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| IALA Guideline |

Maritime Service Portfolios:  
digitising maritime services

Edition 1.0

Document date

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

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# INTRODUCTION

## General Description

When developing the IMO e-Navigation strategy to improve safety and efficiency of sea transport it became clear that digital services provided to ships are an essential part of this initiative. In order to best describe, structure and implement those services, IMO introduced the concept of “Marine Service Portfolios” (MSPs).

A “Maritime Service Portfolio (MSP)” defines and describes the set of operational and technical services and their level of service provided by a stakeholder in a given sea area, waterways or ports, as appropriate. (NAV 57/6 para 23)

IMO has identified a preliminary list of 16 MSPs. Under its remit, IALA recognised that additional MSPs were needed for items such as AtoNs and PNT, which have been added to these guidelines.

## Purpose

This guideline is mainly for providers of services defined in MSPs to understand what is expected by the maritime community if a dedicated provider of such services is declaring the availability of an MSP in their jurisdiction. It provides the basic information on the defined MSPs. It describes the objectives to be achieved with the MSP as well as a short explanation of the MSP. It also includes references to other MSPs, which may be associated to the specific MSP in question.

This guideline helps providers to integrate new digital services and to migrate from conventional to digital services but does not include technical specifications necessary for the implementation of those MSPs. Those will be defined elsewhere through the respective competent bodies, but are referenced in this document for easy access. It rather provides the guidance on the overarching expectations for a service provider of a given MSP.

The services described in this guideline are intended for IALA guidance, but can also be used for other organisations and authorities planning to implement a set of services as a portfolio.

## Implementation

The services described within this guideline can be implemented in full or in part, based on individual service providers local circumstances.

### Change process

The transformation of existing services into digital services needs to follow a defined process to be successful. See Figure below:

In the beginning there needs to be an assessment of the current situation as well as a clear definition of the intended future situation. This assessment includes review of the organization, the processes and the outputs of the two states: Current and Future.

The result of this assessment will be the input to further analysis. During the analysis phase all relevant information need to be taken into consideration. The categories of information to be analysed are technical and procedural information as well as existing experience and guidelines. The analysis phase will document all information classes of relevant and the expected outcomes in accordance with the initial assessment of the intended end state. Both a Change Process Plan as well as a Change Process Timeline will have to be created. Once those two plans are available, the execution can start in accordance to those plans.



For example: If a certain Competent Authority decides to change a service to digital (implementing an MSP), it should take into account the following steps:

* 1. Assess the services being delivered by traditional means and the actual delivery platforms (e.g. VHF network);
  2. Identify the services under own responsibility and the eventual need for new delivery platforms.
  3. Identify the services to be delivered in the new format (MSP) and the timeline for the implementation
  4. Identify the providers of information for the selected MSP’s
  5. Establish a common workable platform between all providers. This platform must be able to allow interoperability between the different providers and systems. It must also be established a working protocol to guarantee the responsibility levels and the flow of information.
  6. Coordinate the intended work with MSP users and organizations creating tools for utilizing MSP output to ensure usability by intended end users.
  7. Implement the onshore structures (infrastructures, hardware and software) necessary for the delivery of the MSP’s.
  8. Guarantee an experimental faze in order to allow assess the resilience of the system. When the Competent Authority decides that the service is mature enough, it can be delivered to the mariners and be used as primary means for the delivery of that information. However, due to the existence of different levels of equipment on board of vessels, both services must be provided simultaneously.
  9. During the transformation procedures, it is necessary to continuously evaluate the process in order to see if the service can be improved, optimized, identify gaps and implement the necessary changes. This is a continuous process, and it must be complemented with a permanent monitoring of the system (e.g. feedback from mariners and other stakeholders)



## Technical Issues

(should this be an Annex?) According to the situation, information provided electronically (digital format) could complement and/or replace radio communication. However, critical and urgent situations will most likely be better addressed through radio voice communication, which ensures that the distress call has reached out a VTS centre and proper response is triggered. For non-critical situations, information can be provided in a digital format but care should be taken to ensure that all ships have the capacity to receive and display properly the information.

