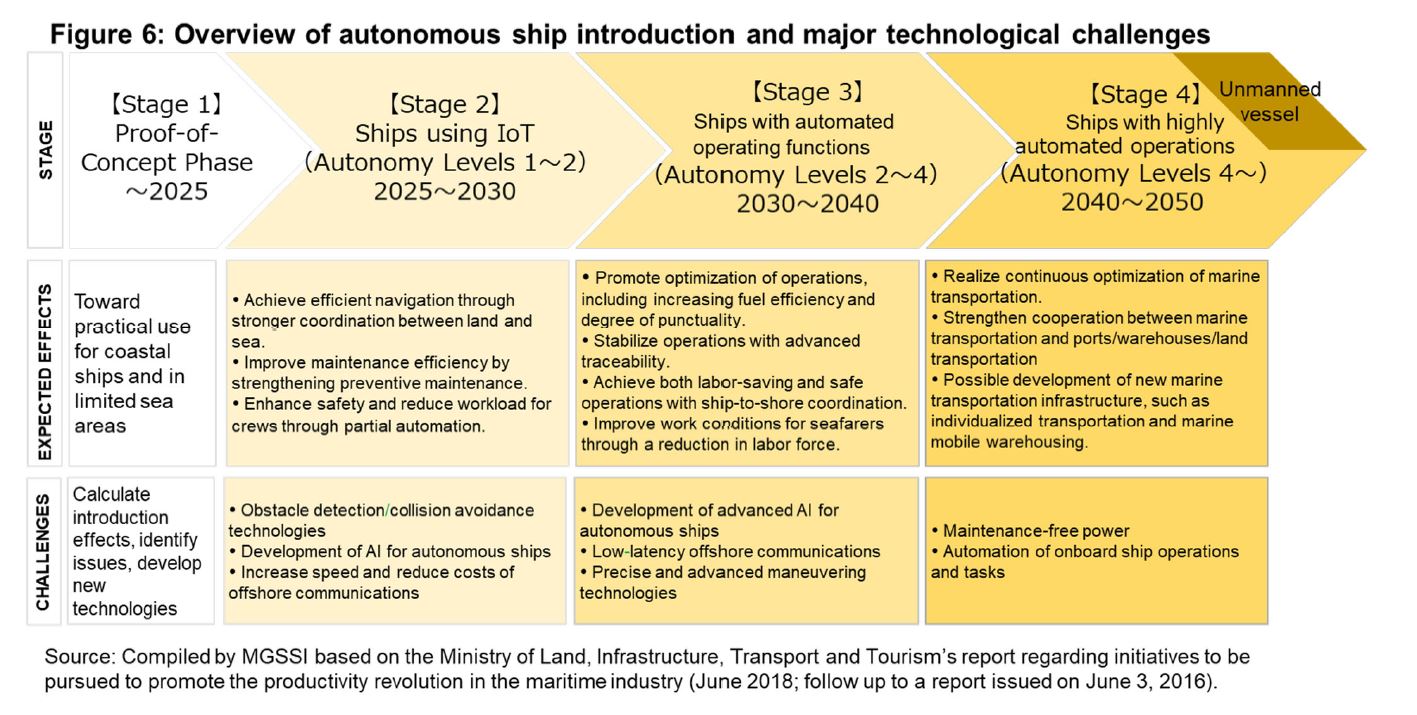
Pending MSC preparing a road map, including scope, steps and timelines, for consideration at MSC the following overview provides a starting point for consideration:

Diagram

Description automatically generated

Figure 1. Transitioning to autonomous shipping (Remote and Autonomous Ships – the next steps. (AAWA Position paper)

Source - Mitsui & Co. Global Strategic Studies Institute Monthly Report September 2019



## Opportunities

Developments currently underway that provide an opportunity to strategically plan for MASS and determine work programme tasks associated with the preparation of new/amended IALA guidance specifically related to VTS include:

1. **IALA engagement at MSC**:

<text to follow>

1. **Case Studies - MASS Trials and ‘Test Beds’ - The use of case studies.**

The increasing number of trials and ‘test beds’ are being conducted globally and a number of potential “case studies” have been identified that may assist gaining a greater understanding of MASS and its implications by monitoring their development/outcomes and identifying opportunities for involvement/engagement.

