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MSC.1/Circ.1610  
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**INITIAL DESCRIPTIONS OF MARITIME SERVICES  
IN THE CONTEXT OF E-NAVIGATION**

1 The Maritime Safety Committee, at its 101st session (5 to 14 June 2019), adopted resolution MSC.467(101) on *Guidance on the definition and harmonization of the format and structure of Maritime Services in the context of e-navigation*, and:

- .1 agreed to consolidate the descriptions of Maritime Services and to consider them together with all involved international organizations and interested Member States in order to harmonize the provision and exchange of maritime information and data; and
- .2 invited Member States and international organizations acting as domain coordinating bodies to submit descriptions of Maritime Services to the Organization, taking into account the guidance provided in the resolution.

2 In doing so, the Committee also approved the *Initial descriptions of Maritime Services in the context of e-navigation*, set out in the annex, which had been prepared by the Sub-Committee on Navigation, Communications and Search and Rescue, at its sixth session (16 to 25 January 2019), based on information submitted by Member States and international organizations acting as domain coordinating bodies.

3 The information contained in the annex constitutes the first draft of Maritime Service descriptions and it is an initial contribution for the harmonization of the format and structure of Maritime Services. The initial descriptions of Maritime Services are expected to be periodically updated, taking into account developments and related work on harmonization.

4 Interested Member States, international organizations and other stakeholders are invited to contribute to the work on harmonization of the format and structure of Maritime Services, either through the Organization or through the relevant domain coordinating bodies.

5 Member States and international organizations are invited to bring the Initial descriptions to the attention of those responsible for the development or implementation of Maritime Services.

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**ANNEX\***

**MARITIME SERVICES DESCRIPTIONS IN THE CONTEXT OF E-NAVIGATION**

**MS 1 – VTS Information service (INS)**

**1.1 Submitting organization**

IALA

**1.2 Coordinating bodies**

IMO and IALA

**1.3 Description of the Maritime Service**

IALA Guideline 1089 on *Provision of Vessel Traffic Services (INS, TOS, NAS)* provides guidance on the delivery of the three different types of services provided by a Vessel Traffic Service (VTS): Information Service (INS), Traffic Organization Service (TOS) and Navigational Assistance Service (NAS).

According to resolution A.857(20) on *Guidelines for Vessel Traffic Services*, an information service provided by a VTS is defined as "a service to ensure that essential information becomes available in time for onboard navigational decision-making."

Resolution A.857(20) also states that "the *information service* is provided by broadcasting information at fixed times and intervals or when deemed necessary by the VTS or at the request of a vessel, and may include for example reports on the position, identity and intentions of other traffic, waterway conditions, weather, hazards, or any other factors that may influence the vessel's transit."

Information related to:	Examples:
Navigational situations (including traffic and route information)	<ul style="list-style-type: none"> <li>• Position, identity, destination of vessels and the intention of other traffic.</li> <li>• Amendments and changes in promulgated information concerning the VTS area such as boundaries, procedures, radio frequencies, reporting points, the mandatory reporting of movements.</li> <li>• Limited manoeuvrability that may impose restrictions on the navigation of other vessels, or any other potential hindrances.</li> <li>• Suspension or change of routes, etc.</li> </ul>
Navigational warnings	<ul style="list-style-type: none"> <li>• Dangerous wrecks, obstacles not otherwise promulgated, diving operations, vessels not under command, etc.</li> </ul>
Meteorology	<ul style="list-style-type: none"> <li>• Information that will include the speed and direction of the prevailing wind, direction and height of the waves, visibility, atmospheric pressure, the formation of ice, etc.</li> </ul>

\* The annex is provided in English only.

<b>Information related to:</b>	<b>Examples:</b>
Meteorological warnings	<ul style="list-style-type: none"> <li>• Gale, storm, tsunami, restricted visibility, etc.</li> </ul>
Hydrography	<ul style="list-style-type: none"> <li>• Information that will include factors such as the stability of the seabed, sea depth, the accuracy of surveys, tidal ranges, tidal streams, prevailing currents and swell, etc.</li> </ul>
Electronic navigational aids	<ul style="list-style-type: none"> <li>• The availability of electronic navigational aids such as GNSS, Loran, DGPS, AIS, RACON, etc.</li> </ul>
Other information	<ul style="list-style-type: none"> <li>• Port information, pilot or tug request, cargo information, health condition, PSC, ISPS, etc.</li> </ul>

**Table 1-1: Examples of the types of information that may be provided by the VTS operating an Information service (IALA Guideline 1089)**

#### **1.4 Purpose**

The purpose of this Maritime Service is to provide data in a digital format to support VTS Information service (INS) and to create the means to reduce administrative burden and information overload, reduce miscommunication due to external interference, simplify work procedures, promote sustainable shipping and increase navigational safety.

Information provided in a digital format could complement and/or replace verbal/voice communications. The steps to achieve this transition to digital information exchange may vary in different areas and for different types of vessels. Details about digital information exchange should be published by the VTS authority.

#### **1.5 Operational approach**

The digitalization of information will diversify the communication means between shore authorities and vessels and will affect VTS procedures regarding provision of information.

Not all vessels are capable of receiving information in digital format. Provisions should, therefore, be made to ensure that less capable vessels are receiving the information they require. VTS should remain the primary contact with vessels for urgent and important messages and to ensure communications with mariners.

#### **1.6 User needs**

Resolution A.857(20) contains examples of information that can be provided to vessels. The use case below is based on the information from table 1-1.

##### **Use case: Vessel arrival**

Before or upon arrival in the VTS area, a data collection system on board sends all details regarding the arrival via relevant infrastructure to the VTS. The VTS collects the vessel's data directly into its system and automatically updates the vessel's pre-registered data. Both the vessel and the VTS use chart systems as a graphic interface to present details that are of interest to the voyage.

This example is generic and is intended for description purposes only. Actions and template categories may differ for different countries. Information exchange can be in real time instead of at specific times as indicated in the table below.

Time	Automated Vessel Action	Automated VTS Action	Information category
01:00	Provides pre-arrival information	Replying with information on weather	Environmental
02:00	Enters VTS area, provides sailing route	Traffic information to vessel	Traffic and Route information
02:30	Passes reporting point line	Provides information on current, wave height, etc.	Hydrographical information
03:00	Requires port information	Provides quay details	Traffic and Route information
03:30	Passes second reporting point	Provides operational information on AtoNs	Navigation Hazards
04:00	Vessel along side	Gives information on wind speeds, visibility	Environmental

### 1.7 Information to be provided

(Under development)

### 1.8 Associated technical services

Name	ID (MRN)	Description	Standardization Body
Voyage information service	urn:mrn:stm:service:specification:sma:vis	The service supports exchange of voyage plans, text messages and area messages	IEC
Weather service			
ENSI Voyage reporting service	urn:mrn:mcp:service:specification:fta:ENSI-VRS	The Service provides route validation for ships and facilitates sharing of SRS reports and Voyage information to shore centres	
Routeing information	urn:mrn:iho:s127	S-127	IHO
Currents service	urn:mrn:iho:s101	S-101	IHO
Wave height service			
Port information (harbour charting information)	urn:mrn:iho:s101	S-101	IHO
Port information (harbour services information)			IHMA
AtoN Information	urn:mrn:iala:aton		IALA

(To be further developed)

## 1.9 Relation to other Maritime Services

MS 1 has a relationship with other Maritime Services where it affects the VTS.

Examples may be different depending on coastal State arrangements.

<b>Maritime Service</b>	<b>Examples of information related to MS 1</b>
MS 2 – VTS Navigational assistance service (NAS)	(Under development)
MS 3 – Traffic organization service (TOS)	(Under development)
MS 4 – Port support service (PSS)	Delays, obstruction, cargo operations, port availability and anchorage area in the port, ISPS state, Marsec level
MS 5 – Maritime safety information (MSI) service	All information depending on structure of MSI
MS 6 – Pilotage service	Pilot orders and updates
MS 7 – Tug service	Tug order and updates
MS 8 – Vessel shore reporting	Notification of arrival, dangerous cargo, etc.
MS 9 – Telemedical assistance service (TMAS)	Delays
MS 10 – Maritime assistance service (MAS)	Notifications, routeing, places of refuge
MS 11 – Nautical chart service	Local area updates, chart updates
MS 12 – Nautical publications service	Updates to publication
MS 13 – Ice navigation service	Ice routes, ice conditions, ice-breaking assistance
MS 14 – Meteorological information service	(Under development)
MS 15 – Real-time hydrographic and environmental information services	Horizontal and vertical tidal information in VTS area, available water column
MS 16 – Search and rescue (SAR) service	Search pattern and vessel of opportunity

## MS 2 – VTS Navigational assistance service (NAS)

### 2.1 Submitting organization

IALA

### 2.2 Coordinating bodies

IMO and IALA

### 2.3 Description of the Maritime Service

IALA Guideline 1089 on *Provision of Vessel Traffic Services (INS, TOS, NAS)* provides guidance on the delivery of the three different types of services provided by a Vessel traffic service (VTS): Information service (INS), Traffic organization service (TOS) and Navigational assistance service (NAS).

According to resolution A.857(20) on *Guidelines for Vessel Traffic Services*, a navigational assistance service is defined as "a service to assist onboard navigational decision-making and to monitor its effects."

Resolution A.857(20) also states that "the *navigational assistance service* is especially important in difficult navigational or meteorological circumstances or in case of defects or deficiencies. This service is normally rendered at the request of a vessel or by the VTS when deemed necessary."

Information related to:	Examples:
Request and identification	<ul style="list-style-type: none"> <li>• Availability of NAS, start and end of NAS.</li> <li>• Request for vessel identification such as position, course made good and speed over the ground.</li> <li>• Status of vessel's equipment; etc.</li> </ul>
Navigational information (including position and course information)	<ul style="list-style-type: none"> <li>• Examples provided to an individual vessel: <ul style="list-style-type: none"> <li>• provide range and bearing from fixed objects, fairway/channel or way-points; proximity to navigational hazards, etc.</li> <li>• provide information related to navigating into a channel/fairway/lane (i.e. track is parallel/diverging/converging with/from/to reference line); etc.</li> </ul> </li> </ul>
Advice (or instruction)	<ul style="list-style-type: none"> <li>• Advise (or instruct) a vessel to alter the course, speed.</li> <li>• Advise (or instruct) to keep clear from area/position, close up/drop back on/from vessels; etc.</li> </ul>
Warning	Diverging from the recommended track towards dangerous wrecks, obstacles not otherwise promulgated; diving operations; vessels not under command; etc.

**Table 2-1: Examples of the types of information that may be provided by a VTS operating a Navigational assistance service (IALA Guideline 1089)**

## 2.4 Purpose

The purpose of this Maritime Service is to provide data in a digital format to support Navigational assistance service (NAS) and to create means to reduce administrative burden and information overload, reduce the risk for miscommunication due to external interference, simplify work procedures, promote sustainable shipping, and increase navigational safety.

Information provided in a digital format could complement and/or replace verbal/voice communications. The steps to achieve this transition to digital information exchange may vary in different areas and for different types of vessels. Details about digital information exchange should be published by the VTS authority.

## 2.5 Operational approach

All information related to MS 2 should be delivered only by VTS authorities.

VTS should remain the primary contact with vessels for urgent and important messages necessary for onboard decision-making.

Information provided digitally could complement voice communications in time-critical situations and in addition partly replace voice communications in non-time critical situations.

*Note:* Example of time critical situation:

Risk of grounding/striking/collision. In addition to voice communications, the vessel can be provided with an electronic route recommendation.

*Note:* Example of non-time critical situation:

Assist a vessel to an anchoring position by providing the vessel with an electronic route recommendation without voice communications.

The identity of the vessel receiving Navigational Assistance Service should be assured. Other items listed in IALA Guideline 1089 on *Provision of Vessel Traffic Service* (appendix B) should also be taken into consideration for digital transmission of information.

All information related to this service should be displayed in real time. Measures should be taken to ensure that the information is received and acknowledged.

## 2.6 User needs

The use cases are generic and intended for description purposes only. Actions and template categories may differ for different countries.

For example:

- Recommended route can be sent digitally to a vessel.
- Pre-arrival reporting can be done digitally without voice communication for update of route of voyage plan in order to avoid collisions, allisions and groundings and assist in safe navigation.
- The content of the voice communication can be provided digitally and be displayed as text in parallel / in addition to voice communication.

**Use case: Vessel deviates from planned route**

A vessel approaches the VTS area according to the voyage plan sent to the VTS. The route is displayed in the VTS application and vessel's positions are automatically compared to the planned route. The system alerts the VTS operator, who then confirms that the vessel has deviated from its route. The VTS operator informs, warns and, if necessary, instructs / advises the vessel to change its course via voice communication. Navigational assistance information is also presented on the vessel's own navigation system. The VTS operator ensures that the vessel has changed its course according to the solution. The VTS application continues to monitor the vessel's voyage. It will alert the VTS operator if new deviation occurs.

The example is generic and intended for description purposes only. Actions and template categories may differ for different countries.

Time	Vessel Action	VTS Action	Information category
01:00	Approaches VTS area	Receive voyage plan and monitor vessels progress	Traffic and Route Information
01:30	Deviates from the route	Informs, warns and advises / instructs the vessel to change course/speed	Navigational advice
01:35	Changes course	Verifies that the vessel has changed course and is no longer in danger	

**Use case: Assistance to a vessel to an anchoring position**

A vessel is inside the VTS area and needs to stop for engine repair. The vessel asks for a safe anchorage position. The VTS provides anchoring position. The vessel takes a direct course to the anchoring position, over a shallow area. The VTS gives warning to the vessel and provides a safe route to anchorage position.

After the vessel has anchored, high winds develop causing the vessel to drag anchor. The VTS operator monitoring the anchorage receives an alarm and warns the vessel through automated digital alert and through voice communication.

Time	Vessel Action	VTS Action	Information category
00:00	Ask for anchorage position	Provides position	Navigation Information
00:10	Takes course to the position	Warning: You are running into danger – shallow waters... Provides vessel safe route	Navigational warning / Advice
00:20	Follows route provided by VTS to the anchorage	Monitors	Navigational Information
05:00	Drags anchor	Warning: You are dragging anchor	Navigational warning
05:30	Repositions	Monitors	Navigational Information

## 2.7 Information to be provided

(Under development)

## 2.8 Associated technical services

Name	ID (MRN)	Description	Standardization Body
Voyage information service	urn:mrn:stm:service:specification:sma:vis	The service supports exchange of voyage plans, text messages and area messages	IEC
Route information		S-421	IEC

(To be further developed)

## 2.9 Relation to other Maritime Services

MS 2 has a relationship to other Maritime Services where it affects VTS.

Examples may be different depending on the coastal State arrangements.

Maritime Service	Examples of information related to MS 2
MS 1 – VTS Information service (INS)	(Under development)
MS 3 – Traffic organization service (TOS)	(Under development)
MS 4 – Port support service (PSS)	Delays, obstruction, cargo operations, port availability and anchorage area in the port, ISPS State, Marsec level
MS 5 – Maritime safety information (MSI) service	All information depending on structure of MSI
MS 6 – Pilotage service	Pilot orders and updates
MS 7 – Tug service	Tug order and updates
MS 8 – Vessel shore reporting	Notification of arrival, dangerous cargo, etc.
MS 9 – Telemedical assistance service (TMAS)	Delays
MS 10 – Maritime assistance service (MAS)	Notifications, routeing, places of refuge
MS 11 – Nautical chart service	Local area updates, chart updates
MS 12 – Nautical publications service	Updates to publication
MS 13 – Ice navigation service	Ice routes, ice conditions, ice-breaking assistance
MS 14 – Meteorological information service	Weather information
MS 15 – Real-time hydrographic and environmental information services	Horizontal and vertical tidal information in VTS area, available water column
MS 16 – Search and rescue (SAR) service	Search pattern and vessels of opportunity

## MS 3 – Traffic organization service (TOS)

### 3.1 Submitting organization

IALA

### 3.2 Coordinating bodies

IMO and IALA

### 3.3 Description of the Maritime Service

IALA Guideline 1089 on *Provision of Vessel Traffic Services (INS, TOS, NAS)* provides guidance on the delivery of the three different types of services provided by a Vessel traffic service (VTS): Information service (INS), Traffic organization service (TOS) and Navigational assistance service (NAS).

According to resolution A.857(20) on *Guidelines for Vessel Traffic Services*, a traffic organization service is defined as "a service to prevent the development of dangerous maritime traffic situations and to provide for the safe and efficient movement of vessel traffic within the VTS area."

Resolution A.857(20) also states that "the *traffic organization service* concerns the operational management of traffic and the forward planning of vessels movements to prevent congestion and dangerous situations, and is particularly relevant in times of high traffic density or when the movement of special transports may affect the flow of other traffic. The service may also include establishing and operating a system of traffic clearances or VTS sailing plans or both in relation to priority of movements, allocation of space, mandatory reporting of movements in the VTS area, routes to be followed, speed limits to be observed or other appropriate measures which are considered necessary by the VTS authority."