Given that neither shore-based authorities nor all ships will have modernized their equipment to the digital format level at the same time, a transition period from the current provision of Information Services to the Digital Service format must be envisaged. This transition period will also allow to both ship and shore authorities to get familiar with the new technology and have confident into it.

It is also important to consider that the provision of VTS Services in many VTS areas is not limited to SOLAS ships but includes as well other type of vessels (domestic, fishing, pleasure craft, etc.). These vessels will need a similar period of transition, which can be longer according to the financial investment that might be required. Thus, the transition period will require that both ways of communication, radio and digital, be maintained in parallel to ensure safety of navigation, and until the Digital format proves to be as efficient and reliable for all situations (figure x).

Figure x – Illustration of the provision of VTS services over time.

Also, many Services are produced by other national authorities (see x.x.x below) and the conversion of information such as ice, meteorological and hydrographic data to the digital format will gradually change the role of VTS centres with respect to these data. In some cases, the digitalization process will allow to transmit directly the information to mariners without necessarily passing through a VTS centre. However, these situations will require that VTS centres have a constant access to these data in order to monitor its status and to provide the information to ships experiencing electronic problems.

Currently, there are situations where the exchange of information between shore authorities and ships is done electronically.

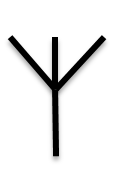
For example:

* Provision of VTS services such as INS can be done electronically without radio voice communication;
* Meteorological, hydrographic and other type of environmental data can be broadcasted directly to ships through AIS Application Specific Message (AIS ASM), without passing by a VTS centre; and
* The content of the VHF communication can be transmitted electronically and be displayed as a text in parallel to voice communication.

As illustrated in figure x, digitalization of information will change the communication procedure between shore authorities and ships and consequently, the role of VTS. Historically, VTS used to communicate to ships most of the information services (MSPs) produced by other recognized organizations (figure xx).