Refer to document VTS51-TG1.2.5 Proposed Case Studies)

1. **The role out of MASS 1 and MASS 2.**

<to follow>

1. **‘Fast tracking’ adoption of digital communications and automated data exchange**

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## Issues / challenges for the management of ship traffic in a VTS area

The advent of MASS will present issues and challenges for VTS operations and will undoubtedly contribute to major changes to how VTS interacts with participating ships and manages ship traffic to ensure the safety and efficiency of ship movements by VTS. Questions to be considered include, for example:

* **VTS Operations**:
  + How VTS receives, assimilates and processes data and information from MASS.
  + How does VTS interact with both conventional ships and MASS.
  + How does the VTS interact with the entity in control of the ship (Master/RCC/automated systems).
  + How VTS manages ship traffic, including:
    - A mix of conventional ships and MASS.
    - The means of providing warning, advice and instruction to achieve its purpose.
  + How VTS responds to the development of unsafe situations (conventional ships and MASS).
  + Knowing the degree of MASS for individual ships.
  + Managing interaction with multiple RCC’s.
  + Emerging situations where a ship needs to be contained / controlled to mitigate incident effects (national governments, VTS, other agencies).
* **Communications and interaction** 
  + Embracing digital communications.
  + Data and information exchange, including automated exchange.
  + Managing a mix of VHF voice, digital communications and automated data exchange.
  + The need for MASS to communicate their status.

The advent of MASS will invariable be associated with VTS managing ‘big data’, interacting with MASS using digital means, and possibly centralised, distributed and/or virtualised VTS ‘centres’ in the future.

Recognising the considerable work identified in the IMO Regulatory Scoping to determine how the safe, secure and environmentally sound operation of Maritime Autonomous Surface Ships (MASS) may be introduced in IMO instruments (*Refer to Section 3.5*) and the change processes associated with these, identifying the issues, challenges, and implications for VTS has been approached by adopting key assumptions.

It is recognised these assumptions will change as the advent of MASS evolves and the framework provided by international conventions is amended accordingly, however, achieving a common understanding of these provides a platform to facilitate discussion and analyses in exploring the implications of MASS for VTS.

### Overarching Assumptions

Consideration of the implications of MASS from a VTS perspective have been prepared based on the following overall assumptions:

* MASS will be required to participate in VTS. That is, subject to the same:
* Regulatory reporting requirements, and
* Obligations with regards to the issue of advice, warnings and instructions as deemed necessary.
* MASS will be subject to COLREG, as amended.
* MASS will be required to broadcast status as to who/what is in command at any time (Master/on-board DST, Remote Control Center?

### Degree of autonomy, Assumptions, and Implications for VTS

The implications of MASS from a VTS perspective have been identified in the table below, noting the overarching assumptions regarding MASS described in Section 3.3.1.

| **Degree of autonomy** | **Assumption/s** | **Implications for VTS** |
| --- | --- | --- |
| **Degree one**  Ship with automated processes and decision support.   * Seafarers are on board to operate and control shipboard systems and functions. * Some operations may be automated and at times be unsupervised but with seafarers on board ready to take control. | MASS of degree one is considered as a conventional ship with some additional functions to support human decision making on board.  The master and crew of the ship are in control of all ship operations at all times. | **Minimal**  There is a need to monitor advances in the automated process and decision support onboard |
| **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. | MASS of degree two is controlled and operated from the RCC.   * Seafarers considered as a back-up should remote control experience problems/fail.   The RCC may release control and operation to the master/crew.  No matter if MASS can be operated from another location, seafarers on board are assumed to be able to meet all the operation and control requirements. | * Managing ship traffic comprising both MASS and conventional ships * Digital interaction with ships, RCCs and other stakeholders to:   + Exchange information   + Provide advice, warnings and instruction * Managing Interaction with multiple RCCs * Operational and procedural changes associated with the above * Provision of advice, warnings and instructions to the RCC with responsibility for the vessel. * Communications and interaction with participating ships (Voice / data exchange). This may include communications between ships (MASS and Traditional). |
| **Degree three**  Remotely controlled ship without seafarers on board:   * The ship is controlled and operated from another location. * There are no seafarers on board. | The ship is controlled and operated from the RCC with no seafarers on board. | * As above, plus: * Emerging situation where ship needs to be contained / controlled to mitigate incident (national gov’t, VTS, other agencies) |
| **Degree four**  Fully autonomous ship:   * The operating system of the ship is able to make decisions and determine actions by itself. * There are no seafarers on board. | The operating system of the ship is able to make decisions and determine actions by itself.  A remote control centre may exist for MASS 4 but will have minimal impact on voyages except to define destinations and a route plan  The remote control centre could take control of the MASS 4 if necessary and in such circumstances would change the vessel status to MASS 3. | As above, plus:   1. Operational and procedural changes associated managing Degree four MASS 2. VTS should be able to request that the RCC retakes control of the MASS 4, changing its operational status to MASS 3 |

## EMBRACING AND INFLUENCING the development of mass.

To facilitate strategically planning for MASS and ensure VTS continues to contribute to safety of life at sea, safety and efficiency of navigation and the protection of the environment within the VTS area by mitigating the development of unsafe situations the following strategies have been adopted:

### Discussion Paper

The purpose of the discussion paper (this document) is to assist the Committee achieve a common understanding of MASS and its implications on the provision of VTS by clearly and concisely identifying:

* + Trends and opportunities presented by MASS.
  + Issues / challenges for the management of ship traffic in a VTS area.
  + Options, policies, and strategies for VTS to embrace / influence MASS.
  + Implications for the regulatory and legal framework for VTS.
  + Implications for IALA Standards relating to VTS.