Information related to:	Examples
Traffic clearance	Give authorization under conditional circumstances to a vessel prior to or when entering a VTS area: <ul style="list-style-type: none"> <li>• departing from a berth or an anchorage position within a VTS area;</li> <li>• entering into a fairway within a VTS area; or</li> <li>• prior to commencing a manoeuvre that may be detrimental to safe navigation.</li> </ul> Examples of conditions: <ul style="list-style-type: none"> <li>• a VTS sailing plan before entering a VTS area;</li> <li>• lock and bridge passage planning;</li> <li>• report position at determined reporting point/line/pilot station;</li> <li>• use a second fairway in case of bad visibility/weather;</li> <li>• use a tug boat in case of strong wind;</li> <li>• dredging or compass swing in confined waterway.</li> </ul>
Anchorage	Examples of anchorage situations: <ul style="list-style-type: none"> <li>• organizing the movements to/from an anchorage position/area;</li> <li>• assignment of an anchorage position;</li> <li>• assisting vessels into anchorage position.</li> </ul>
Enforcement	Examples of enforcement: <ul style="list-style-type: none"> <li>• speed limits;</li> <li>• adherence to rules regarding traffic routing measures;</li> </ul>

Information related to:	Examples
	<ul style="list-style-type: none"> <li>• pilotage requirements;</li> <li>• other traffic regulations and possibly local by-laws.</li> </ul>
Waterway (sea, channels and fairway) management	<p>Examples of management measures:</p> <ul style="list-style-type: none"> <li>• the use of one-way traffic as an alternative of two-way traffic, depending on the dimensions of vessel or the weather conditions;</li> <li>• organizing other traffic when a vessel has passed point of no return;</li> <li>• slot management to allocate vessels in a time window;</li> <li>• organizing the traffic concerning vessel dimensions in comparison to fairway restrictions;</li> <li>• instruct vessels when overtaking is not permitted;</li> <li>• establish and organize vessel safety zones in case of particular operations;</li> <li>• establish and organize exclusion zones;</li> <li>• instruct vessels to keep clear from special areas/positions;</li> <li>• organizing the traffic with regards to meteorological, hydrographical or other restrictions such as visibility, wind speed, current, sea state and under-keel clearance.</li> </ul>

**Table 3-1: Examples of types of information that may be provided by the VTS within a Traffic Organization Service (IALA Guideline 1089)**

### 3.4 Purpose

The purpose of this Maritime Service is to provide data in a digital format to support Traffic organization service (TOS) and to create means to reduce administrative burden and information overload, reduce the risk for miscommunication due to external interference, simplify work procedures, promote sustainable shipping, and increase navigational safety.

Information provided in a digital format could complement and/or replace verbal/voice communications. The steps to achieve this transition to digital information exchange may vary in different areas and for different types of vessels. Details about digital information exchange should be published by the VTS authority.

### 3.5 Operational approach

A Traffic organization service should be responsible for separating traffic in the interest of safety and efficiency. This separation could be defined in space, time and/or distance.

Enforcement may also be carried out within a Traffic organization service where the VTS should monitor adherence to applicable rules and regulations and to take appropriate action where required and within the authority of the VTS (IALA Guideline 1089 on *Provision of Vessel Traffic Services*).

Digital communication may apply to elements of the Traffic organization service that are not time critical situations.

Examples:

- Slot management: provides vessels digitally with priority of arrival and distance between two vessels.
- Traffic clearance: provides vessels digitally with permission to proceed, impose conditions or deny entry.
- Route information: provides vessels digitally with recommended route information.
- Traffic information: vessel provides VTS digitally their intentions, such as overtaking of another vessel.
- Information regarding restricted or no-go area: the content (draft, closed fairway/port/quay, etc.) can be provided digitally to vessels without using voice communication.

All information provided digitally can complement and/or replace verbal/voice communications.

### 3.6 User needs

The use cases are generic and are intended for description purposes only. Actions and template categories may differ for different countries.

#### Use case: Vessel leaves quay

When the vessel is ready to sail, it sends its planned time of departure digitally to the VTS where it is presented in the VTS application. The application alerts operator on upcoming traffic conflicts and advises on a solution, which is assessed by the VTS. The VTS operator takes action and digitally instructs the vessel to delay planned departure by thirty minutes. The instructions are graphically displayed in applications, acknowledged by the vessel and the VTS operator provides delayed departure information to other traffic via digital and/or verbal means for vessels not able to receive information digitally.

Time	Vessel action	VTS action	Information category
00:00	Sends ETD to the VTS and requests permission to leave quay (in some cases additional communication by voice could be required)	Denies clearance. Gives permission to leave in thirty minutes.	Waterway management
00:01	The vessel acknowledges revised ETD	VTS receives acknowledgement and informs other traffic of revised ETD	Waterway management
00:30	The vessel informs VTS of intended departure	VTS issues traffic clearance with any appropriate conditions attached	

### Use case: Vessel transiting protected area

As a vessel is approaching a marine mammal protected area where a speed restriction may or may not be active depending on the presence of marine mammals. When marine mammals are present, vessels are advised digitally that a speed restriction is in effect. For example, the vessel receives a digital message and the extent of the area is displayed in the navigational systems.

Time	Vessel action	VTS action	Information category
00:00	Sailing in the vicinity of marine mammal protected area	Receives information confirming presence of marine mammals and activates the speed restriction area	Enforcement
00:30	Approaches a marine mammal protected area	Sends automated digital message regarding active speed restriction and the area (text and visual)	Waterway management
02:00	Entering the marine mammal protected area	Confirm that speed restrictions are in force	Waterway management
02:10	Exceeding speed limit	Send automated digital alert message requesting vessel conform to speed limit	Enforcement

### 3.7 Information to be provided

(Under development)

### 3.8 Associated technical services

(Under development)

### 3.9 Relation to other Maritime Services

MS 3 has a relationship with other Maritime Services where it affects the VTS.

Examples may be different depending on the coastal State arrangements.

Maritime Service	Examples of information related to MS 3
MS 1 – VTS Information service (INS)	(Under development)
MS 2 – VTS Navigational assistance service (NAS)	(Under development)
MS 4 – Port support service (PSS)	Delays, obstruction, cargo operations, port availability and anchorage area in the port, ISPS State, Marsec level
MS 5 – Maritime safety information (MSI) service	All information depending on structure of MSI
MS 6 – Pilotage service	Pilot orders and updates

<b>Maritime Service</b>	<b>Examples of information related to MS 3</b>
MS 7 – Tug service	Tug order and updates
MS 8 – Vessel shore reporting	Notification of arrival, dangerous cargo, etc.
MS 9 – Telemedical assistance service (TMAS)	Delays
MS 10 – Maritime assistance service (MAS)	Notifications, routeing, places of refuge
MS 11 – Nautical chart service	Local area updates, chart updates
MS 12 – Nautical publications service	Updates to publication
MS 13 – Ice navigation service	Ice routes, ice conditions, ice-breaking assistance
MS 14 – Meteorological information service	Weather information
MS 15 – Real-time hydrographic and environmental information services	Horizontal and vertical Tidal information in VTS area, available water column
MS 16 – Search and rescue (SAR) service	Search pattern and vessel of opportunity

## **MS 4 – Port support service (PSS)**

### **4.1 Submitting organization**

IHMA

### **4.2 Coordinating body**

IMO

### **4.3 Description of the Maritime Service**

Port Support Service (PSS) is defined as a digital service in support of a ship calling at a port. It provides information necessary to organize and support the port call and varies depending on the local needs. PSS may relay information from related Maritime Services and may incorporate other services if the respective MS is not available at a port. Examples of PSS include:

- Berth and mooring details;
- Waste handling arrangements;
- Fuel/bunkers;
- Crane and other cargo handling arrangements;
- Provisioning;
- Water supply;
- Customs and Immigration;
- ISPS information; and
- Reporting formalities.

### **4.4 Purpose**

PSS will provide detailed information on available services at the port of call. It will enable the ship or its representatives, like the operational centre of a shipping line or shipping agents, to plan and prepare for a port call. It will also allow users to request required services and enable the execution of the services during a port call to be tracked.

PSS will enable the actors within a local port to receive data from an approaching ship in order to provide appropriate and timely support to a port call and enable coordination of the different aspects of the port call with the local actors involved.

### **4.5 Operational approach**

PSS will be defined by analysing the local services available at the individual port. This analysis will establish which, if any, related Maritime Services are available locally and do not need to be included in PSS. Those services determined to be included in PSS will be clearly defined and made available for related actors to understand which services are included in the given implementation of PSS.

PSS will then define which data streams are used to organize PSS. It will also include the different methods used to exchange the necessary information between ships and ports and between the different actors within the port.

#### 4.6 User needs

Users of PSS include both ships approaching the respective port as well as the actors within the port.

For ships and their operators there is a need to understand which services they can expect locally to provide support during a port call. The ship will also need to understand which digital information needs to be submitted in order for the port actors to be able to provide the necessary support.

PSS will define those requirements and will specify the information exchange in order to provide the described port call services to the ship as well as the information needed between port actors to execute their individual aspects of those services.

#### User case

When a ship is approaching a port, they may require mooring services. If mooring services are provided as PSS in a given port, the required data exchange will be defined so the organization providing the mooring service can determine which level of service they need to prepare for in order to safely and efficiently moor the ship requesting this service.

#### 4.7 Information to be provided

(Under development)

#### 4.8 Associated technical services

Name	ID (MRN)	Description	Standardization body
PortCallMessageExchangeService		Standard for exchange of timestamps and related data associated with a port call – Data Standard will be S-211	IPCDMC through IALA
VoyageInformationService		Standard for exchange of voyage related information including waypoints and timestamps – Data standard will be S-421	IEC

(To be further developed)

#### 4.9 Relation to other Maritime Services

The following services are related to MS4:

<b>Maritime Service</b>	<b>Examples of information related to MS 4</b>
MS 1 VTS information service (INS)	(Under development)
MS 6 – Pilotage service	(Under development)
MS 7 – Tug service	(Under development)
MS 8 – Vessel shore reporting	(Under development)
MS 10 – Maritime assistance service (MAS)	(Under development)
MS 13 – Ice navigation service	(Under development)
MS 14 – Meteorological information service	(Under development)
MS 15 – Real-time hydrographic and environmental information services	(Under development)

## **MS 5 – Maritime safety information (MSI) service**

### **5.1 Submitting organizations**

IHO and WMO

### **5.2 Coordinating bodies**

IMO, IHO and WMO

### **5.3 Description of the Maritime Service**

This Maritime Service describes the provision of navigational and meteorological warnings, meteorological forecasts and other urgent safety-related messages broadcast to ships. The MSI Service is the internationally and nationally coordinated network of broadcasts containing urgent information which is necessary for safe navigation, received in ships by equipment which automatically monitors the appropriate transmissions, displays information which is relevant to the ship and provides a print capability.

### **5.4 Purpose**

The purpose of this Maritime Service is to provide the mariner with information related to navigational and meteorological warnings, meteorological forecasts and other urgent safety-related messages.

The provision of MSI makes available to mariners, prior to and during voyages, information that improves their situational awareness and assists with safety of navigation.

The promulgation of MSI is defined in SOLAS chapter IV, as part of the Global Maritime Distress and Safety System (GMDSS) and in resolution A.705(17), as amended, on *Promulgation of Maritime Safety Information*.

SOLAS regulations V/4 through V/7 govern the Contracting Government's responsibilities with regards to providing MSI.

The Revised Joint IMO/IHO/WMO Manual on MSI, Publication S-53 (the Joint Manual on MSI), describes the provision of the service and the receiving methods in more detail.

The delivery methods are described in the International SafetyNET Manual (MSC.1/Circ.1364, as revised).

The roles and responsibilities of a METAREA Coordinator are defined in resolution A.1051(27), as amended, on *IMO/WMO Worldwide Met-Ocean Information and Warning Service – Guidance Document*, and the provision of marine meteorological services is guided by WMO No.558 (Manual on Marine Meteorological Services) and WMO No.471 (Guide to Marine Meteorological Services).

Services that constitute the Maritime Service are currently provided in a fully electronic format and, as such, there is no requirement to transition from analogue to digital information provision. Additional analogue (voice) services do exist but there is no intent to transition these to digital services.

## 5.5 Operational approach

The MSI Service, as defined in resolution A.705(17), as amended, is the internationally and nationally coordinated network of broadcasts containing information which is necessary for safe navigation, received in ships by equipment which automatically monitors the appropriate transmissions, displays information which is relevant to the ship and provides a print capability. This concept is illustrated in the figure below:

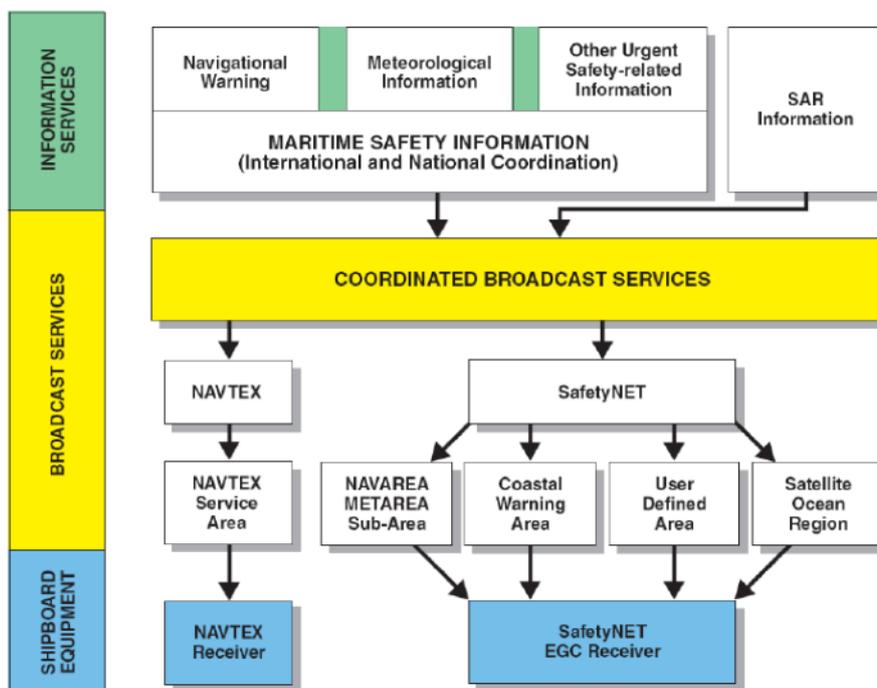
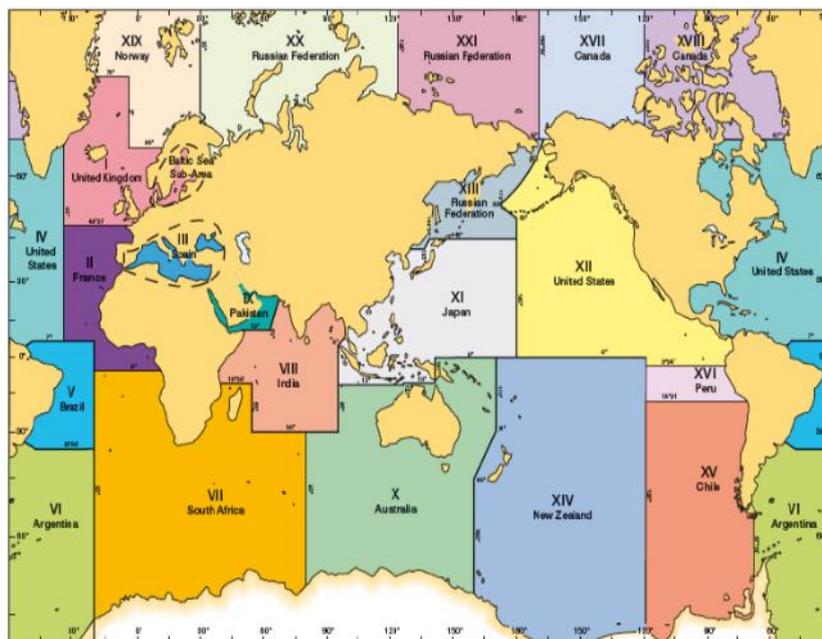


Figure 5-1: The maritime safety information service of the Global Maritime Distress and Safety System (Source: S-53)

Within the GMDSS, MSI is promulgated to defined areas that are managed by area coordinators as illustrated in the figures below:



**Figure 5-2: NAVAREAs for coordinating and promulgating navigational warnings under the World-Wide Navigational Warning Service (Source: S-53)**



**Figure 5-3: METAREAs for coordinating and promulgating meteorological warnings and forecasts under the World-Wide Met-Ocean Information and Warnings Service (Source: S-53)**

## 5.6 User needs

To meet the needs of GMDSS users, NAVAREA, METAREA and National MSI Coordinators promulgate MSI to their respective areas of responsibility via approved GMDSS methods as follows:

Typical MSI services and delivery:

Information	Area	Service Delivery
Navigation warning	NAVAREA	EGC/HF NBDP
Navigation warning	Coastal warning area	NAVTEX/EGC
Meteorological warnings and forecasts	METAREA	EGC/HF NBDP
Meteorological warnings and forecasts	Coastal warning area	NAVTEX/EGC

To meet the needs of non-GMDSS users, NAVAREA, METAREA and National MSI Coordinators may promulgate MSI to their respective areas of responsibility via other methods as follows:

Information	Area	Service Delivery
Navigation warning	NAVAREA	HF voice
Navigation warning	Coastal warning area	VHF/ MF voice
Meteorological warnings and forecasts	METAREA	HF voice
Meteorological warnings and forecasts	Coastal warning area	VHF/ MF / HF voice
Navigational warning	NAVAREA and coastal warning area	Web service
Meteorological information	METAREA and coastal area	Web service

Potential future services/delivery methods:

Information	Area	Service Delivery
Navigation warning	NAVAREA	VDES-SAT
Navigation warning	Coastal	VDES-TER AIS-SRM
Meteorological warnings and forecasts	NAVAREA	VDES-SAT
Meteorological warnings and forecasts	Coastal	VDES-TER AIS-SRM (warnings) AIS-ASM (forecasts)

## 5.7 Information to be provided

MSI Services, as listed in resolution A.706(17), as amended, on *IMO/IHO World-Wide Navigational Warning Service – Guidance Document* for hazards to navigation, the Manual on Marine Meteorological Services and in the Joint Manual on MSI for marine weather warnings and forecasts are listed below.