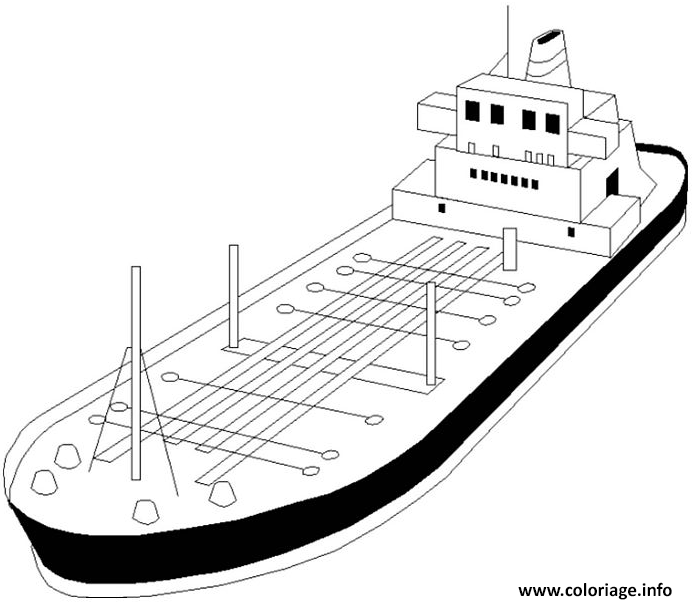
MSP5

MSP6



MSP7

MSP8

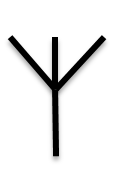




**MSP1**

MSP10

MSP13



MSP14

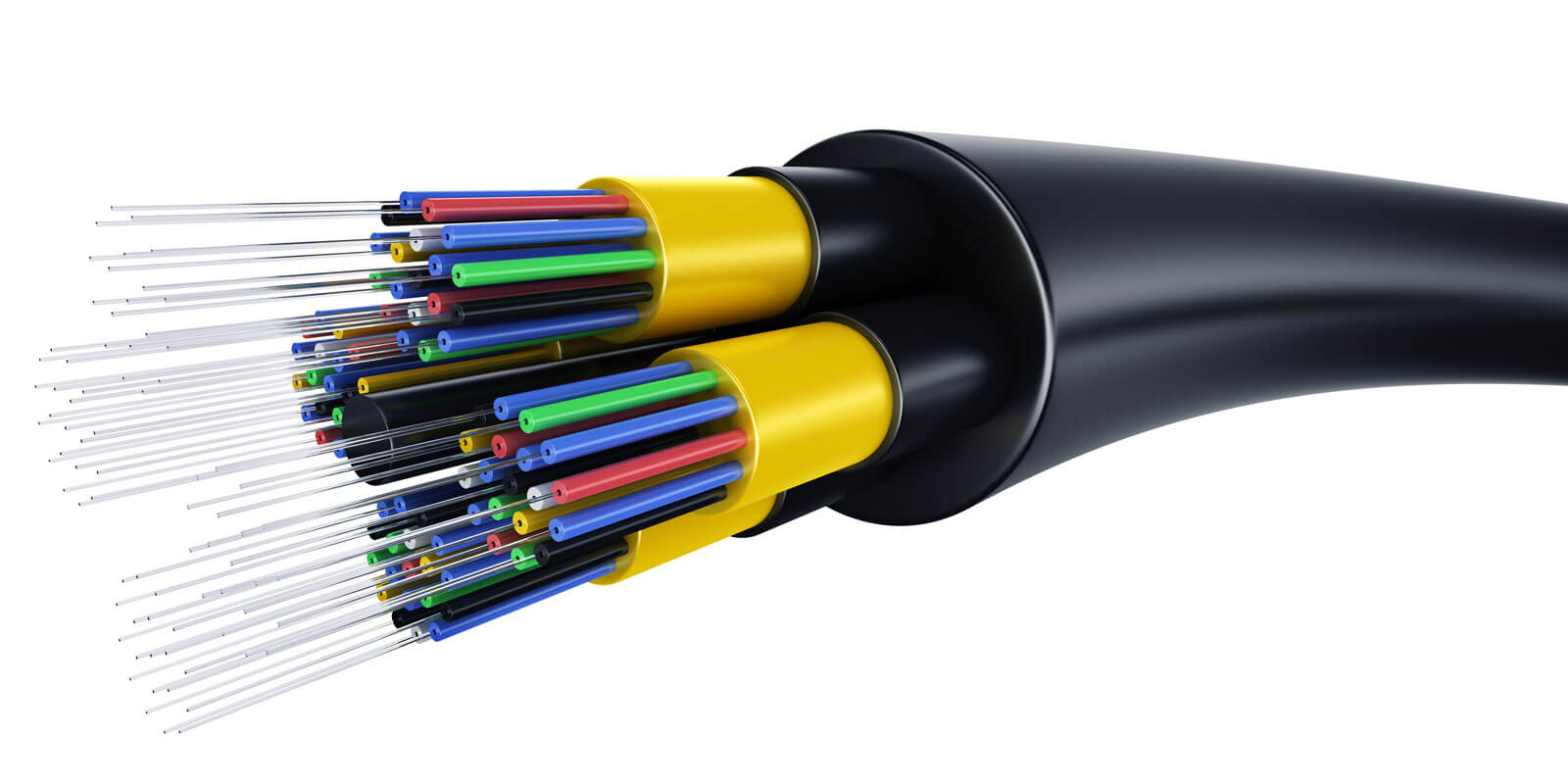
MSP16

MSP15

Figure xx: Illustration of the historical communication process between shore and ship.

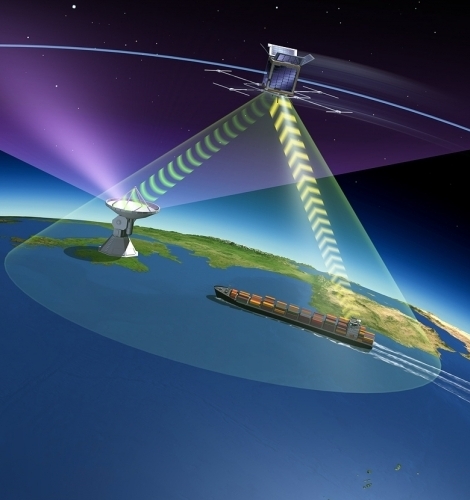
Over the last decades, the common practice was to “push” information to ships. This allowed VTS to have a knowledge of the status of this information and to trigger a notification procedure whenever a problem was noted. Digitalization of information introduces new ways to communicate with ships and although it will still be possible to push it through communication systems such as AIS and VDES, the capacity of ships to “pull” it directly from internet through Web services will also exist. In both cases, the assistance of VTS may not be required. This new situation may decrease the situational information awareness of VTS as they won’t know whether or not information has been received by ships. In order to keep pace with the digital transformation of information service, VTS will need to have access and monitor the status of information transmitted directly to ships. Hence, if ever there is a technological failure and information service cannot be communicated to ships, VTS will be in a position to notify as well mariners as the service producer, or to provide the information to the ship.