The advent of MASS will be ongoing for many years and it is intended that this document will be reviewed and updated, as appropriate, by the VTS Committee at each meeting.

### Case studies

The ongoing use of ‘Case Studies’ to assist gaining a greater understanding of MASS and its implications by monitoring their development/outcomes and identifying opportunities for involvement/engagement.

### Position Paper

Preparation of a concise “Position Paper’ to articulate and communicate the Committee’s opinion and intentions on key considerations for the management of ship traffic to ensure the safety and efficiency of ship movements by mitigating the development of unsafe situations are considered in the IMO’s preparation of a mandatory instrument to address MASS operations.

Items to be considered in a “Position Paper’ include:

1. **What’s required to manage ship traffic and the interactions between** **conventional and autonomous ships, VTS and RCC’s, including any gaps.**

* Changes to the IMO Regulatory Regime
* Development of IMO goal-based MASS instrument, including:
  + MASS terminology and definitions, including an internationally agreed definition of MASS and clarifying the meaning of the term “master”, “crew” or “responsible person”, particularly in Degrees Three (remotely controlled ship) and Four (fully autonomous ship).”
  + “Other key issues include addressing the functional and operational requirements of the remote-control station/centre and the possible designation of a remote operator as seafarer
* MASS required to participate in VTS. That is, subject to the same:
  + Regulatory reporting requirements, and
  + Obligations with regards to the issue of advice, warnings and instructions as deemed necessary.
* MASS subject to COLREG.
* MASS required to broadcast status as to who/what is in command at any time (Master/on-board DST, Remote Control Center?

1. **Standards for digital communications, both autonomous and conventional ships.**

IALA and IMO Standards for all interactions to be undertaken by digital communications / data exchange, including:

* ‘Ships’[[2]](#footnote-2) to provide reports and information required by a VTS.
* VTS to provide ‘ships’ with information on factors that may influence ship movements and assist ‘onboard decision-making’[[3]](#footnote-3).

1. **The role of VTS and interaction with RCC’s and autonomous ships**

<To follow >

### Fast tracking adoption of new/revised IALA guidance

Two new Tasks already adopted:

* Ensuring VTS Guidance Documents evolve with the Advent of Mass
* Digital VTS Communications

### IALA Policy Documents

Key documents associated with the IALA Strategic Vision 2018-2026 should be regularly reviewed by the VTS Committee with a view to recommending updates to reflect the advent of MASS and provide the policy framework to facilitate embracing these developments:

1. **Position on the Development of Marine Aids to Navigation Services 2019**

This purpose of this document is to describe the Positions that that IALA will take concerning certain critical technical and operational aspects of its work with the object of assisting the work of the technical Committees of IALA and informing IALA members.

These position statements provide a link between the Strategic Vision and the work programmes of the Committees, giving guidance, where needed, on the technical philosophy on specific topics and IALAs preferred policy direction. Section 6 (vessel Traffic Services) list several position statements which may benefit from updating:

*6.1.3. VTS Technology*

*As digital communications platforms and services become more available it is envisaged that VTS will move towards a more digital service in parallel with the developments of on-board systems and equipment.*

*IALA’s technological guidance for VTS will describe in general terms the sensor and system performance required for VTS equipment installations, but IALA will not concern itself with technical specifications.*

*6.1.4. Autonomous vessels in a VTS area*

*IALA will prepare for the advent of Maritime Autonomous Surface Ships (MASS) and for their interaction with conventional manned vessels within VTS areas. IALA will cooperate with other international organisations in this preparation work.*

*Initial work in this area will consider the interaction process of autonomous vessels with conventional traffic, the information flow between MASS and shore authorities, and the related information exchange with conventional traffic.*

*IALA envisages that MASS will need services from shore including digital MSI perhaps in formats specifically for autonomous vessels.*

1. **Current Drivers and Trends (Ed.1.2)**

This document describes key trends and developments as guidance to assist IALA reach its strategic goals with a long-term horizon and perspective by closely monitoring and considering these in the future priorities of the association. Section 4 Considerations on IALA’s Future Organization and Activities may benefit from updating:

*4. CONSIDERATIONS ON IALA’S FUTURE ORGANIZATION AND ACTIVITIES*

*IALA should consider the following actions, as well as ensuring a higher flexibility and agility in the committee structure:*