Information related to:	Examples: <sup>1</sup>
Hazards to navigation	<ul style="list-style-type: none"> <li>.1 casualties to lights, fog signals, buoys and other aids to navigation affecting main shipping lanes;</li> <li>.2 the presence of dangerous wrecks in or near main shipping lanes and, if relevant, their marking;</li> <li>.3 establishment of major new aids to navigation or significant changes to existing ones, when such establishment or change might be misleading to shipping;</li> <li>.4 the presence of large unwieldy tows in congested waters;</li> <li>.5 drifting hazards (including derelict ships, ice, mines, containers, other large items over 6 metres in length, etc.);</li> <li>.6 areas where search and rescue (SAR) and anti-pollution operations are being carried out (for avoidance of such areas);</li> <li>.7 the presence of newly discovered rocks, shoals, reefs and wrecks likely to constitute a danger to shipping, and, if relevant, their marking;</li> <li>.8 unexpected alteration or suspension of established routes;</li> <li>.9 cable or pipe-laying activities, the towing of large submerged objects for research or exploration purposes, the employment of manned or unmanned submersibles, or other underwater operations constituting potential dangers in or near shipping lanes;</li> <li>.10 the establishment of research or scientific instruments in or near shipping lanes;</li> <li>.11 the establishment of offshore structures in or near shipping lanes;</li> <li>.12 significant malfunctioning of radio navigation services and shore-based maritime safety information radio or satellite services;</li> <li>.13 information concerning events which might affect the safety of shipping, sometimes over wide areas, e.g. Naval exercises, missile firings, space missions, nuclear tests, ordnance dumping zones, etc. It is important that where the degree of hazard is known, this information is included in the relevant warning. Whenever possible such warnings should be originated not less than five days in advance of the scheduled event and reference may be made to relevant national publications in the warning;</li> <li>.14 acts of piracy and armed robbery against ships;</li> <li>.15 tsunamis and other natural phenomena, such as abnormal changes to sea level;</li> <li>.16 World Health Organization (WHO) health advisory information; and</li> <li>.17 security-related requirements.</li> </ul>

<sup>1</sup> Examples from resolution A.706(17), as revised, Document Review Working Group 2018, and the Manual on Marine Meteorological Services.

Information related to:	Examples: <sup>1</sup>
Marine weather warnings and forecasts	<p><b>For high seas areas:</b> Forecasts shall include wind parameters, sea state and visibility.</p> <p>Warnings shall be provided for the following phenomena:</p> <ul style="list-style-type: none"> <li>• wind warnings of gale force (Beaufort force 8) and above; and</li> <li>• ice accretion.</li> </ul> <p><b>For coastal areas:</b> Forecasts shall include wind parameters, waves (sea and swell) and ice accretion where applicable.</p> <p>Warnings shall be given for the following phenomena:</p> <ul style="list-style-type: none"> <li>• winds of gale force (Beaufort 8) and above;</li> <li>• potentially hazardous ice accretion; and</li> <li>• unusual and hazardous sea-ice conditions.</li> </ul> <p>Warnings should be given for the following phenomena:</p> <ul style="list-style-type: none"> <li>• near gales (Beaufort force 7);</li> <li>• severe thunderstorms/squall lines;</li> <li>• restricted visibility (one nautical mile or less);</li> <li>• storm-induced water-level changes; and</li> <li>• tsunami.</li> </ul>

## 5.8 Associated technical services

Two principal methods are used for broadcasting MSI in accordance with the provisions of the SOLAS Convention, as amended, in the areas covered by these methods, as follows:

- NAVTEX: broadcasts to coastal waters, or EGC where no NAVTEX services exist; and
- Enhanced Group Call Services (EGC) (e.g. SafetyNET): broadcasts which cover all the waters of the globe except for Sea Area A4, as defined by resolution A.801(19) on *Provision of Radio Services for the GMDSS*, annex 3, as amended.

Additionally, HF NBDP may be used to promulgate MSI to Sea Area A4 (SOLAS regulation IV/7.1.5).

Ships are required to be capable of receiving MSI broadcasts for the area in which they operate in accordance with the provisions of the SOLAS Convention, as amended.

Method	ID (MRN)	Description	Standardization body
EGC services		Delivery of MSI via IMO Recognized satellite service	Resolution A.1001(25)
NAVTEX		Delivery of MSI via NAVTEX	ITU-R M.540
HF NBDP		Delivery of MSI via HF NBDP	ITU-R M.688 Resolution A.700(17)
Web platforms		Display of MSI and access to MSI data files	

S-100 format messaging will be used to pass MSI for display in ECDIS (specifically S-124, S-411 and S-412 standards).

## 5.9 Relation to other Maritime Services

MS 5 has relationships with other Maritime Services for the delivery of safety information.

Examples may be different depending on the coastal State arrangements.

<b>Maritime Service</b>	<b>Identified responsible service provider</b>
MS 1 – VTS Information service (INS)	VTS Authority
MS 4 – Port support service (PSS)	Local port/harbour authority
MS 11 – Nautical chart service	National hydrographic authority/ organization
MS 13 – Ice navigation service	National competent authority organization
MS 14 – Meteorological information service	National meteorological authority public institutions
MS 15 – Real-time hydrographic and environmental information services	National hydrographic and meteorological authorities
MS 16 – Search and rescue (SAR) service	SAR Authorities

## **MS 6 – Pilotage service**

### **6.1 Submitting organization**

IMPA

### **6.2 Coordinating bodies**

IMO and IMPA

### **6.3 Description of the Maritime Service**

Ships proceeding or leaving a port or a specific area, should have easy access to information regarding the pilotage service provided. Information such as local regulations, contact, notices, means of boarding, boarding point, limitations or pilot booking procedure, could be accessible by electronic means, where available.

The information provided through this service is not piloting information as pilotage is a service physically performed on board ships by duly qualified and certificated or licensed maritime pilots.

### **6.4 Purpose**

This Maritime Service is limited to information provided to ships regarding the pilotage service in a given geographic area. It does not address the act of piloting, which is provided by a pilot on the bridge of a ship.

The purpose of this Maritime Service is to provide information related to the pilotage service when planning an operation before the pilot boards the vessel, by using modern technology and common standards.

### **6.5 Operational approach**

Pilot organizations providing pilotage service in an area could provide information to ships about the pilotage service in a digital and easy accessible way. The information could be, as an example, portrayed as a layer on the ECDIS or in a graphical display. This information could include, for inbound ships, the location of the pilot station(s) or boarding point(s) in latitude/longitude or distance and bearing from a location, or marked by an aid to navigation. In addition, the transmitted information could include the VHF channels to contact the pilot or pilot boat. Typically, the Pilotage service information will not be provided by the pilot, but rather by the pilot organization, because the pilot must be engaged in the actual performance of his/her pilotage duties.

Examples of information can be:

<b>Information related to:</b>	<b>Examples</b>
General information	<p>Examples of information:</p> <ul style="list-style-type: none"> <li>• pilot requirements in the area;</li> <li>• local regulations;</li> <li>• limitations;</li> <li>• requirements and procedures for ordering the pilot;</li> <li>• requirements and procedures for pilot boarding;</li> <li>• contact information to pilot station;</li> <li>• mandatory needs for tug assistance; and</li> <li>• pilot boarding point.</li> </ul>
Operational information	<p>Examples of information:</p> <ul style="list-style-type: none"> <li>• contact to pilot boat, launch, helicopter;</li> <li>• position of pilot station, pilot boat;</li> <li>• required arrangements for pilot boarding;</li> <li>• boarding speed;</li> <li>• communication;</li> <li>• set-up of ship's radar, ECDIS and other equipment as requested for the pilot's use; and</li> <li>• any other actions requested of the ship for the pilot's benefit.</li> </ul>

## 6.6 User needs

Ships are concerned by this service and need to know the pilot boarding / disembarking position, the pilot request procedures, local and special regulations and the compulsory use of tugs.

## 6.7 Information to be provided

See in section 6.4.

## 6.8 Associated technical services

(Under development)

## 6.9 Relation to other Maritime Services

MS 6 has relationships with other Maritime Services where it affects the pilot boarding operation and contributes to safe and efficient operations.

(Under development)

## **MS 7 – Tug service**

### **7.1 Submitting organization**

Norway

### **7.2 Coordinating bodies**

IMO and Norway

### **7.3 Description of the Maritime Service**

This Maritime Service ranges from small vessels with limited capacity and service in ports and rivers to ocean-going vessels built for complex operations and salvage. This service contributes to the safety of navigation, protection of the marine environment, and efficiency of marine transportation by conducting different types of operations, such as:

- transportation (personnel and staff between port and anchorages);
- ship assistance (e.g. mooring);
- salvage (grounded ships or structures);
- shore;
- towage (harbour/ocean);
- escort; and
- oil spill response.

The need of tug services differ from port to port, type of vessel and cargo. In some cases, information about a tug service capacity and/or availability may be difficult to obtain due to communication deficiencies. This maritime service is intended to improve information availability of tug services.

Tug services would encompass all kinds of tugs, such as:

- conventional;
- azimuth stern drive;
- tractor; and
- rotor.

<b>Information related to:</b>	<b>Examples of information shared in a tug service</b>
Deep sea information	<ul style="list-style-type: none"><li>• Contact information for tug vessel / operator</li><li>• Safety procedures and regulations</li><li>• Available resources</li><li>• Working hours</li></ul>
Local port or river information	<ul style="list-style-type: none"><li>• Contact information for tug vessel / operator</li><li>• Mooring and berthing information</li><li>• Available resources</li><li>• Working hours</li></ul>

Information related to:	Examples of information shared in a tug service
Tug information	<ul style="list-style-type: none"> <li>• Type of tug</li> <li>• Capacity such as bollard pull</li> <li>• Size</li> <li>• Assistance services</li> <li>• Response time</li> <li>• Contact information</li> <li>• Working hours</li> </ul>

**Table 7-1: Examples of information that can be shared in a tug service**

#### **7.4 Purpose**

This Maritime Service aims to facilitate access to all necessary tug-related information required by ships heading to port, in order to optimize transit times and promote efficient movement of goods and persons by using modern technology and common standards.

Effective communications and exchange of information between relevant stakeholders would contribute to efficient tug services. Electronic exchange of information would significantly contribute to the improvement of this service. For example, notifying a ship officer in advance about tug availability in port could lead the ship to adapt its speed accordingly. In some cases this may prevent a requirement to anchor the ship. The types of information which can be exchanged include:

- ETA (request);
- confirmation requests;
- updates on transit status and tug availability;
- updates among stakeholders; and
- standardized messages to overcome language barriers.

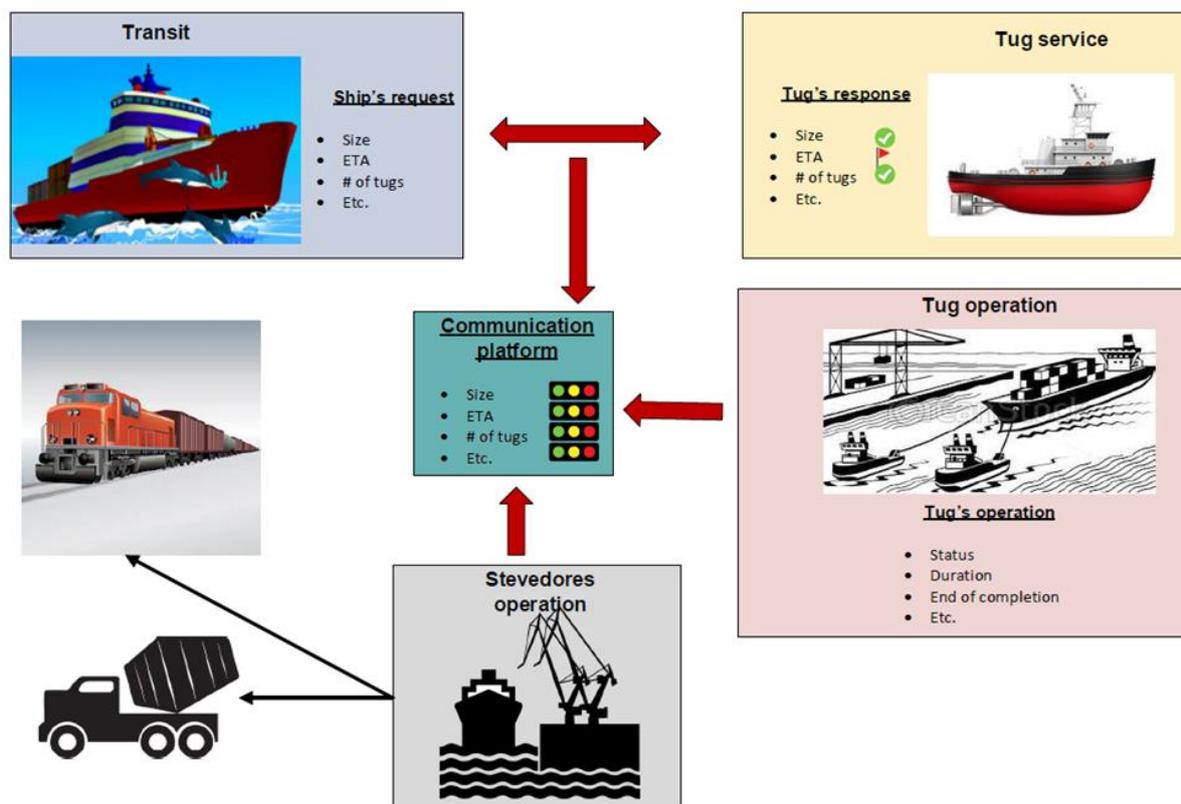
#### **7.5 Operational approach**

Tugs operations are a key element of the marine transportation chain and well-coordinated procedures and communication means should be in place to ensure fluid movement of ships.

Like the Port support service, utilization of a common platform to exchange information electronically and keep users updated on a regular basis about the status of operations would significantly improve this service, for both the ship's operator and the tug owners. The Tug service aims mainly to improve the communications involved in a ship request, rather than altering current operational procedures. Some of these communications may include:

- ship's size;
- number of tugs required;
- time the service is required;
- time the tug may be on site;
- estimated duration of operations; and
- end of operations.

Access to this information electronically would enhance the awareness of a ship's time-stamp.



**Figure 7-1: Example of an electronic communication platform for all actors involved in the tug operations**

Increased connectivity, through sharing of harmonized digital information regarding tug operations in ports, rivers or deep-sea, will enhance efficiency through just-in-time services. It will also reduce human factor errors, such as language barriers or outdated information in publications, enhancing efficiency and access to information in a fast and easy-to-use-manner.

## 7.6 User needs

Easy and timely access to tug service information is crucial to ensure fluidity in the transportation chain. The information required from this service is mainly related to:

- capacity;
- availability;
- time of response;
- status of operations; and
- duration of operations.

In return, tug services should be regularly updated on the ship's ETA/ATA to plan their operations accordingly. In the event of an unanticipated change, the tug service and ship officers should be able to communicate easily with each other to keep both parties informed about the evolving situation and allow for proper decision-making. An easy communication link should be part of the user needs and this communication link would also benefit all other actors.

## 7.7 Information to be provided

(Under development)

## 7.8 Associated technical services

(Under development)

## 7.9 Relation to other Maritime Services

<b>Maritime Service</b>	<b>Examples of information related to MS 7</b>
MS 1 – VTS Information service (INS)	VTS area, types of VTS services, VTS contact information, places of refuge, local regulations, limitation, visibility, information regarding traffic in the area
MS 3 – Traffic organization service (TOS)	Traffic clearance, time slots
MS 4 – Port support service (PSS)	Berthing information, time slots, security, local regulations, supply, assistance, port contact information
MS 5 – Maritime safety information (MSI) service	Navigational warnings, meteorological information and other urgent safety-related information
MS 6 – Pilotage service	Pilot regulations, contact information, request procedures
MS 8 – Vessel shore reporting	Vessel information, cargo information, crew information
MS 10 – Maritime assistance service (MAS)	Contact information, places of refuge
MS 11 – Nautical chart service	Charting information, chart updates
MS 12 – Nautical publications service	Digital information from nautical publications that is relevant for the operations at hand
MS 13 – Ice navigation service	Ice chart, ice conditions, information regarding icebreaker service / assistance, ice routes
MS 14 – Meteorological information service	Information regarding weather in the area
MS 15 – Real-time hydrographic and environmental information services	Information from real-time sensors
MS 16 – Search and rescue (SAR) service	Salvage information, drifting parts, SAR areas, and rescue capabilities in the area

## **MS 8 – Vessel shore reporting**

### **8.1 Submitting organization**

Norway

### **8.2 Coordinating bodies**

IMO, Norway and Singapore

### **8.3 Description of the Maritime Service**

This Maritime service provides information from shore to ship about two different reporting regimes. The first regime is Vessel Shore Reporting (VSR), implemented for pre-arrival reporting. This service can cover information and guidelines related to reporting formalities and instructions (when, what and how) for reporting to a specific port. In addition, this service can be extended to the full exchange of information required in a single window ship reporting system. The VSR regime may contain the following elements:

- Marine security regulations;
- Vessel Traffic Services zones regulations;
- Customs and immigration regulations;
- Port State regulations;
- Health and veterinary regulations; and
- Environmental regulations.