Even though information in the near future could be made accessible directly to ships, VTS will remain the primary contact with ships for urgent and important messages, including as a back-up for electronic failure. The figure xxx illustrates some of the current and future possibilities with respect to shore ↔ ship communication.



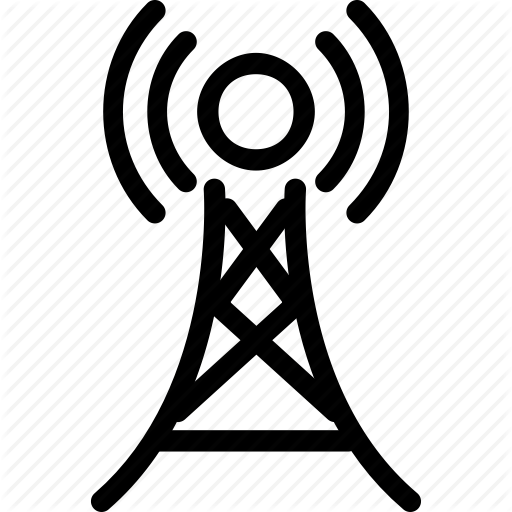
Larger Bandwidth

Terrestrial & Satellite



Satellite

AIS + SVDES



Terrestrial

AIS + VDES

**MSPs**

**Producers**

**MSP5**

**MSP6**

**MSP7**

**MSP8**

**MSP10**

**MSP13**

**MSP14**

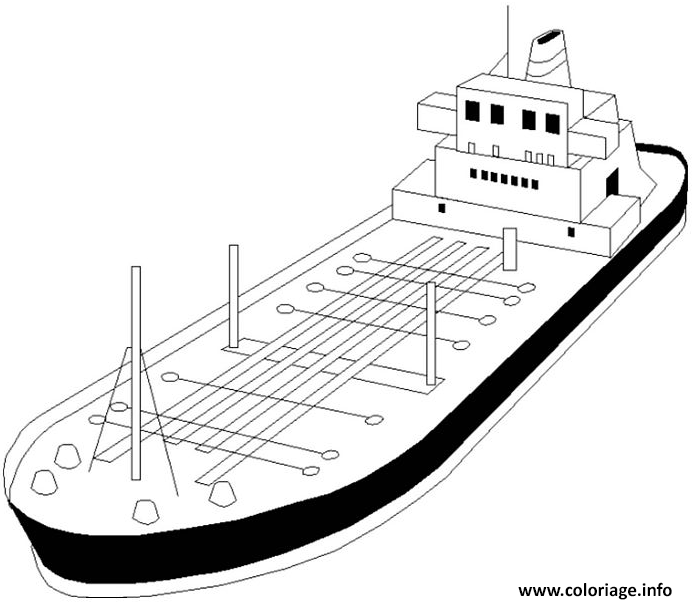
**MSP15**

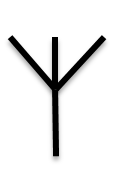
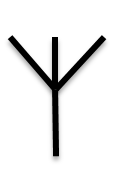
**MSP16**



**VTS Centre**

Monitoring & Communication, including AIS AtoN (critical situation) and AIS SRM(message 12)





Pushnfo

Pull info



AIS AtoN

Met/Hydro Data



Figure xxx: Illustration of some current and future communication processes between shore and ship.

Implementation of MSP1 by a national authority will require a strong coordination with all other MSP producers to clarify the mean of communication that wil be used to transmit their own service information to mariners, and to determine how the VTS will be kept informed. Development of national procedures detailing how shore ↔ ship communication will proceed will be essential to maintain safety to navigation.