1. *Define, develop and provide support regarding digitalization and managing of data, including but not limited to data infrastructure, harmonization and sharing of data, data protection and vulnerability, data risk tools etc.;*
2. *evaluate and evolve the role of VTS in the future including update guidelines and training in VTS - ability to communicate with modern vessels;*
3. *consider regularly the structure of IALA committees and their expertise (industry, secretariat). Where relevant, committee structure to become more flexible and responsive;*
4. *consider how IALA supports IMO and increase cooperation with IMO and other international maritime organization where relevant;*
5. *update guidelines and provide training in smart ATON vs. traditional ATON;*
6. *provide guidance on AtoN related cyber security threats and procedures;*
7. *focus on smart shore and floating maritime infrastructure to cope with smart ships;*
8. *capacity building and training (also through partnership collaboration);*
9. *develop a resilient GNSS back-up solution; and*
10. *it is a prerequisite that IALA possesses skilled and competent staff and authorities to conduct the above new activities as well as its current tasks and obligations. In addition to maritime and technical expertise, the focus on digitalization requires competencies and specific skills.*

### Greater IALA engagement with MSC and FAL

<to follow>

## Implications for the IMO regulatory regime for VTS

Current expectations are there are no implications for the IMO regulatory regime for VTS with the advent of MASS, noting:

* The IMO Regulatory Scoping Exercise completed in May 2021 (*Section 3.1.1*) did not identify any implications associated with SOLAS regulation V/12 (Vessel Traffic Services).
* IMO Resolution A.1158(32) adopted by the IMO Assembly in December 2021 has ‘future proofed’ the Guidelines as much as possible to accommodate new trends, such as the development, adoption and implementation of Maritime Service Portfolios, e-navigation and other evolving instruments aimed at the facilitation of safe, secure, and efficient maritime traffic and trade through:
  + Recognising applicable IMO instruments and other international guidance

*“In complying with these Guidelines, Contracting Governments should take account of applicable IMO instruments and refer to the relevant international guidance prepared and published by appropriate international organizations”. (Section 1.4)*

* + Recognising IALA Standards
    - *“NOTING that the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) has contributed significantly to the development of internationally harmonized guidance for vessel traffic services”*.
    - *“IALA is recognized as an important contributor to IMO's role and responsibilities relating to vessel traffic services”.* (*Section 1.3*)
    - *“Contracting Governments are encouraged to take into account IALA standards and associated recommendations, guidelines and model courses”*. (*Section 9.2*)

## Implications for IALA Standards relating to VTS

The implications for IALA Standards relating to VTS with the advent of MASS are significant, noting the role of IALA in contributing significantly to the development of internationally harmonized guidance for vessel traffic services (Refer Section 3.5).

To facilitate this two Work programme Tasks have been identified:

* Ensuring VTS Guidance Documents evolve with the Advent of Mass
* Digital VTS Communications

### Ensuring VTS Guidance documents evolve with the advent of MASS

To ensure IALA Standards specifically related to the establishment and operation of VTS evolve with the advent of MASS and continue to provide an effective framework for achieving worldwide harmonisation of VTS a new work programme task has been proposed to:

* Identify guidance requiring updating/amendment.
* Identify additional guidance required with the advent of MASS.
* Provide a framework for planning the preparation of amended/new guidance that reflects the conclusions described in the *Discussion Paper - Implications of MASS from a VTS perspective*.

Note: Refer to *VTS51-9.2.1.3 Proposed new task - MASS - Implications for IALA Guidance*

### Digital VTS Communications

Consensus is that new/additional guidance will be required, particularly in the short term for VTS digital communications (Refer to *VTS51-X.X.X Proposed new task - Digital VTS Communications*)

# Acronyms

AIS Automatic Identification System

MASS Maritime Autonomous Surface Ships

RCC Remote Control Center

VDES VHF Data Exchange System

VTS Vessel Traffic Services

# references

<reference list to be reviewed / updated and an explanatory sentence under each as to why it is included>

1. China MSA. (2020). Scoping exercise on the implications of MASS on VTS documents (VTS48-8-2.6).
2. NL Paper on the impact of MASS on VTS (VTS49-3.1.2).
3. IALA. (2019d). VTS COMMITTEE TASK REGISTER FOR 2018 – 2022.
4. IALA Standards S1040
5. IALA Guideline 1141
6. IMO. (2021). MSC.1/Circ.1638
7. IMO. (2019). MSC.1/Circ.1604
8. IMO. (2018). MSC 100/20/add.1
9. IMO. (2017). MSC 98/20/2

1. The degrees of autonomy are as defined by the IMO for the purposes of the Regulatory Scoping Exercise completed at the 103rd Session of the MSC in May 2021 [↑](#footnote-ref-1)
2. ‘ship’ – refers to conventional and autonomous [↑](#footnote-ref-2)
3. ‘onboard decision-making’ refers to the “responsible entity” for the ‘ship’ [↑](#footnote-ref-3)