Many of these elements will be addressed by the IMO Facilitation Committee, which is developing the specifications for the single window reporting system. This is linked to e-navigation Strategy Implementation Plan Solution 2 – Means for standardized and automated reporting (see MSC.1/Circ.1595).

E-navigation solution 2, regarding automated ship reporting, is one of the most important solutions to reduce the mariners' workload (amount of time spent on preparing and submitting reports to shore-based authorities). To achieve this, reports should be automatically generated as much as possible from onboard systems.

The second regime is linked to a transit in an area where a Ship reporting system (SRS) is established.

In SRS areas, shore authorities can provide more automated and efficient reporting systems by using technology such as AIS and VDES, in combination with common data structures and product specifications.

Resolution MSC.433(98) on *Guidelines and criteria for ship reporting systems*, recalls that communication between a shore-based authority and a participating ship should be limited to information essential to achieve the objectives of the SRS. The initial report required from a ship entering the system should generally be limited to:

- ship's name;
- call sign;
- IMO identification number if applicable; and
- position.

The existing resolution is based on SOLAS regulation V/11, as follows:

"Ship reporting systems contribute to safety of life at sea, safety and efficiency of navigation and/or protection of the marine environment. A ship reporting system, when adopted and implemented in accordance with the guidelines and criteria developed by the Organization pursuant to this regulation, shall be used by all ships, or certain categories of ships or ships carrying certain cargoes in accordance with the provisions of each system so adopted.

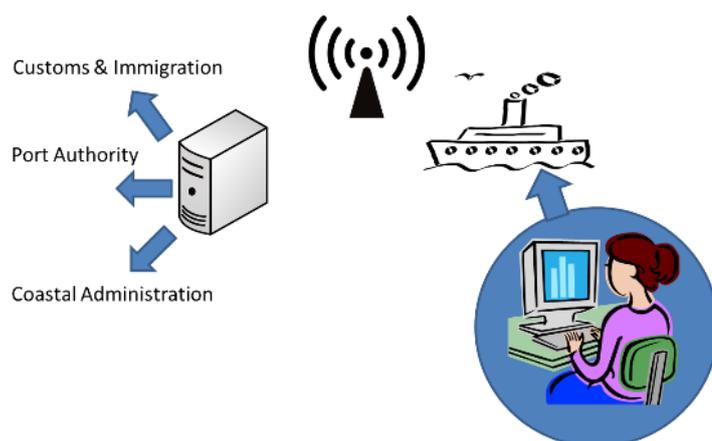
The Organization is recognized as the only international body for developing guidelines, criteria and regulations on an international level for ship reporting systems. Contracting Governments shall refer proposals for the adoption of ship reporting systems to the Organization. The Organization will collate and disseminate to Contracting Governments all relevant information with regard to any adopted ship reporting system."

Although the regulation refers to safety of life at sea, safety and efficiency of navigation and/or protection of the marine environment, resolution MSC.433(98) states that other supplementary information may also be requested in the initial report, if justified to ensure the effective operation of the ship.

This information may include the intended movement of the ship through the area covered by the reporting system and any operational defects or difficulties affecting the ship, as well as the general categories of any hazardous cargoes on board.

A VSR system normally includes a web solution and an onshore representative, or agency, for the vessel operator or owner. The agency acts on behalf of the master or owner and provides information to relevant authorities.

The VSR as envisaged by e-navigation solution 2 aims to reduce time-consuming paperwork on board.



**Figure 8-1: Vessel shore reporting and ship reporting systems**

Information required to be transmitted as part of a mandatory SRS is generally transmitted to the VTS centre, or the relevant authority, via VHF voice communication. Some SRSs also accept reports transmitted through AIS, Internet-based reporting systems, email, fax, SATcom, mobile phone, or a combination of these communication means.

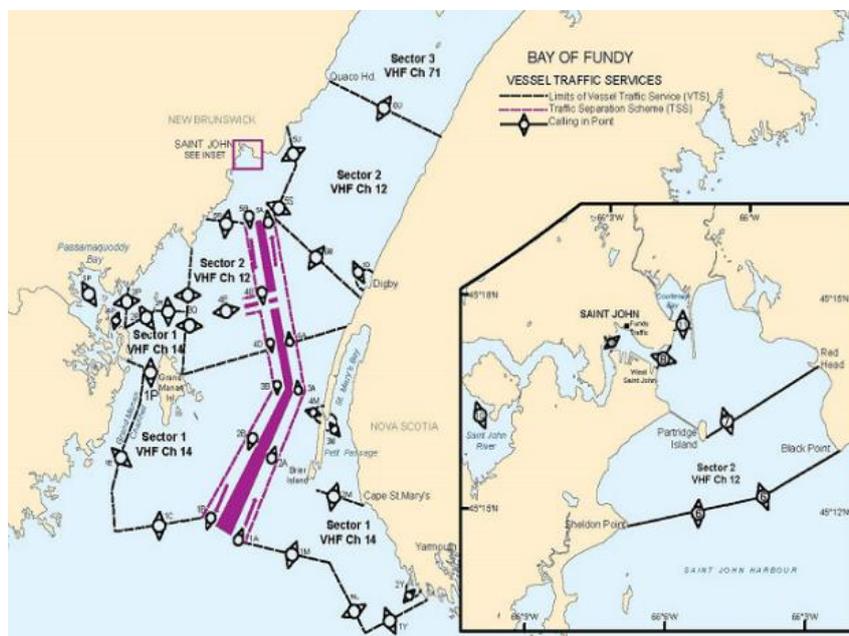


Figure 8-2: Examples of reporting points from Bay of Fundy

#### 8.4 Purpose

The purpose of this Maritime Service is to:

- secure submission and distribution of reports required by shore-based authorities in the harmonized standard and in the required time frame;
- reduce the administrative burden on board the ship and ashore;
- reduce the number of human errors and missing information by automating the reporting processes as much as possible; and
- provide real-time access to information to relevant stakeholders in a secure manner.

Resolution MSC.433(98) states that the objectives of SRS should be based upon:

"the improvement of the safety of life at sea, the safety and efficiency of navigation and/or to increase the protection of the marine environment. They may or may not be operated as part of a vessel traffic service."

As such, the VSR service contributes to the traffic situational awareness of a coastal administration either by being informed of vessels heading into its waters or the ones already in transit. Based on the information collected, a coastal administration can initiate an intervention plan, if required.

## 8.5 Operational approach

Electronic systems for ship reporting should use the same protocols and product specifications, in a single window solution, to send digital pre-arrival information such as the FAL forms and other regional/national requirements, as defined in SOLAS regulation V/11.2 for ship reporting systems. This will ensure a common harmonized platform for all ship reporting systems.

National competent authorities should provide information about reporting formalities and ensure that all information regarding reporting is easy to understand, accessible and even automated for the master or operator.

This service should provide ICT tools for shipboard and shore-based personnel to streamline the processes and procedures associated with the generation and distribution of required reports, including retrieval of information from other ship systems (ballast management, waste management system, emission control system, navigation system, etc.) and from shore-based sources (cargo and passenger booking offices, crewing agents, stevedores, etc.).

Examples of information to provide can be:

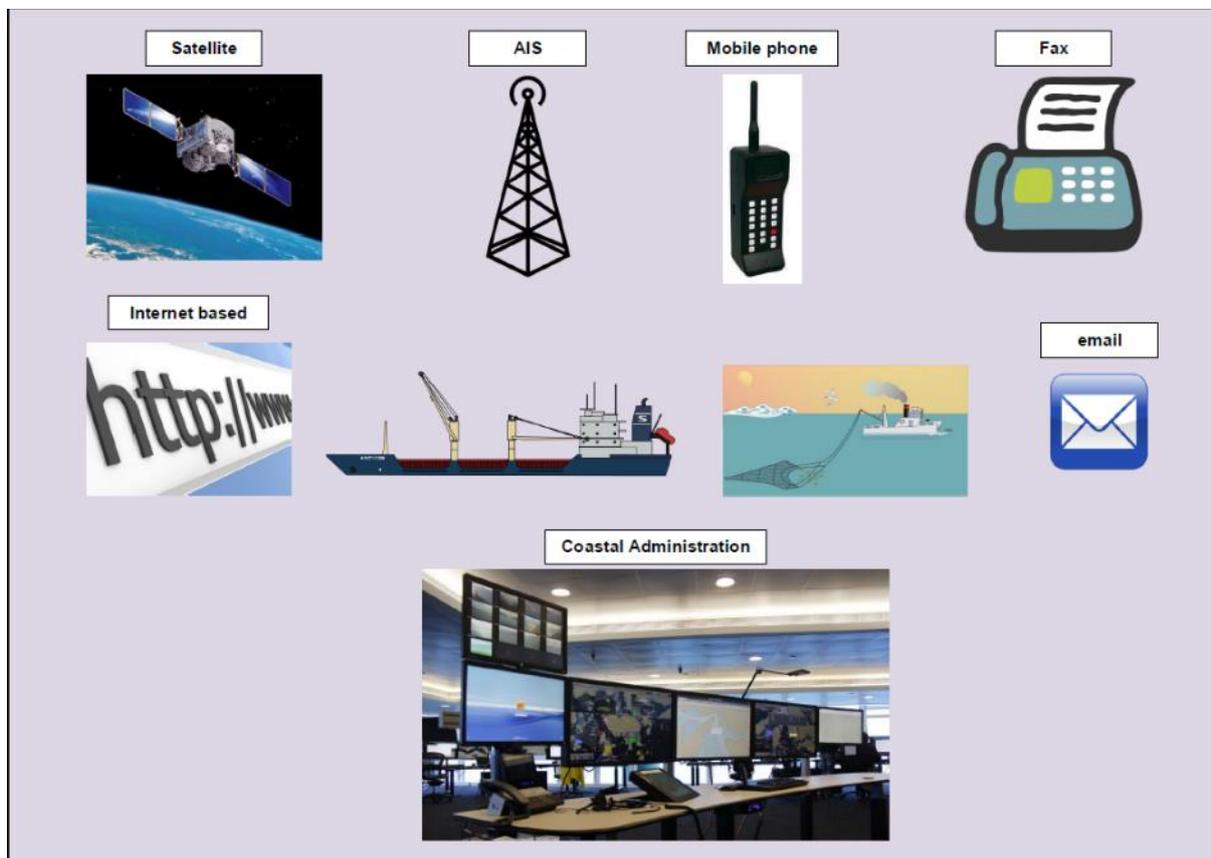
Information related to:	Examples
Reporting regulations	<ul style="list-style-type: none"> <li>• What to report. The pre-arrival information may consist of ship particulars, arrival notice, crew and passenger lists, crew and passenger effects declarations, stores list, IMDG information, waste declaration, ship's certificates, ports of call list, dangerous cargo declaration and manifests, vaccination list, narcotic list, ship's money declaration, etc.</li> <li>• When / what to report (e.g. 24h, 48h, 72h, 96h before arrival)</li> <li>• To whom (e.g. immigration, police, port master, etc.)</li> </ul>
Reporting tools	<ul style="list-style-type: none"> <li>• Web, app, etc.</li> <li>• Communication</li> <li>• Guidelines</li> </ul>
Shore receivers and support	<ul style="list-style-type: none"> <li>• Contact information</li> <li>• Support information</li> <li>• Information about local reporting aid / support such as coastal radio stations and agencies</li> </ul>

The type of information required and reporting periods may differ from country to country and create some confusion on the ships' side, if the information requested is not clearly stated. Also, the reporting periods in some situations start as far in advance as 96 hours before a ship enters a coastal administration's waters. This may pose challenges with respect to the communication means available to provide the required information all along the transit.

Currently, the following communication systems are normally used to report information:

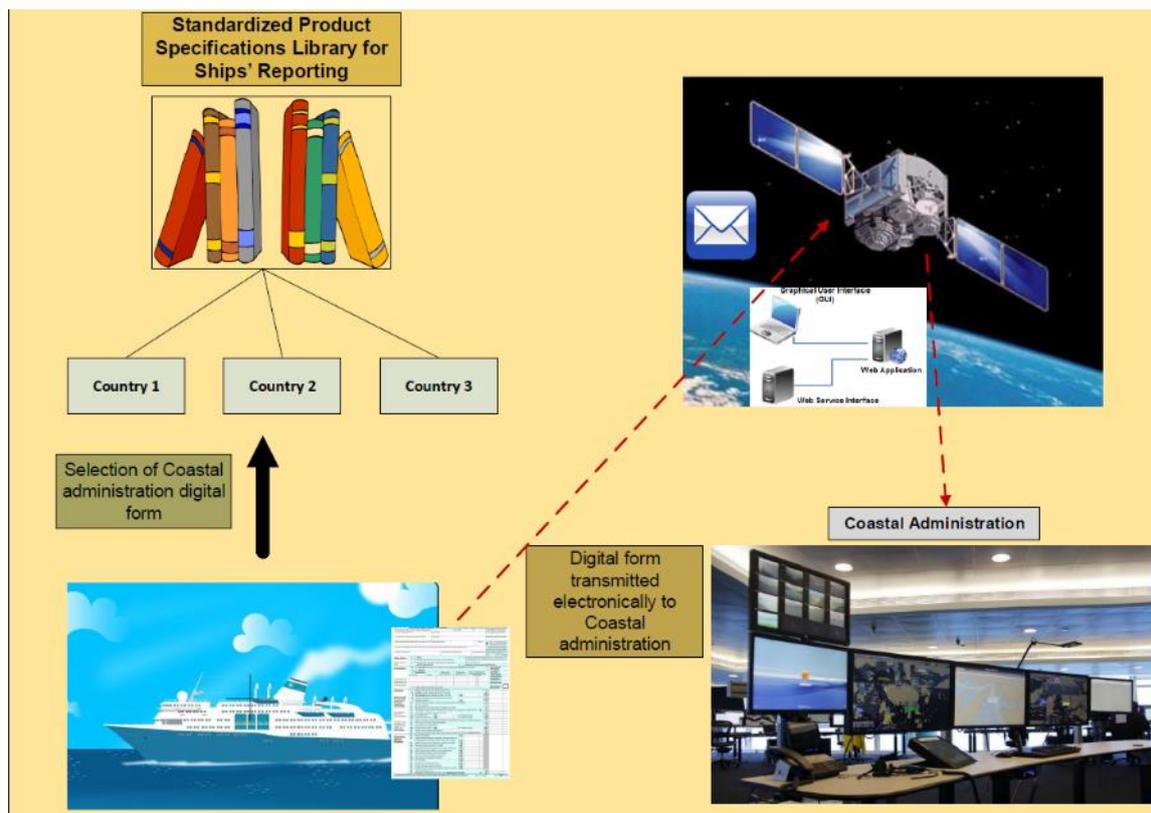
- AIS;
- Internet-based reporting systems;
- email;
- fax;
- SATCOM;
- mobile phone; or
- a combination of these systems.

As the scope, transmission capacity and data format of each of these systems differ, the possibility of developing standardized protocols with their product specifications to automate the collection of data on board and communicate it to shore-based authorities might constitute a real issue. There is a possibility of packaging the reporting information with a route exchange format (e.g. S-421), but the security of the means of communication would need to be carefully evaluated.



**Figure 8-3: Example of current communication systems used to report information**

Some of these reporting systems are not using a digital format, which prevents provision of an automated service. The first step in an operational approach would be the use of a communication system capable of transmitting digital data. Secondly, and given reporting requirements differ among coastal States, a library containing information required by each administration should be developed which complies with the standardized product specifications principle. Specific requirements requested by an Administration would be part of the form pertaining to this country.



**Figure 8-4: Example of electronic communication systems using a standardized product specifications library**

Basic information such as the ship name, call sign, IMO number and MMSI, etc. can be automatically collected from the ship's AIS system and transmitted through terrestrial or satellite AIS.

## 8.6 User needs

Ships' masters are facing considerable administrative burden to comply with different mandatory VSR requirements and transmission of information. Different procedures, data formats, documentary requirements and formalities are applied depending on the country, ship reporting system or port of destination. One of the main challenges is that the ship has to communicate in different manners through different systems.

This, in turn, requires building and maintaining a library of required reports that are uniquely identified and characterized by their requirements for format, deadline, content, etc. The vessel reporting system also requires developing and maintaining an S-100 product specification for CMDS that can be used to generate all required reports in the library. Lastly, it requires that ships' systems that generate reporting information be certified to be compliant with an international machine-to-machine interface standard or ship network standards such as IEC 61162 series.