In parallel to the development of MSPs’ content, the IMO is working on *Guidelines for harmonized display of navigation information received via communication equipment*. These Guidelines aim to develop standards and specifications which will automatically display on equipment onboard MSPs’ information received from a recognized an official mean of communication. This interoperability will allow a national authority to select, among e-Navigation recognized means of communication, those adapted to its own situation and capacity.

There are currently some e-Navigation means of communication already implemented or available but several are still in a development phase. Also, there are still works to do on the ships’ side to ensure harmonization of display. The Table xx below summarizes the status of these means of communication. This Table wiil be amended whenever the status of a mean of communication changes.

1. Current status of e-Navigation Communication means

|  |  |  |  |
| --- | --- | --- | --- |
| **Mean of communication**  **(e-Navigation)** | **Status** | **Standards** | **Area(s) of application** |
| AIS Application Specific message (ASM) | In force | IMO SN. 1/Circ.289  [Rec. ITU-R M.1371-5](http://www.itu.int/rec/R-REC-M.1371/en) | Terrestrial: 1, 2  Satellite: all areas |
| AIS Addressed Safety Related Message | In force | [Rec. ITU-R M.1371-5](http://www.itu.int/rec/R-REC-M.1371/en) | Terrestrial: 1, 2  Satellite: all areas |
| VDES  (terrestrial & satellite) | In development | ITU-R-M.2092 | Terrestrial: 1, 2  Satellite: all areas |
| NAVDAT | In development | ITU-R M.2010 (03/2012) | 1, 2, 4, 5 |
| Web service | In force | XML  (Conforming to ISO 8879) | Cellular: 1, 2  Satellite: all areas |

# Governing body, SERVICE PROVIDERS & STAKEHOLDERS

## Definitions

- **MSP governing body** which defines and maintains the overall architecture of the MSPs, endorses the definition and scope of individual MSPs, ensures interoperability and consistency, etc. (the IMO/IHO HGDM could be the initial basis for defining further that structure;

- **Service definition owner** which proposes the definition to the governing body and then implement the agreed definition through technical specifications

- **Service provider** responsible for delivering an operational service according to the relevant specifications;

- **Service producer** refers to a national authority responsible of the collection or creation of an information or data.

- **User** which makes use of the information provided by the service. In some cases (i.e. MSI service), there may be a need to distinguish between the provider of the information content (i.e. a NAVAREA coordinator) and the provider of the communication infrastructure/service (i.e. SafetyNET).

**- Technical service specification owner** refers to the body responsible for developing and maintaining the technical specification(s) of a service, based on the corresponding service definitions [by way of example: for VTS Information Service, technical service specification owners could be ~~the~~ IALA ~~ENAV Committee~~ and the IHO]

## [*all above agreed enav 20 with IHO comments*]Responsible service providers [to be decided later]

In each country there will be authorities responsible for providing information services. The table below offers examples of authorities responsible in each case, which can be different between countries.

Responsible authorities may require service providers to deliver the operational service.

1. Responsible Authorities (use table derived from NCSR1/28, annex 7?)

| Service No | Identified Services | Identified Responsible Service Provider |
| --- | --- | --- |
| 1 | VTS Information Service (INS) | VTS Authority |
| 2 | Navigational Assistance Service (NAS) | VTS Authority |
| 3 | Traffic Organisation Service (TOS) | VTS Authority |
| 4 | Local port Service (LPS) | Local Port/Harbour Authority |
| 5 | Maritime Safety Information (MSI) Service | National Competent Authority |
| 6 | Pilotage service | Pilotage Authority/Pilot Organization |
| 7 | Tug Service | National Competent Authority; Local Port/Harbour Authority |
| 8 | Vessel Shore Reporting | National Competent Authority and appointed service providers |
| 9 | Telemedical Assistance Service (TMAS) | National health organization / dedicated health organization |
| 10 | Maritime Assistance Service (MAS) | Coastal/Port Authority / Organization |
| 11 | Nautical Chart Service | National Hydrographic Authority / Organization |
| 12 | Nautical Publications service | National Hydrographic Authority / Organization |
| 13 | Ice navigation Service | National Competent Authority Organization |
| 14 | Meteorological information service | National Meteorological Authority Public Institutions |
| 15 | Real time hydrographic and environmental information service | National Hydrographic and Meteorological Authorities |
| 16 | Search and Rescue Service | SAR Authorities |

# Defined sea areas for MSP's

The following six areas have been identified for the delivery of MSPs: (See NCSR 1/28 Annex 7)

1. port areas and approaches.
2. coastal waters and confined or restricted areas.
3. open sea and open areas.
4. areas with offshore and/or infrastructure developments.
5. Polar areas.
6. other remote areas.