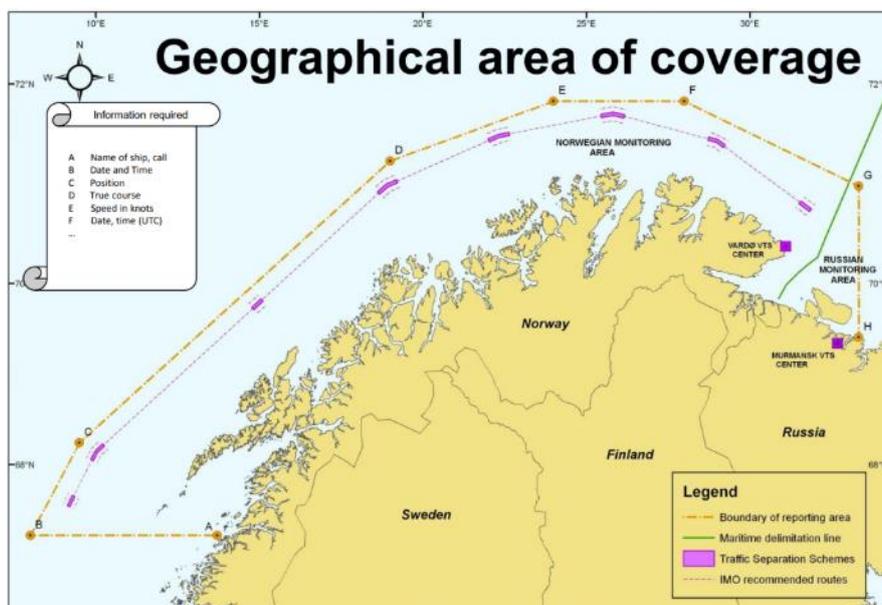


Figure 8-5: BAREP SRS between the Russian Federation and Norway

### 8.7 Information to be provided

(Under development)

### 8.8 Associated technical services

To be capable of generating this information automatically and transmitting it automatically, a realistic operational implementation of the VSR service would require the involvement of both coastal Administrations and shipowners. Coastal Administrations would need to develop an international library of ship reports that are uniquely identified and characterized by their requirements for format, deadline, content, etc. This library would be part of the S 10x register and standardized product specifications (e.g. S-127 and S-421) would be developed and maintained in order to generate the required reports.

(To be further developed)

### 8.9 Relation to other Maritime Services

Digital information from the ship reporting system using common standards is beneficial for several stakeholders and actors involved.

In addition to authorities (e.g. border police, immigration, defence, coast guard, customs, etc.) claiming the information, the list below gives example of services that can benefit from access to ship reporting information.

Maritime Service	Examples of information related to MS 8
MS 1 – VTS Information service (INS)	Type of vessel, nationality, MMSI, IMO number, contact information
MS 2 – VTS Navigational assistance service (NAS)	Draft, cargo
MS 3 – Traffic organization service (TOS)	ETA / ATA, ISPS information, purpose for arrival
MS 4 – Port support service (PSS)	The majority of the information in a ship reporting system is useful and can be re-used for an effective and transparent port operation
MS 5 – Maritime safety information (MSI) service	Inform about changes to reporting requirements
MS 6 – Pilotage service	Ship reporting systems can exchange information with the pilot system. Easy access to information can be important for the pilot. A digital pilot requesting / booking system connected to the ship reporting system will increase efficiency.
MS 10 – Maritime assistance service (MAS)	Information about cargo, dangerous goods and persons on board can reduce time before assistance and contribute to the allocation of the appropriate resources for the actual situation
MS 11 – Nautical chart service	Contain charted information about areas where reporting is required
MS 12 – Nautical publications service	Contain detailed information about reporting requirements, such as who must report, when reports are due, and to whom the reports must be submitted
MS 13 – Ice navigation service	Information from the ship reporting system can contribute to a more tailor-made and effective icebreaker service
MS 16 – Search and rescue (SAR) service	Salvage information, drifting patterns, SAR areas, rescue capabilities in the area

## **MS 9 – Telemedical assistance service (TMAS)**

### **9.1 Submitting organization**

IMHA

### **9.2 Coordinating bodies**

IMO and IMHA

### **9.3 Description of the Maritime Service**

According to IMO/ILO resolution 164, the TMAS provider should be able to provide medical advice for seafarers 24h/day, 365 days/year. TMAS should be permanently staffed by physicians qualified in conducting remote consultations and who are well-versed in the particular nature of treatment on board ship.

Within maritime medicine, the prevailing view has been, for a long time, that a standardization of the TMAS services is both necessary and wanted. This would enhance the quality of the medical practice. A standardization of reporting and registering of medical events will also make a much better basis for advancement (MSC.1/Circ.1218 on *Guidance on exchange of medical information between telemedical assistance services (TMAS) involved in international SAR operations* and MSC/Circ.960 on *Medical assistance at sea*).

### **9.4 Purpose**

TMAS can be delivered in all sea areas, but differences in bandwidth, depending on available types of transmission techniques, will result in different levels of service.

Seafarers have some basic and limited training and skills in medical treatment. Sharing of digital information for diagnosis will increase the rate of appropriate treatment.

It is essential to provide seafarers with easy and fast access to a single point of contact with the TMAS centre, as well as to share the information between the TMAS centre and medically responsible personal on board during treatment.

The purpose of TMAS is to give decision support and advice to the seafarer on board responsible for medical care whenever the provision of treatment cannot wait. This is today mostly done by voice communication using VHF, MF or short wave radio, or email. In a future e-navigation scenario, the quality of remote diagnostics and even treatment can be expected to improve.

In addition to prevailing TMAS provisions, real time monitoring of the patient's current health status will be important. The parameters monitored may differ in different systems, but may include heart rate, blood oxygen saturation and pressure. As an example, see the figure below:



**Figure 9-1: Example of a typical telemetry screen**

Further needs might involve real-time video chat between the remote specialist doctor and the patient, as well as examinations with remotely controlled cameras. In addition, extensive, detailed cardiovascular (heart) data for a period of time should be able to be collected and sent as compressed files for further monitoring by the specialist doctor.

## 9.5 Operational approach

It could be envisioned that, in the not too distant future, what today is very expensive medical equipment could be installed on some types of ships, e.g. large cruise vessels. Examples of such equipment could be ultrasonography, computer tomography (CT) and surgical operation robots. Such equipment will then be remotely operated from land given reliable radio connections.

Diagnostic ultrasonography is used to see internal body structures such as tendons, muscles, joints, vessels and internal organs. Its aim is often to find a source of a disease or to exclude any pathology. The practice of examining pregnant women using ultrasound is called obstetric ultrasound, and is widely used.

The European Space Agency has already tested a long-distance robotic ultrasound system for remote operation by distant specialists. An assistant on board simply holds the device against the patient and the ultrasound expert can move the probe as if present in the examination room, rather than thousands of kilometres away. They control the device in real time using a joystick, based on ultrasound imagery relayed back.

Computed tomography, more commonly known as a CT or CAT scan, is a diagnostic medical test that, like traditional x-rays, produces multiple images or pictures of the inside of the body.

Remote surgery (also known as tele-surgery) allows the surgeon to remotely perform surgery either using direct tele-manipulator or through computer control. The surgeon does not have to be present, but can be anywhere in the world, leading to the possibility for remote surgery.

## 9.6 User needs

### **Today**

A digital health emergency monitoring system allowing logged text interchange between a ship and medical specialist at a shore hospital including:

- voice communication not only with the medical officer on board, but also with the patient in the medical bay;
- real-time video for visual examination by the remote specialists using video;
- real-time transmission at length of medical telemetry;
- transmission of compressed data packages of e.g. EEG data; and
- up-to-date digital georeferenced lists of available telemedical assistance services that can be offered by a coastal state. Comparison of TMAS with ship capabilities would facilitate the request of the most adapted service to respond to the situation on board.

***In the future (examples):***

- transmission of data and remote control of ultrasonography;
- transmission of data and remote control of computer tomography and the like imaging techniques; and
- transmission of data and remote control of robotic surgery.

**9.7 Information to be provided**

(Under development)

**9.8 Associated technical services**

(Under development)

**9.9 Relation to other Maritime Services**

<b>Maritime Service</b>	<b>Examples of information related to MS 9</b>
MS 1 – VTS Information service (INS)	Communication with ship
MS 12 – Nautical publications service	Provide up-to-date information on radio station and earth stations offering TMAS
MS 16 – Search and rescue (SAR) service	Medical information and constraints for SAR procedures

## **MS 10 – Maritime assistance service (MAS)**

### **10.1 Submitting organization**

Norway

### **10.2 Coordinating bodies**

IMO and Norway

### **10.3 Description of the Maritime Service**

Resolution A.950(23) on *Maritime Assistance Services (MAS)* specifies that the circumstances of a ship's operation that involve a MAS are not those requiring rescue of persons. Three situations can arise:

- the ship is involved in an incident (e.g. loss of cargo, accidental discharge of oil, etc.) that does not impair its seakeeping ability but nevertheless has to be reported;
- the ship, according to its master's assessment, is in need of assistance but not in a distress situation (about to sink, fire developing, etc.) that requires the rescue of those on board; and
- the ship is found to be in a distress situation and those on board have already been rescued, with the possible exception of those who have remained aboard or have been placed on board to attempt to deal with the ship's situation.

However, if in an evolving situation, the persons on board find themselves in distress, the involvement of MRCC and not MAS will have priority. As such, MAS is responsible only for receiving and transmitting communications and monitoring the situation.

The establishment of a MAS should not necessarily entail the setting up of a new organization. The functions of MAS could, at the discretion of the Administration, be discharged by an existing organization, preferably an MRCC, or alternatively a harbour master's office, a coast guard operations centre (if one exists) or another body.

Coastal States are requested to notify IMO of the existence and details (call numbers, call signs, etc.) of their MAS, in accordance with the predetermined format (resolution A.950(23), annex 2, appendix). Information on MAS is periodically updated in the Global Integrated Shipping Information System (GISIS), maintained by IMO. National organizations that disseminate nautical information are invited to publish such particulars.

### **10.4 Purpose**

The purpose of this Maritime Service is to manage communications between the coastal State, ships' officers requiring assistance and other responsible maritime organizations: fleet owners, salvage companies, port authorities, brokers, etc. As an intermediary, the main purposes of the MAS are:

- receiving the reports, consultations and notifications required by the IMO instruments referred to in resolution A.950(23), annex;

- monitoring the ship situation if a report, as referred above, discloses an incident that may cause the ship to be in need of assistance;
- serving as the point of contact between the master and the coastal State concerned, if the ship's situation requires exchanges of information between the ship and the coastal State but is not a distress situation that could lead to a search and rescue operation; and
- serving as the point of contact between those involved in a marine salvage operation undertaken by private facilities at the request of parties having a legitimate interest in the ship and the coastal State, if the coastal State concerned decides that it should monitor all phases of the operation.

### **10.5 Operational approach**

Resolution A.950(23) indicates that a MAS should be operational on a 24-hour basis and that it should be possible for the English language to be used in exchanges between a ship in need of assistance and a MAS. Also, MASs should be authorized by their respective Governments to exchange information concerning reports received and situations involving ships which may be in need of assistance with each other.

The most common events requiring MAS are:

- fire;
- explosion;
- damage to the ship, including mechanical and/or structural failure;
- collision;
- pollution;
- impaired vessel stability; and
- grounding.

Development of scenarios including their potential consequences with regard to safety of persons and pollution, fire, toxic and explosion risks.

The development of a database containing the key services' contact information and availability of their respective resources would help move towards the digitalization of MAS. Also, the use of templates listing the types of incidents that commonly occur and their level of severity could facilitate ship-to-shore-based communication. The exchange of information on key services, their contact details, capabilities and geographic service areas could be developed as an S-100-based product specification. On the ship side, digital nautical publications in the S-12x-series of product specifications, such as S-123 (Marine Radio Service), could contain MAS information.

The figure below illustrates briefly the different functions of a MAS:

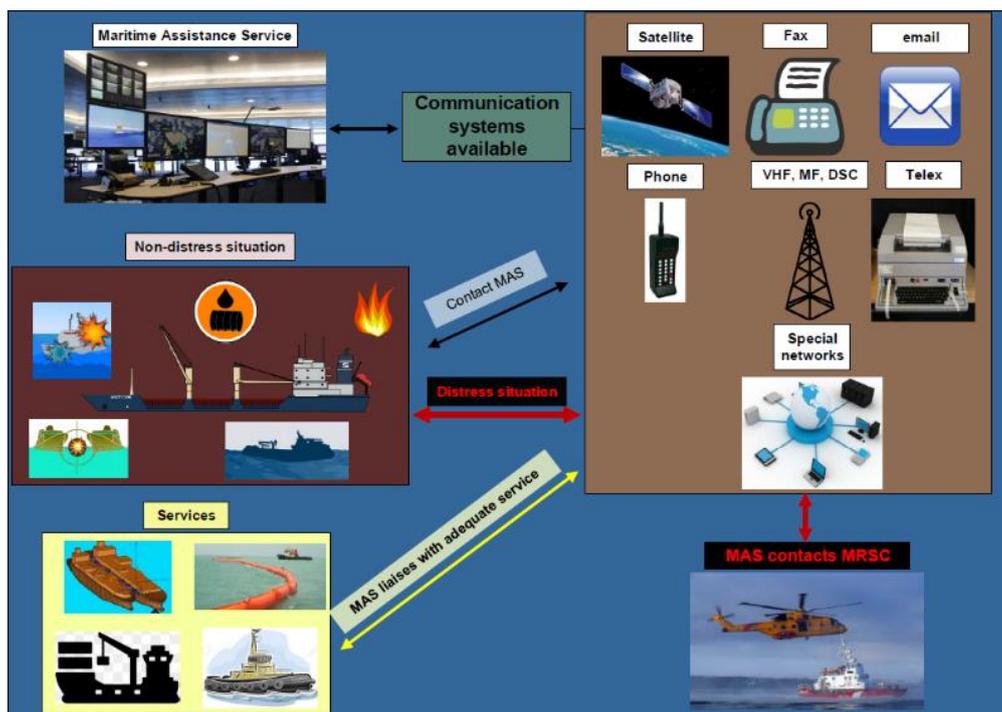


Figure 10-1: Illustration of some functions provided by a MAS

## 10.6 User needs

Information related to:	Examples
General information	<ul style="list-style-type: none"> <li>• Competent MAS</li> <li>• Roles and responsibilities of authorities and responders (fire-fighting capability)</li> <li>• Responsible SAR coordination centre</li> <li>• Contact information to MRCC / operator</li> <li>• Ongoing operations in an area</li> </ul>
MAS information	<ul style="list-style-type: none"> <li>• MAS geographical coordinates, contact information, capacity, etc.</li> <li>• Information on available resources for lightering</li> <li>• Information on available resources for pollution combating and recovery</li> <li>• Information on available resources for towage</li> <li>• Information on available resources for stowage</li> <li>• Information on available resources for salvage</li> <li>• Information on available resources for storage</li> <li>• Contingency planning</li> <li>• Evacuation facilities</li> <li>• Type of operation</li> <li>• What and when</li> <li>• Vessels involved</li> <li>• Communication</li> </ul>

Table 10-1: Examples of types of information provision that MAS can cover

In some of these situations, the ship's assistance may require the designation of a place of refuge in order to limit the navigational impacts, protect the environment or facilitate repairing the ship. In that case, an assessment of risks related to the identified event should be done taking into account:

- .1 environmental and social factors, such as:
  - .1 safety of those on board;
  - .2 threat to public safety;
  - .3 pollution caused by the ship;
  - .4 sensitive habitats and species; and
  - .5 facilities available; and
- .2 natural conditions, such as:
  - .1 prevailing winds and sea conditions;
  - .2 tides and tidal currents; and
  - .3 bathymetry.

### 10.7 Information to be provided

(Under development)

### 10.8 Associated technical services

Regarding communication facilities, resolution A.950(23) recommends the use of COMSAR/Circ.18 on *Guidance on minimum communication needs of maritime rescue coordination centres (MRCCs)*, as a basis. This circular identifies the following communication systems, such as:

- telephone links;
- fax links;
- telex link;
- VHF and MF with DSC;
- ordinary VHF;
- special networks – examine the possibility of linking with existing networks (Administration, armed forces telephone networks), in particular the aeronautical fixed telecommunication network (AFTN), which provides a link with the aeronautical rescue organization; and
- Inmarsat-C ship earth station or other satellite service providers.

S-123 (Marine radio service) data products contain contact details for MRCCs.

(To be further developed)

### 10.9 Relation to other Maritime Services

Maritime Service	Examples of information related to MS 10
MS 1 – VTS Information service (INS)	Local sensor information such as CCTV, Radar, AIS. Regulations. Other traffic
MS 2 – VTS Navigational assistance service (NAS)	Exchange of routes, directions, navigation advices and assistance

<b>Maritime Service</b>	<b>Examples of information related to MS 10</b>
MS 3 – Traffic organization service (TOS)	Information regarding regulations and other traffic
MS 4 – Port support service (PSS)	Port availability and anchorage are in the port, services related to the MAS situation
MS 5 – Maritime safety information (MSI) service	All information depending on the structure of MSI
MS 6 – Pilotage service	Contact information for pilotage, pilot assistance, pilot request
MS 7 – Tug service	Tug capacity, contact information, tug order and updates
MS 8 – Vessel shore reporting	Information about the reporting formalities, local regulations, contact information, notification about dangerous cargo, number of persons on board, arrival and departure information, etc.
MS 9 – Telemedical assistance service (TMAS)	Contact Information
MS 11 – Nautical chart service	Local area updates, chart updates, Notice to mariners
MS 12 – Nautical publications service	Tidal tables, notice to mariners, list of lights, information updates to publications. Contact information.
MS 13 – Ice navigation service	Ice routes, ice conditions, ice-breaking assistance
MS 14 – Meteorological information service	Weather information, visibility, wave information
MS 15 – Real-time hydrographic and environmental information services	Horizontal and vertical tidal information in an area, real-time current, real-time wave form sensors in an area
MS 16 – Search and rescue (SAR) service	Search and rescue contact information, SAR capacity. SAR areas of operations.

## **MS 11 – Nautical chart service**

### **11.1 Submitting organization**

IHO

### **11.2 Coordinating bodies**

IMO and IHO

### **11.3 Description of the Maritime Service**

This Maritime Service provides geospatial information (in digital and / or printed format) to support safe maritime navigation. The types of information depicted in nautical charts include the configuration of the shoreline and seafloor, water depths, locations of dangers to navigation, locations and characteristics of aids to navigation, anchorages, and other features relevant to maritime navigation. SOLAS regulation V/2.2 defines nautical chart or nautical publication as "*a special-purpose map or book, or a specially compiled database from which such a map or book is derived, that is issued officially by or on the authority of a Government, authorized Hydrographic Office or other relevant government institution and is designed to meet the requirements of marine navigation*".

A Nautical chart service should include updated functions to ensure that all navigational products and service are kept current. Update information should be delivered in a standardized format. Distribution networks should conform to standardized data authentication and distribution standards to ensure their safe and secure transmission and delivery.

### **11.4 Purpose**

The primary purpose of this Maritime Service is to provide information to be used for safe navigation. The information provided as part of a Nautical chart service must complement information provided as part of other services such as Nautical publications services and Real-time hydrographic and environmental information services. A Nautical chart service should support functions such as voyage planning, pilotage, collision avoidance, vessel traffic managements, etc.

A Nautical chart service should include discovery metadata information that will enable users to determine what products and services are available within a given area of interest (both geographic and contextual).

### **11.5 Operational approach**

The data model is based on the IHO S-100 Hydrographic Data Model and derived product specifications. It enables information provision in a harmonized way. The products should take into account a harmonized display of navigational information. The portrayal of digital Nautical chart services should conform to IMO / IHO standards.

The provision of Nautical chart services should use distribution strategies, methods, and technologies which can adapt to serve vessels in locations or conditions that may be challenging for data transfer.

Digital chart distribution services should conform the S-100 authentication and encryption data standard. Mechanisms should also be included to accommodate new editions of the Chart product specification, including the issuing of new datasets, and associated feature and portrayal catalogues.

## 11.6 User needs

The primary users are mariners responsible for maritime navigation. Access to the information is required both onshore and at sea.

SOLAS regulation V/19.2.1.4 describes the requirement for ships to carry "*nautical charts and nautical publications to plan and display the ship's route for the intended voyage and to plot and monitor positions throughout the voyage*". Timely and simple access to uniform up-to-date nautical information for a particular sea area is essential for the conduct of safe voyages.

The Nautical chart service provides navigational information for safe navigation on open sea, for making landfall and for navigation in confined waters.

## 11.7 Information to be provided

The appropriate resolutions and recommendations adopted by IHO provide the recommended set of information to be covered by the Nautical chart service.

Information related to:	Examples:
Geographical features	<ul style="list-style-type: none"> <li>• Coastline</li> <li>• Inland topography</li> <li>• Bathymetry</li> <li>• Rivers</li> </ul>
Transits and routeing	<ul style="list-style-type: none"> <li>• Routes in constricted shipping lanes</li> <li>• Associated Vessel traffic service</li> <li>• Associated Ship reporting system</li> </ul>
Ports approaches and entry	<ul style="list-style-type: none"> <li>• Hazards, directions, limiting conditions</li> <li>• Pilot service, outer anchorages</li> <li>• Navigational aids</li> </ul>
Protected area information	<ul style="list-style-type: none"> <li>• Locations of marine protected areas</li> <li>• Restrictions and regulations applicable within specific areas</li> </ul>
Regulatory information	<ul style="list-style-type: none"> <li>• Laws and regulations applicable in specific locations</li> <li>• Laws and regulations applying to vessels of specific dimensions or carrying specified cargo</li> <li>• Local rules regarding use of specific pilot boarding places by vessels exceeding specified dimensions or carrying hazardous cargo</li> </ul>
Navigation aids	<ul style="list-style-type: none"> <li>• Descriptions of lights</li> <li>• Descriptions of buoys</li> </ul>
Planning	<ul style="list-style-type: none"> <li>• Mariners' routeing guides</li> </ul>
Controlled areas	<ul style="list-style-type: none"> <li>• Vessel traffic service contact information</li> <li>• Ship reporting system contact information</li> <li>• Exercise area contact information</li> </ul>
Metadata	<ul style="list-style-type: none"> <li>• Update information</li> <li>• Projection / spheroid</li> <li>• Data bounding polygon</li> </ul>

## 11.8 Associated technical services

IHO does not provide any technical services to deliver charts and nautical publications to the end user. This will be done by the technology which is developed by the value added resellers.

By having established sophisticated secure quality proof transmissions, IHO only ensures that the data will not be corrupted during the transport from the producing HO to the end user.

The Service should include hard media and online delivery mechanisms. The delivery mechanism should make provision for data authentication and data encryption.

(To be further developed)

### 11.9 Relation to other Maritime Services

Nautical chart service provides overviews of other Maritime Services. It summarizes content information which is covered by other Maritime Services in more detail. Other Maritime Services may reuse information which is provided by the Nautical chart service.

<b>Maritime Service</b>	<b>Examples of information related to MS 11</b>
MS 1 – VTS Information service (INS)	Area of the service, functions, contact information, communication, local sensor information such as CCTV, Radar, AIS. Regulations. Other traffic. Information regarding regulations and special traffic.
MS 2 – VTS Navigational assistance service (NAS)	Recommended routes, directions, navigation advices
MS 4 – Port support service (PSS)	Area of the service, contact information, communication, navigational warnings issued by the MSI service
MS 5 – Maritime safety information (MSI) service	Pilot boarding areas

## **MS 12 – Nautical publications service**

### **12.1 Submitting organization**

IHO

### **12.2 Coordinating bodies**

IMO and IHO

### **12.3 Description of the Maritime Service**

This Maritime Service delivers a set of nautical information available for a particular marine area. The aim of the Nautical publications service is to provide information as a support to the navigation process. This comprises information to complement nautical charts, such as information on ports and sea areas, as well as the contact information of authorities and services for a sea area or port. It further describes regulations, restrictions, recommendations and other nautical information applicable in these areas.

Nautical publications services include:

- .1 the information traditionally provided within updated nautical publications such as sailing directions, lists of lights, notices to mariners, tide tables and all other nautical publications necessary for the intended voyage (SOLAS regulation V/27). The majority of the information can be delivered from shore to ship in a digital format. This will enhance the usability, increase the quality and update rate and give the navigator an opportunity to tailor made the information needed;
- .2 a discovery service to allow users to determine what is available in their area of interest (geographic and context);
- .3 an ordering service to allow users to order the information required from the service providers identified; and
- .4 a delivery service to allow the user to receive the information required.

### **12.4 Purpose**

The purpose of this Maritime Service is to electronically provide the mariner with information to complement ENC/nautical charts for advance planning and to navigate a ship safely during the intended voyage.

The Nautical publications service provides information which is continuously updated and which is required for voyage planning and execution. It improves the situational awareness during the voyage.

SOLAS regulation V/2 defines the provision of nautical publication information in digital format as a database and SOLAS regulation V/27 requires the carriage of nautical publications suitable for the intended voyage. The combination of both is a digital provision of nautical information requested for navigation according to SOLAS chapter V.

The information covered in nautical publications is either provided as printed paper publications (NP1) or as digital publications based upon existing paper publications (NP2). The next evolutionary step is the provision of information in digital datasets based on internationally harmonized and appropriate data models (NP3). The datasets will be distributed by appropriate methods to electronic onboard equipment.

The anticipated steps in the transition to full digital delivery can be described only in general terms at this time:

- .1 development of product specifications (including data models) for digital data products;
- .2 conversion of appropriate parts of the content of existing NP1 and NP2 nautical publications to NP3 data products;
- .3 integration of appropriate new sources of nautical publications information into the supply and production chain for NP3 data products;
- .4 delivery infrastructure and methods – either the design and construction of new delivery infrastructure/methods, or the integration into existing or under-development delivery infrastructure/methods;
- .5 application upgrades or new application development to make best use of the digital products; and
- .6 test beds for the data products, delivery methods and applications.

## **12.5 Operational approach**

The data model is based on the IHO S-100 Hydrographic Data Model and derived product specifications. It enables the information provision in a harmonized way. The products are designed for a display based on *Interim guidelines for the harmonized display of navigation information received via communication equipment* (MSC.1/Circ.1593) and the data provision should take into account a harmonized display of navigational information. The used product specifications comprise rules for interoperation and harmonized graphical presentations of datasets that will be interacting one each other and with the ENC information when used by a navigation system such as ECDIS.

The provision of Nautical publications services should use distribution strategies, methods, and technologies which can adapt to serve vessels in locations or conditions that are highly challenging for information transfer.

The data provision follows the S-100 based data protection schema.

## **12.6 User needs**

The primary users are mariners responsible for maritime navigation. Access to the information is required both onshore and at sea.

SOLAS regulation V/19.2.1.4 describes the requirement for ships to carry "*nautical charts and nautical publications to plan and display the ship's route for the intended voyage and to plot and monitor positions throughout the voyage*". Timely and simple access to uniform up-to-date nautical information for a particular sea area is essential for the conduct of safe voyages.

The nautical publications service provides navigational information for safe navigation on open sea, for making landfall, and for navigation in confined waters.

The nautical publications service provides information on Maritime Services available and provides details to get access to responsible authorities and services provided by those authorities.

Secondary users such as Pilot services, defence, VTS Authorities or any individuals or organizations, onshore and at sea, require access to the information for reference.

## 12.7 Information to be provided

The appropriate resolutions and recommendations adopted by IHO provide the recommended set of information to be covered by the Nautical publications service.

Information related to:	Examples:
Transits and routeing	<ul style="list-style-type: none"> <li>• Routes in constricted shipping lanes</li> <li>• Routeing measures, traffic separation schemes and shipping lanes</li> <li>• Associated Vessel traffic service</li> <li>• The mandatory reporting of vessel traffic movements</li> <li>• Associated Ship reporting system</li> </ul>
Ports approaches and entry	<ul style="list-style-type: none"> <li>• Hazards, directions, limiting conditions</li> <li>• Pilot service, outer anchorages</li> <li>• Traffic regulation, arrival procedure</li> </ul>
Summary information about port facilities	<ul style="list-style-type: none"> <li>• Function, port authority</li> <li>• Basins and berths</li> <li>• Depth alongside berths, and quay lengths</li> <li>• Cargo handling facilities at specified terminals and berths</li> <li>• Specific vessel parameters, such as length, draft, beam</li> </ul>
Marine radio services	<ul style="list-style-type: none"> <li>• Geographic availability of services</li> <li>• Frequencies and channels used and broadcast schedules</li> <li>• Purposes supported – weather forecasts, MSI, telemedical assistance, etc.</li> </ul>
Protected area information	<ul style="list-style-type: none"> <li>• Locations of marine protected areas</li> <li>• Restrictions and regulations applicable within specific areas</li> </ul>
Prevailing natural conditions	<ul style="list-style-type: none"> <li>• Seasonal hazardous conditions</li> <li>• Periodic (e.g. tide-related) or irregular hazardous conditions</li> </ul>
Regulatory information	<ul style="list-style-type: none"> <li>• Laws and regulations applicable in specific locations</li> <li>• Laws and regulations applying to vessels of specific dimensions or carrying specified cargo</li> <li>• Local rules regarding use of specific pilot boarding places by vessels exceeding specified dimensions or carrying hazardous cargo</li> </ul>
Port Services	<ul style="list-style-type: none"> <li>• Waste disposal, collection of ship pollutants such as oily wastes</li> <li>• Repair, bunkering</li> <li>• Availability of potable water</li> <li>• Issuing of Ship Sanitation Certificates</li> <li>• Pilot services contact information and notice times</li> </ul>
Navigation aids	<ul style="list-style-type: none"> <li>• descriptions of lights</li> <li>• descriptions of buoys</li> </ul>

<b>Information related to:</b>	<b>Examples:</b>
Climatic Information, predictions	<ul style="list-style-type: none"> <li>• Tide surge prediction tables and tidal stream atlases</li> <li>• Weather routeing, solar radiation and precipitation</li> <li>• Cold/hot durations and warnings</li> <li>• Air temperature, wind speed and direction</li> <li>• Cloudiness and barometric pressure</li> <li>• Ephemerides and nautical almanacs for celestial navigation</li> </ul>
Planning	<ul style="list-style-type: none"> <li>• Mariners' routeing guides</li> </ul>
Controlled areas	<ul style="list-style-type: none"> <li>• Vessel traffic service contact information</li> <li>• Ship reporting system contact information</li> <li>• Exercise Area contact information</li> </ul>
Chart catalogue	<ul style="list-style-type: none"> <li>• Graphically display a chart catalogue<sup>2</sup></li> </ul>

The Nautical publications service provides up-to-date information pertaining to the area along the planned route.

Users should be enabled to report discrepancies between the real world and the information provided by the Nautical publications service with no or minimal human interference.

Corrections to Nautical publications service information should be provided as updates (either as updates of the whole dataset or as incremental updates) in a format which supports the automatic correction and the traceability of the corrections of the onboard datasets.

## **12.8 Associated technical services**

IHO does not provide any technical services to deliver charts and nautical publications to the end user. This will be done by the technology which is developed by the value added resellers.

By having established sophisticated secure quality proof transmissions, IHO only insures that the data will not be corrupted during the transport from the producing HO to the end user.

The service should be capable to work within multiple levels of bandwidth limitations. The service should provide the data in various data packages according to the bandwidth capability.

(To be further developed)

## **12.9 Relation to other Maritime Services**

Nautical publications service provides overviews of other Maritime Services. It summarizes content information which is covered by other Maritime Services in more detail. Other Maritime Services may reuse information which is provided by the Nautical publications service.

<sup>2</sup> To fulfil IEC61174 "in order to identify the date and origin of the ENC in use, the ECDIS shall include a graphical index of ENC data available, presented upon the mariner's request and providing access to the edition and date of each cell."

<b>Maritime Service</b>	<b>Examples of information related to MS 12</b>
MS 1 – VTS Information service (INS)	Area of the service, functions, contact information, communication, local sensor information such as CCTV, Radar, AIS. Regulations. Other traffic. Information regarding regulations and special traffic.
MS 2 – VTS Navigational assistance service (NAS)	Recommended routes, directions, navigation advices
MS 3 – Traffic organization service (TOS)	Not relevant
MS 4 – Port support service (PSS)	Port security, facilitation and anchorage area, services related to the vessel, arrival procedure, contact information, communication
MS 5 – Maritime safety information (MSI) service	Area of the service, contact information, communication, navigational warnings issued by the MSI service
MS 6 – Pilotage service	Applicability, contact information for pilotage, pilot assistance, pilot request
MS 7 – Tug service	Availability, contact information, regulations
MS 8 – Vessel shore reporting	Applicability, information about the reporting formalities, local regulations, contact information
MS 9 – Telemedical assistance service (TMAS)	Contact information
MS 10 – Maritime assistance service (MAS)	Contact information
MS 11 – Nautical chart service	Charted information, notice to Mariners
MS 13 – Ice navigation service	Ice routes, ice-breaking assistance
MS 14 – Meteorological information service	Local weather phenomena, climatic information, wave information
MS 15 – Real-time hydrographic and environmental information services	Information about sensors in an area, radio services information
MS 16 – Search and rescue (SAR) service	Search and rescue contact information, communication, SAR capacity, SAR areas of responsibility

## **MS 13 – Ice navigation service**

### **13.1 Submitting organization**

WMO

### **13.2 Coordinating bodies**

IMO and WMO

### **13.3 Description of the Maritime Service**

To provide ice navigation information to ships in and in the vicinity of possible ice infested regions.

### **13.4 Purpose**

The World Meteorological Organization's Manual on Marine Meteorology (WMO No. 558) defines the procedures for marine meteorological information text bulletins involving ice-related components in high seas areas, coastal, offshore and local waters, for decision-making whether or not proceed with ice navigation.

SOLAS regulation V/5 outlines obligations for the provision of weather information suitable for shipping with forecasts including ice conditions and hazards.

The International Code for Ships Operating in Polar Waters (Polar Code) outlines the environmental information requirements for ships operating in polar waters. The Polar Code reinforces operating guidelines for the hazard of ice accretion and ice waters (sea-ice conditions), and introduces new operating guidelines for hazards related to sea ice, icebergs, and low air temperature, and defines the polar service temperature for equipment performance.