# MARITIME SERVICES

## MSP1 VTS Information Service (INS)

### Definition

The VTS Information Service is defined by IMO as “a service to ensure that essential information becomes available in time for on-board navigational decision-making” (Res. A857(20)).

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 .(IMO Res A.857(20))

IALA Guideline No. 1089 defines the “Provision of Vessel Traffic Services”(INS, TOS & NAS).

Table 3 provides a general overview of information service that can be provided by VTS, however the role of VTS in the provision of information service may differ from country to country

1. Examples of the types of information that may be provided by the VTS operating an Information Service

| Information related to: | Examples: |
| --- | --- |
| Navigational situations (including traffic and route information) | Position, identity, destination of vessels and the intention of other traffic;  Amendments and changes in promulgated information concerning the VTS area such as boundaries, procedures, radio frequencies, reporting points; the mandatory reporting of movements;  Limited maneuverability that may impose restrictions on the navigation of other vessels, or any other potential hindrances;  Suspension or change of routes; etc. |
| Navigational warnings | Dangerous wrecks, obstacles not otherwise promulgated, diving operations, vessels not under command, etc. |
| Meteorology | 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. |
| Meteorological warnings | Gale, storm, tsunami, restricted visibility, etc. |
| Hydrography | 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. |
| Electronic navigational aids | * The availability of electronic navigational aids such as: GNSS, Loran, LRIT, DGPS, AIS, RACON etc. |
| Other information | Port information, pilot or tug request, cargo information, health condition, PSC, ISPS, etc. |

### Area of Operation

MSP1 can be delivered in all sea areas (1-6).

### Objective

The aim is to give guidance on new complementary functionalities to the VTS Information Service (INS). The purpose is to reduce administrative burden and information overload, reduce miscommunication due to external interference, simplify work procedures, and increase navigational safety.

Complementary functionalities could include:

* Transfer of ship-shore data, internal VTS data, external data, etc.
* IT infrastructure
* Human-machine interface
* Machine-to-machine interface

The categories of services and the associated details are listed in Annex A, MSP 1, Information Service Template.

### User requirements

Examples of MSP1

The example is generic and simplified through an example for description purposes only. Actions and template categories may differ for different countries. *Content in the column named “Template Info (technical)” is pending submissions from relevant stakeholders.*

Information provided electronically could complement and/or replace VHF communication.

For example:

* Pre arrival reporting can be done digitally without VHF communication say for update of voyage plan.
* The content of the VHF communication can be transmitted digitally and be displayed as text in parallel to voice communication.

### Future Scenarios

#### Example - Vessel Arrival

The vessel provides pre-arrival information to VTS, such as ETA and destination. The VTS replies, providing information on weather. In the template, this is categorised as Environmental information.

After entering the VTS area, the vessel provides its sailing route to the VTS. The VTS responds with traffic information, such as position, identity and intention. In the template, this action is categorised as Traffic and Route information.

The vessel passes the reporting point line, upon which the VTS provides information on currents, wave height, etc. In the template, this action is categorised as Hydrographical information.

The vessel requires port information. The VTS provides quay details. In the template, this action is categorised as Traffic and Route information.

The vessel passes the second reporting point line. The VTS responds by giving operational information on AtoNs. In the template, this action is categorised as Navigation Hazard information.

The vessel comes along side, upon which the VTS provides information on speeds and visibility. In the template, this action is categorised as Environmental information.

| Time | Ship Action | VTS Action | Template Info (category) | Template Info (technical) |
| --- | --- | --- | --- | --- |
| 01:00 | Provides pre-arrival info | Replying with information on weather | Environmental | Annex 1 |
| 02:00 | Enters VTS Area, provides sailing route | Traffic information to vessels | 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 | Ship along side | Gives information on wind speeds, visibility | Environmental |  |

**Prior to arrival:** The vessel uses a data collecting system on board to send 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 vessel and VTS use chart systems as a graphic interface to present details that are of interest to the voyage, such as reporting point line and VHF channel.