The standards for the ice terminology and symbology, including sea ice, ice of land origin (icebergs) and lake ice are set by the WMO publication 259 "WMO Sea-Ice Nomenclature" (vol.I – Terminology, vol.III – International System of Sea-Ice Symbols) with JCOMM publications TR-080 "Electronic Chart Systems Ice Objects Catalogue" and TR-081 "S-411 Ice Information Product Specification" documenting coding and portrayal of ice conditions on electronic navigational chart systems.

WMO publication 574 "Sea-Ice Information Services in the World" has comprehensive up-to-date information on National ice services. Resolution A.1051(27), as amended on *IMO/WMO Worldwide Met-Ocean Information and Warning Service – Guidance Document* outlines the functions of the Worldwide Met-Ocean Information and Warning Service. The Worldwide Met-Ocean Information and Warning Service (WWMIWS) provides met-ocean Maritime safety information (MSI) including sea-ice conditions and hazards to mariners.

### 13.5 Operational approach

Examples of Ice navigation services are listed in table 13-1.

Information related to:	Examples:
Ice conditions (as an ice chart)	<ul style="list-style-type: none"> <li>• Near real-time and forecasts of:               <ul style="list-style-type: none"> <li>• sea ice concentration;</li> <li>• sea ice stage of development (or thickness);</li> <li>• form of sea ice;</li> <li>• ice dynamics (ridging, pressure, drift);</li> <li>• location and orientation of leads, cracks;</li> <li>• icebergs location, concentration and drift; and</li> <li>• limits of all known sea ice, iceberg risk and/or ice edge</li> </ul> </li> </ul>
Ice reports and bulletins	<ul style="list-style-type: none"> <li>• Text summaries of ice conditions</li> </ul>
Routeing aids	<ul style="list-style-type: none"> <li>• Recommended routes</li> <li>• Ice navigator</li> <li>• Icebreaker assistance</li> </ul>
Navigation Planning	<ul style="list-style-type: none"> <li>• Risk assessment</li> <li>• Application for navigation (from relevant bodies)</li> </ul>

**Table 13-1 – Ice Navigation Service**

The most important features of sea ice which affect marine operations are:

- .1 the amount of ice present, i.e. concentration usually measured as tenths of the sea surface covered by ice;
- .2 ice thickness, referred to as stage of development which is related to ice age;
- .3 form of ice, i.e. whether it is fast ice or drifting ice, floe size;
- .4 ice dynamics including ridging, pressure, drift; and
- .5 location and orientation of leads and cracks.

The position of icebergs at specified times are required with information about their estimated size, concentration or number within a certain area; and speed and direction of movement.

#### 13.5.1 Ice analysis and forecast

Some 20 nations around the world offer an ice information service. Services may provide analysis of ice conditions and numerical short-term ice forecasts in a form of ice charts once a day or less for a period of 24 to 144 hours. These are tactical forecasts and may provide advice on difficult ice conditions forming or dissipating, the general motion of the pack, opening and closing of leads, etc. They are strongly influenced by meteorological prediction and should always be used in concert with the weather forecast. Practically in all cases the ice charts are complemented by high and medium resolution satellite imagery – commonly optical and active microwave radar, with resolution and range dependent on the season, region, cloud conditions and type of support. Near coast operations may be complemented by shore-based ice radar imagery.

Other longer-range predictions – those covering periods from 7-10 days to 30 days and seasonal predictions – are based on numerical, climatological, analogue or statistical methods.

### 13.5.2 Vessel escort and ice breaking

Icebreaking and support services may be available to ships transiting ice-covered waters. Coast guards or other national agencies may operate ice operations centres. These centres generally provide up-to-date ice information, suggest routes for ships to follow through or around ice and coordinate icebreaker assistance to shipping. Ice operations centres are generally in contact with icebreakers at all times and monitor progress of shipping within their area of responsibility. Ice operations centres may also provide recommended ice route services, such as routing maps.

### 13.5.3 Ice navigation planning

Voyage in the ice-covered waters is commonly preceded by planning and acquisition of permission for ice navigation in contact with regulatory bodies and icebreaking services. Planning and application process is dependent on the assigned ice class, region and season of navigation and is done using the acting in the region of operation risk assessment or other regulatory criteria, including risk assessment for voyage planning especially in bergy water operations.

## 13.6 User needs

Activity-based information requirements:

Information related to	Examples
En route or at sea	<ul style="list-style-type: none"> <li>• Broad, area-based forecasts</li> <li>• Higher detail in complex waterways</li> <li>• Increased interest in synoptic features and movement</li> <li>• Longer forecast lead-time essential</li> </ul>
Entering, transiting and exiting a port	<ul style="list-style-type: none"> <li>• Point (small area) based forecasts</li> <li>• High spatial and temporal detail</li> <li>• Real-time observations</li> <li>• Focus on short-term lead times</li> </ul>
At berth	<ul style="list-style-type: none"> <li>• Forecasts of changes to ice conditions</li> </ul>
Planning a trip	<ul style="list-style-type: none"> <li>• Focus on short-term time frames, as well as longer forecast lead times</li> <li>• Forecasts and warnings</li> <li>• Specific details on timing of wind changes or hazardous weather leading to changes in ice conditions</li> <li>• Focus on forecast details for specific areas or routes</li> </ul>
Vessel and equipment design	<ul style="list-style-type: none"> <li>• Historical values of low air temperatures and water temperatures</li> <li>• Focus on ocean and sea routes</li> </ul>

### 13.7 Information to be provided

(Under development)

### 13.8 Associated technical services

Name	ID (MRN)	Description	Standardization Body
Ice service		Service that provides sea ice and iceberg information to mariners and related support services	WMO/IOC

(To be further developed)

### 13.9 Relation to other Maritime Services

Maritime Service	Examples of data that could be used in MS 13
MS 5 – Maritime safety information (MSI) service	Provides supplemental up-to-date information on the status of ice dangers
MS 11 – Nautical chart service	Provides supplemental navigational information
MS 12 – Nautical publications service	Provides supplemental navigational information
MS 14 – Meteorological information service	Provides supplemental navigational (meteorological) information
MS 15 – Real-time hydrographic and environmental information services	Provides supplemental navigational (hydrographic) information

## **MS 14 – Meteorological information service**

### **14.1 Submitting organization**

WMO

### **14.2 Coordinating bodies**

IMO and WMO

### **14.3 Description of the Maritime Service**

To provide meteorological information digitally to ships.

### **14.4 Purpose**

The World Meteorological Organization's *Manual on Marine Meteorology* (WMO No. 558) defines two types of marine meteorological information:

- forecasts and warnings for the high seas; and
- forecasts and warnings for coastal, offshore and local areas (including ports and harbours).

SOLAS regulation V/5 requires Contracting Governments to produce and distribute to shipping warnings about severe weather such as gales, storms and tropical cyclones, and to produce and provide other weather information suitable for shipping consisting of data, analyses, warnings and forecasts of weather, waves and ice.

Resolution A.1051(27), as amended on *IMO/WMO Worldwide Met-Ocean Information and Warning Service – Guidance Document* outlines the functions of the Worldwide Met-Ocean Information and Warning Service (WWMIWS). WWMIWS provides meteorological Maritime safety information (MSI) to mariners in the form of marine forecast and warning products. WWMIWS is coordinated across the world's oceans through 21 defined areas, called METAREAs. Ships receive the MSI products via marine communication systems such as SafetyNet and NAVTEX, which form part of the Global Maritime Distress and Safety System (GMDSS).

The International Code for Ships Operating in Polar Waters (Polar Code) outlines the environmental information requirements for ships operating in polar waters. The Polar Code reinforces operating guidelines for the hazard of ice accretion and ice waters (sea-ice conditions), and introduces new operating guidelines for hazards related to low air temperature, and defines the polar service temperature for equipment performance.

SOLAS regulation V/34, resolution A.893(21) on *Guidelines for voyage planning* and MSC/Circ.1063 on *Participation of ships in Weather Routeing Services*, outline the minimum characteristics for a service. SOLAS regulation V/5 states that met-ocean services shall be issued by the National meteorological service, and this would imply that WMO and its members should oversee weather routeing services and standards as well.

The standards for the portrayal of met-ocean conditions on Electronic navigational chart systems are documented within S-412.

Details of service availability, broadcast times and radio frequencies for services provided to vessels at sea are maintained in the WMO publication: *WMO No. 9, Volume D, Information for Shipping*.

Examples of Meteorological information services are listed in the table below:

<b>Information related to:</b>	<b>Examples:</b>
Wind	<ul style="list-style-type: none"> <li>• Wind speed, direction, gust information</li> <li>• Real-time values from instruments or satellite</li> </ul>
Waves	<ul style="list-style-type: none"> <li>• Forecast wave height, direction, period</li> <li>• Real-time values from buoys or satellite</li> </ul>
Atmospheric conditions	<ul style="list-style-type: none"> <li>• Forecast temperature, squalls, cloud, rainfall</li> <li>• Real-time values from instruments or satellite</li> </ul>
Ocean	<ul style="list-style-type: none"> <li>• Forecast surface temperature, currents, salinity</li> <li>• Forecast sub-surface temperature and currents</li> <li>• Real-time values from instruments and satellite</li> </ul>
Weather systems	<ul style="list-style-type: none"> <li>• Mean sea level pressure contours</li> <li>• System features such as cold fronts, tropical cyclones, low pressure centres, high pressure centres</li> <li>• Satellite images</li> </ul>
Dangerous weather	<ul style="list-style-type: none"> <li>• Warnings about location, strength, and movement of storms</li> <li>• Warnings about fog or phenomena causing reduced visibility, ice accretion, cold air temperature, squalls</li> </ul>
Bulletins and forecasts	<ul style="list-style-type: none"> <li>• Surface weather analysis, synoptic features with barometric pressure</li> <li>• Forecasts of wind, waves, weather</li> </ul>
Polar service temperature	<ul style="list-style-type: none"> <li>• Historical values for ocean and port areas</li> </ul>
Low air temperature	<ul style="list-style-type: none"> <li>• Forecasts of hazard areas</li> <li>• Historical values for ocean and port areas</li> </ul>
Ship observations	<ul style="list-style-type: none"> <li>• Receipt of reports from ships in the Voluntary observation system</li> <li>• Transmission of information extracted from received ship reports to shipping</li> </ul>

**Table 14-1 – Meteorological Information Service**

MS14 can be delivered in all areas.

## **14.5 Operational approach**

In general, marine meteorological services have two functions:

- .1 to serve international shipping, fishing and other marine activities on the high seas; and
- .2 to serve the various activities which take place in coastal and offshore areas, ports and on the coast.

SOLAS regulation V/34 resolution A.893(21) on *Guidelines for Voyage Planning* describes how vessels should prepare for their trip and route and therefore their information requirements. The resolution specifically outlines to small vessels the importance of:

- checking the weather forecast for the journey;
- knowing the tides; and
- knowing the vessel limitations for the expected weather and wave conditions.

SOLAS regulation V/5 describes the underlying obligations for weather services, i.e. conveying warnings about severe weather and other weather information useful for shipping, and facilitating weather reports by ships and their distribution as needed for the safety of navigation.

In general, the impact which could result from a meteorological condition depends on its severity and on the sensitivity of a particular activity or operation to that condition. Similarly, meteorological phenomena can make recreational activities and the work of fishing and shipping fleets much more difficult or hazardous.

Marine operations are sensitive to environmental conditions. Generally, extreme values of waves, wind and obstructions to visibility increase the risk to the safety of the vessel or sea structure and to the persons involved in the operation. Less extreme values, even if safety is not threatened, will affect the efficiency, effectiveness or comfort of the operation. The usefulness of a warning or a forecast depends on the accuracy of the prediction, the format and communication platform through which the information is delivered, its timeliness, i.e. the number of hours or days in advance of the event that the forecast can be provided and the ability of the user to react to the information.

Warnings of ice accretion highlight areas where the accumulation of ice on the superstructure and deck equipment of vessels may potentially (effect depends on true wind and waves angles, tonnage, hull shape) affect safety and operational efficiency.

Information about extremely low air temperatures is important for the safety of workers, while historical information about cold air temperatures enables planning and ship design based on the polar service temperature guidelines.

#### 14.6 User needs

Information related to	Examples
En route or at sea	<ul style="list-style-type: none"> <li>• Broad, area-based forecasts</li> <li>• Higher detail in complex waterways</li> <li>• Increased interest in synoptic features and movement</li> <li>• Longer forecast lead-time essential</li> </ul>
Entering, transiting and exiting a port	<ul style="list-style-type: none"> <li>• Point (small area) based forecasts</li> <li>• High spatial and temporal detail</li> <li>• Real-time observations</li> <li>• Warnings of reduced visibility, squalls</li> <li>• Focus on short-term lead times</li> </ul>
At berth	<ul style="list-style-type: none"> <li>• Warnings of squalls, thunderstorms</li> <li>• Forecasts of general weather conditions</li> </ul>

<b>Information related to</b>	<b>Examples</b>
Planning a trip	<ul style="list-style-type: none"> <li>• Focus on short-term time frames, as well as longer forecast lead times</li> <li>• Increased interest in synoptic features and movement</li> <li>• Forecasts and warnings</li> <li>• Specific details on timing of wind changes or hazardous weather</li> <li>• Focus on forecast details for specific areas or routes</li> </ul>
Vessel and equipment design	<ul style="list-style-type: none"> <li>• Historical values of low air temperatures and water temperatures</li> <li>• Focus on ocean and sea routes</li> </ul>

#### **14.7 Information to be provided**

(Under development)

#### **14.8 Associated technical services**

(To be further developed)

#### **14.9 Relation to other Maritime Services**

<b>Maritime Service</b>	<b>Examples of information related to MS 14</b>
MS 5 – Maritime safety information (MSI) service	Provides supplemental up-to-date information on the status of extreme weather
MS 11 – Nautical chart service	Provides supplemental navigational information
MS 12 – Nautical publications service	Provides supplemental navigational information
MS 13 – Ice navigation service	Provides supplemental navigational information
MS 15 – Real-time hydrographic and environmental information services	Provides supplemental navigational information

## **MS 15 – Real-time hydrographic and environmental information services**

### **15.1 Water level information for navigation**

#### **15.1.1 Submitting organization**

IHO

#### **15.1.2 Coordinating bodies**

IMO and IHO

#### **15.1.3 Description of the Maritime Service**

Oceanic and inland water level information is essential for determination of under-keel clearance required for safe navigation. Real-time water level information is important for applications such as route planning port entry and the determination of tidal prediction. Water level information consists of:

- .1 observed and/or forecasted time series at one or more fixed stations;
- .2 forecasted gridded forecasts of water level for one or more regions; and/or
- .3 a gridded hydroid surface.

#### **15.1.4 Purpose**

The development of electronic navigation systems that use high resolution bathymetric data are demanding the provision of real-time water level data. The IHO water level specification provides a standardized mechanism to digitize and transfer water level data.

#### **15.1.5 Operational approach**

Water level data is usually provided by hydrographic organizations, or on their behalf by an approved authority. Datasets are based on an internationally harmonized model and data encoding specification. Water level datasets will be provided via online Internet services or distributed by appropriate distribution networks used for other navigational products and services.

#### **15.1.6 User needs**

Tidal and/or tidal water information is intended for activities such as situational awareness, hazard avoidance, works on offshore renewable energy installations and route planning. A knowledge of water levels and under-keel clearance water along a planned route, and for some time in the future, can help planners select the most efficient time and safest route for transit.

#### **15.1.7 Information to be provided**

Digital water level metadata and catalogue information is encoded using the eXtensible Markup Language (XML). The Hierarchical Data Format (HDF5) is used for water level surface coverage data.

### 15.1.8 Associated technical services

(To be further developed)

### 15.1.9 Relation to other Maritime Services

This product may conflict with simplified information on water levels that are included with many nautical charts. The data from this product should have "display priority" over older simplified water level information.

Maritime Service	Examples of information related to MS 15
MS 11 – Nautical chart service	Underlying chart layout, simplified water level information
MS 12 – Nautical publications service	Description of long-term tidal observations
MS 14 – Meteorological information service	Information on storm surges
MS 16 – Search and rescue (SAR) service	Tidal influences on rescue operations

## 15.2 Surface water currents for navigation

### 15.2.1 Submitting organization

IHO

### 15.2.2 Coordinating bodies

IMO and IHO

### 15.2.3 Description of the Maritime Service

This Maritime Service provides digital information on surface current speed and direction to land-based and ship-board ECDIS. The information consists of:

- .1 time series at one or more fixed stations;
- .2 gridded forecasts of surface currents for one or more regions; and/or
- .3 time series at a moving (i.e. drifting) station.

Surface current information is portrayed as colour-codes vector lines, with additional information available via mouse pick command.

### 15.2.4 Purpose

This Maritime Service includes:

- surface current vector and tidal information, intended for situational awareness;
- hazard avoidance;
- works on offshore renewable energy installations; and
- route planning.

The implementation of this service should result in improved safety and cost reductions due to time and fuel efficiencies. The associated product specification implemented update mechanism to ensure that the latest data is available to the mariner and other users.

This Maritime Service includes:

- information traditionally provided within nautical publications such as tide and surface current information necessary for the route planning (link with SOLAS);
- surface current vector and tidal information, intended for situational awareness, hazard avoidance, works on renewable marine energy and route planning;
- information derived from observations and/or from numerical model;
- a service to allow users to determine what is available in their area of interest (geographic and context);
- an ordering service to allow users to order the information required from the service providers identified; and
- a delivery service to allow the user to receive the information required.

The service provides information on current and tide in complement to ENCs/nautical charts.

#### **15.2.5 Operational approach**

Data are created by hydrographic organizations and are disseminated via Internet or other available channels.

One evolution of the marine service is the provision of datasets information based on an internationally harmonized and appropriate model. The datasets will be distributed by appropriate methods for use by onboard navigation equipment.

#### **15.2.6 User needs**

Surface current vector information and water level are intended for situational awareness, hazard avoidance (storm surge forecast, analysis, marine submersion) and route planning. Upon entering a harbour or other confined body of water, knowledge of currents is essential to pilots to avoid hazards. Knowledge of currents and under-keel clearance water along a planned route, and for some time in the future, can help planners to select the most efficient time and route for transit.

#### **15.2.7 Information to be provided**

Data is contained in XML files that consist of metadata and HDF5 data files containing arrays of speed and direction information, tidal amplitude, tidal water level and water level. This Information and all other necessary information is provided in various IHO Standards (e.g.: S-111, S-104 IHO recommendations).

#### **15.2.8 Associated technical services**

(To be further developed)

### 15.2.9 Relation to other Maritime Services

This product may conflict with simplified information on tidal currents, chart datum, tidal water level, that are included in nautical charts. The data from the new product must have display priority over the older simplified information.

<b>Maritime Service</b>	<b>Examples of information related to MS 15</b>
MS 11 – Nautical chart service	Underlying chart layout, simplified water movement information
MS 12 – Nautical publications service	Description of long-term current observations
MS 14 – Meteorological information service	Information on storm surges
MS 16 – Search and rescue (SAR) service	Current influences on rescue operations

## **MS 16 – Search and rescue (SAR) service**

### **16.1 Submitting organization**

Norway

### **16.2 Coordinating bodies**

IMO, Norway and Singapore

### **16.3 Description of the Maritime Service**

The International Convention on Maritime Search and Rescue, 1979 (SAR Convention) was aimed at developing an international SAR plan to ensure that everywhere in the world, the rescue of persons in distress at sea would be coordinated by a responsible SAR organization or by cooperation between neighbouring SAR organizations.

Following the adoption of the 1979 SAR Convention, IMO's Maritime Safety Committee divided the world's oceans into thirteen search and rescue areas, with provisional SAR plans in place for each of these areas. In each area, the countries concerned have search and rescue regions for which they are responsible.

Parties to the Convention must ensure that arrangements are made for the provision of adequate SAR services in their coastal waters. Parties are encouraged to enter into SAR agreements with neighbouring States involving the establishment of SAR regions, the pooling of facilities, establishment of common procedures, training and liaison visits. The Convention also states that Parties should take measures to expedite entry into its territorial waters of rescue units from other Parties.

The Convention then goes on to establish preparatory measures which should be taken, including the establishment of Rescue Coordination Centres (RCCs) and sub-centres. It establishes a common glossary to be used by all Parties and outlines operating procedures to be followed in the event of emergencies/alerts and during SAR operations. This includes the designation of an on-scene commander and their duties.

IMO and the International Civil Aviation Organization (ICAO) jointly publish the three-volume IAMSAR Manual. This manual provides international guidelines for a common aviation and maritime approach to organizing and providing SAR services. The three volumes are divided as follows:

- Volume 1, Organization and Management;
- Volume 2, Mission Coordination; and
- Volume 3, Mobile Facilities.

### **16.4 Purpose**

The RCC responsible for the Search and Rescue Region (SRR) is the primary contact in a SAR incident and ultimately responsible for incident management and decision-making.

In maintaining a state of full readiness, the service is responsible for a number of search and rescue functions, including:

- detection and coordination of maritime incidents; and
- control and conduct of maritime search and rescue operations.

These functions may include activities such as:

- assisting the crew and passengers of vessels in distress;
- assisting victims of maritime and aircraft accidents or incidents;
- coordinating the medical evaluation of seriously injured or ill persons from a vessel at sea, and their subsequent evacuation, if deemed necessary, to a suitable medical facility;
- monitoring towing operations;
- monitoring and evaluating levels of risk from Maritime Safety Information (MSI) broadcasts to ensure an immediate response to potential life threatening situations;
- monitoring vessels not under command;
- monitoring pollution reports and vessels aground;
- assisting other emergency response organizations when they require additional resources to prevent loss of life; and
- liaising with other organizations assisting with search and rescue operations information collection, distribution, and coordination.

## **16.5 Operational approach**

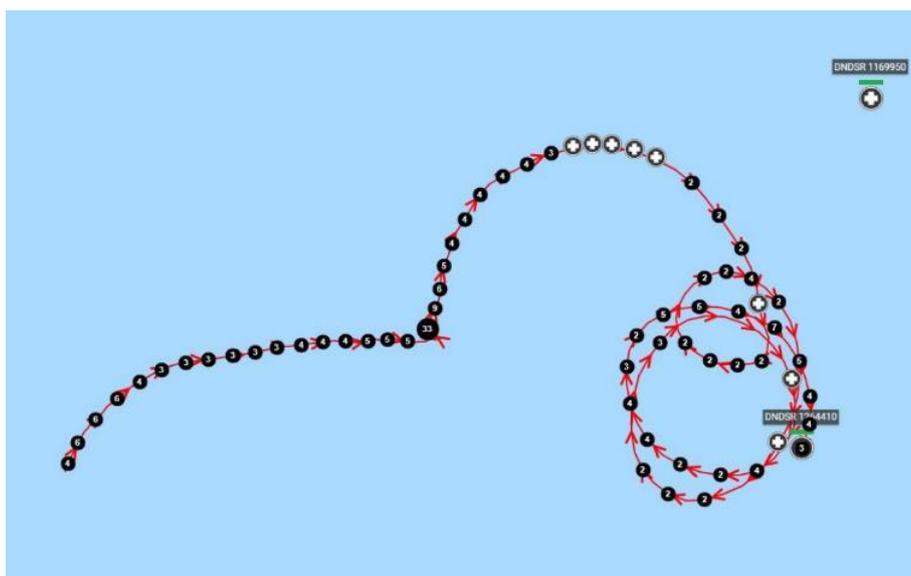
Time, resources and effective communication will always be challenges when it comes to search and rescue cases involving human lives. Effective use of time and allocation of rescue resources to the person(s) in distress are of primary importance.

Several actors are normally involved in a SAR operation. Manual exchange of information can be easily misunderstood in the form of wrong positions, SAR areas and other significant search information, and even a short delay can be the difference between life and death. Lack of language skills has been identified as a major challenge in SAR communications.

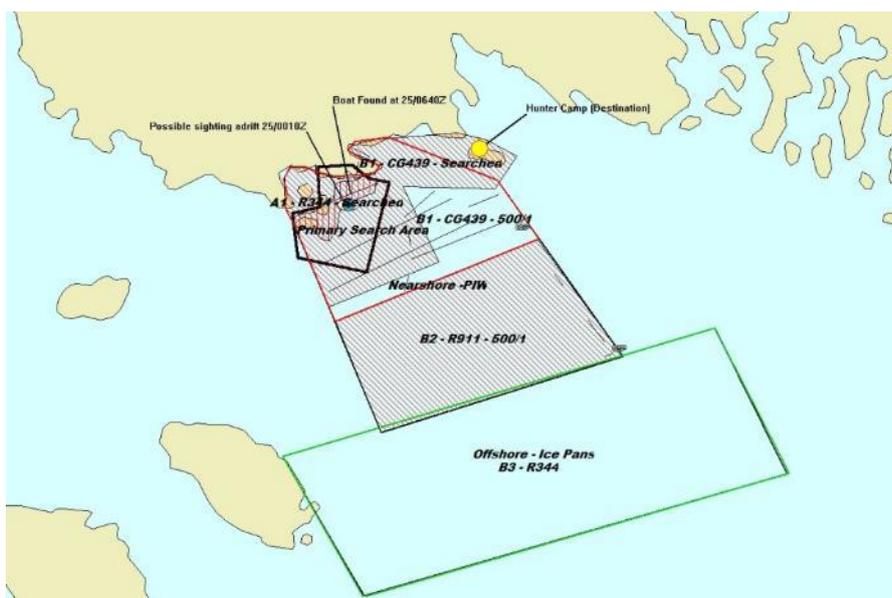
Digital exchange and sharing of information could significantly reduce the human errors in SAR case prosecution and also result in huge time savings by allowing RCCs more timely access to accurate and relevant information.

Examples of information for SAR coordination communications that could be shared electronically to mitigate these challenges include:

- last known position (LKP);
- search areas;
- search patterns;
- search resources;
- drift predictions;
- last known position (LKP);
- datum;
- radio frequencies;
- NOTSHIPs;
- known routeing and planning information for search object (in the case of overdue aircraft or vessels);
- EPIRB hex codes and associated information;
- SLDMB information;
- satellite imaging;
- live stream and images from search resources;
- images of search objects;
- images of search area; and
- SAR Briefing Report (with information for vessels engaged in search).



Credit photo: JRCC Halifax  
**Figure 16-1: Simulation of drift prediction**

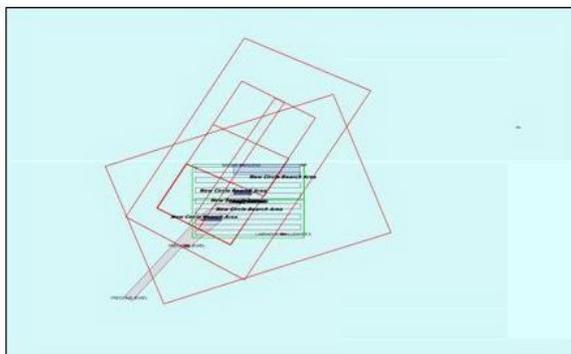


Credit photo: JRCC Halifax  
**Figure 16-2: Illustration of search areas and additional information that may be used during a SAR operation**

## SAR BRIEFING REPORT

### Vessel Name

General	
SAR	Man overboard
SITUATION	Man Overboard
DATE	01 Sep 2015
TIME	07:56
INCIDENT#	C2018-00302
LOCATION	118' ExN of Cape Bauld
N	52°17.30'N
W	052°29.5'W
CALL SIGN	n/a
POB	0



**Nature of distress** ManOverboard

**Tasking** SRU Name: Vessel Name, Sortie #: 425891,

**Description** Person in the water, crew member from the FV Precious Jewel

**Other Info** 32 YOM, no floatation

**Medical Info**

**On Scene Comd** Alfred Needler

**POBs** John Doe ( Age: 33, Gender: Male )

Proceed search area made up of points 52 17.8N 052 32.4W, 52 29.8N 052 20.7W, 52 30.3N 052 21.9W, 52 18.3N 052 33.6W. CSP will be 52 17.8N 052 32.4W head NW @ 030T for 14nm then reverse track with 1/4nm track spacing

Credit photo: JRCC Halifax

**Figure 16-3: Illustration of a SAR briefing report**

The RCC could then deliver this important information about the SAR situation to a graphical display shared with the on-scene commander, search resources and all partners involved, improving communications and increasing situational awareness for everyone. This would make it easier for all units to get current information on the search operation underway.

Information from several services assist the SAR Coordinators in making timely decisions and appropriate use of resources. Some examples would include:

- vessel information such as position, course and speed;
- medical and firefighting capabilities of nearby resources;
- other emergency organizations in the area and their rescue capabilities;
- meteorological information (including tides and currents, ice information);
- Maritime safety information; and
- ship reporting information such as persons on board, capacity, cargo information.

## 16.6 User needs

Coordination, communication and effective exchange of information are important elements of the SAR service. The coordinating RCC must be able to share and receive information quickly and easily with a number of different resources:

- other RCCs;
- vessels assisting in search and transiting search area;
- VTS services;
- ground search and rescue;
- search target;
- other emergency organizations (for example, police, fire, ambulance); and
- port authorities.

Information related to:	Examples
General information	<ul style="list-style-type: none"> <li>• Responsible RCC</li> <li>• Other emergency organizations assisting</li> </ul>
SAR information	<ul style="list-style-type: none"> <li>• Type of operation</li> <li>• What and when</li> <li>• Last known position</li> <li>• Drift plot</li> <li>• Number persons missing/in distress</li> <li>• Dangers such as dangerous substances</li> <li>• In raft, lifeboat, persons in water, etc.</li> <li>• Datum</li> <li>• SAR area</li> <li>• SAR resources in area</li> <li>• Vessels of opportunity within and near search area</li> <li>• Vessels and aircraft involved in search</li> <li>• Search areas assigned and completed</li> <li>• On-scene commander</li> <li>• Communication</li> <li>• Meteorological information</li> </ul>
Assistance	<ul style="list-style-type: none"> <li>• Position of vessels or stations assisting</li> <li>• Towing vessels available and positions</li> <li>• Capacity, bollard pull (BP)</li> <li>• Other salvage and oil recovery capacities</li> <li>• Response time</li> <li>• Connection information</li> <li>• Intended route / towing plan</li> <li>• Speed limits</li> <li>• Manoeuvring limits</li> <li>• Communication</li> </ul>

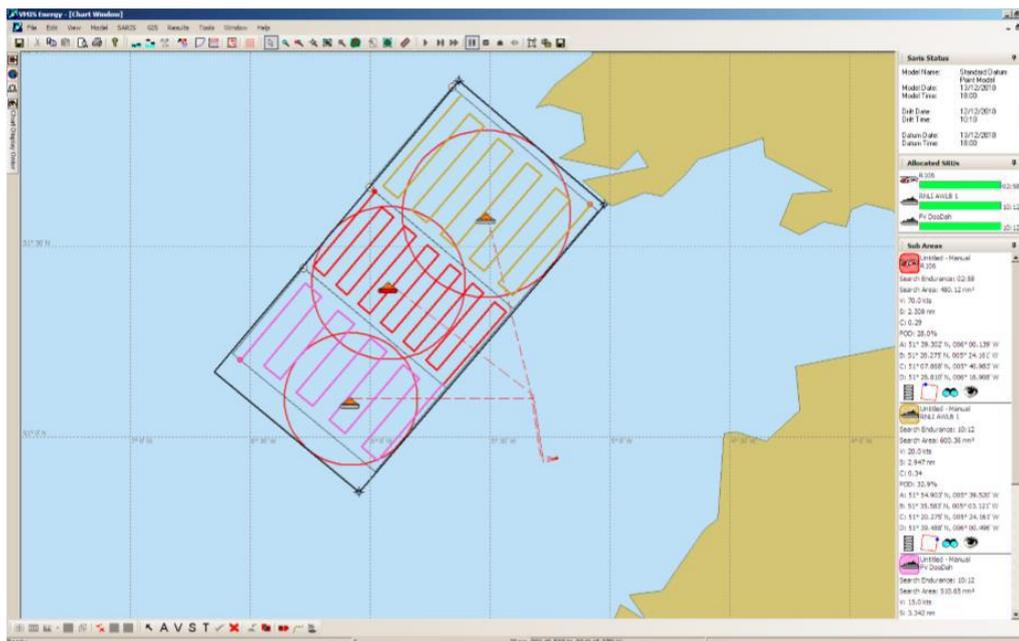


Figure 16-4: Example of common sharing of digital search and rescue information

**16.7 Information to be provided**

(Under development)

**16.8 Associated technical services**

(To be further developed)

**16.9 Relation to other Maritime Services**

Maritime Services	Examples of information related to MS 16
MS 1 – VTS Information service (INS)	Information on VTS areas, places of refuge, vessel traffic in the area, vessel identification information (type of vessel, nationality, MMSI, IMO number, contact information), information from sensors (meteorological, hydrographical, visibility, etc.), radar, AIS, CCTV, communication with ship
MS 2 – VTS Navigational assistance service (NAS)	Information on vessels undertaking NAS, exchange of routes, navigation advice and assistance
MS 3 – Traffic organization service (TOS)	Traffic clearance information, time slots, ETAs, route advisories
MS 4 – Port support service (PSS)	Port availability and anchorage areas, berthing information, cargo operations, security, supply, available assistance, port contact information
MS 5 – Maritime safety information (MSI) service	Warnings, no-go areas, diving operations, exercises
MS 6 – Pilotage service	Pilot boarding stations, pilot vessel positions and orders, contact information, request procedures
MS 7 – Tug service	Tug operations, available tug capacity

<b>Maritime Services</b>	<b>Examples of information related to MS 16</b>
MS 8 – Vessel shore reporting	ETAs, notification of arrival, vessel information, cargo information, number of persons on board
MS 9 – Telemedical assistance service (TMAS)	Local address of medical centres and communication and capacity, medical advice
MS 10 – Maritime assistance service (MAS)	Contact information, places of refuge, routing, information about vessels requesting relevant MAS, incidents, notifications
MS 11 – Nautical chart service	Local area updates, chart updates, notice to mariners
MS 12 – Nautical publications service	Local descriptions and publications, digital information from nautical publications relevant for the operation
MS 13 – Ice navigation service	Ice forecast, ice chart, ice conditions, information regarding icebreaker service / assistance, ice routes
MS 14 – Meteorological information service	Weather in SAR area
MS 15 – Real-time hydrographic and environmental information services	Tidal and current information in SAR area, all information from real-time sensors

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