**Upon arrival:** By using the data collecting system on board, the vessel sends Actual Time of Arrival via relevant infrastructure to VTS. Examples of infrastructure could be national single window, maritime cloud, etc.

### Relationship to other MSPs

MSP1 has relationships with other MSPs where it affects the VTS:

May be different depending on the coastal state arrangements.

|  |  |
| --- | --- |
| MSP 1 VTS INS | Associated |
| MSP 2 VTS NAS |
| MSP3 VTS TOS |
| MSP 4 Local Port Service | Delays, obstruction, cargo operations, port availability, |
| MSP 5 Maritime Information Service | All information depending on structure of MIS |
| MSP 6 Pilotage Service | Updates, delays, |
| MSP 7 Tug Service | Updates, delays, |
| MSP 8 Vessel Shore Reporting | Notification of arrival, dangerous cargo etc |
| MSP 9 Telemedical | Delays, |
| MSP 10 Maritime Assistance Service | Notifications, routing, places of refuge |
| MSP 11 Nautical Chart Service | Local Area updates, chart updates |
| MSP 12 Nautical Publication Service | Updates to publication |
| MSP 13 Ice Navigation Service | Ice channels, ice information |
| MSP 14 Meteorological Service | VTS area weather |
| MSP 15 Real Time Hydro and Inf Service | Tidal information in VTS area |
| MSP 16 Search and Rescue service | Search pattern and delays |

## MSP2 Navigational Assistance Service (NAS)

### Definition

The VTS Navigational Assistance Service is defined by IMO as “a service to assist on-board navigational decision-making and to monitor its effects. (IMO Res.A857(20))

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. (IMO Res.A857(20))

IALA guideline 1089 gives guidance on the delivery of the three different types of services provided by a VTS; Information Service (INS), Traffic Organization Service (TOS) and Navigational Assistance Service (NAS).

1. Examples of the types of information that may be provided by a VTS operating a NavigationalAssistance Service

|  |  |
| --- | --- |
| **Information related to NAS** | **Examples** |
| Request and identification | availability of NAS, start and end of NAS;  request for ship identification such as position, course made good and speed over the ground;  status of ship's equipment; etc. |
| Navigational information  (including position and course  information) | Examples provided to an individual vessel:  provide range and bearing from fixed objects, fairway/channel or way‐points; proximity to navigational hazards, etc.  provide information related to navigating into a channel/fairway/lane (i.e.track is parallel/diverging/converging with/from/to reference line); etc. |
| Advice (or instruction) | advise (or instruct) a ship to alter the course, speed;  advise (or instruct) to keep clear from area/position, close up/drop backon/from vessels; etc. |
| Warning | Diverging from the recommended track towards dangerous wrecks, obstacles not otherwise promulgated; diving operations; vessels not under command; etc. |

### Area of Operation

MSP2 can be delivered in sea areas 1-4.

### Objective

The aim is to give guidance on new complementary functionalities to Navigational Assistance Service (NAS). The purpose is to reduce administrative burden and information overload, reduce miscommunication due to external interference, simplify work procedures, and increase navigational safety.

Complementary functionalities could include:

* Transfer of ship-shore data, internal VTS data, external data, etc.
* IT infrastructure
* Human-machine interface
* Machine-to-machine interface

The categories of services and the associated details are listed in Annex B, MSP 2, Navigation Assistance Service Template.

### User requirements

The categories of services and the associated details are listed in Annex 2, MSP2 Navigational Assistance Service template.

Those categories may include for example: Navigational information, advice, instruction or warning.

All information related to this service should be displayed in real time.

Information provided electronically could complement VHF communication in time critical situations and in addition partly replace VHF communication in non-time critical situations.

Note: Example of time critical situation:

* Risk of grounding; In addition to VHF communication, vessel can be provided with an electronic route recommendation.

Note: Example of non-time critical situation:

* Assist a vessel to an anchoring position; provide the vessel with an electronic route recommendation without VHF communication.

The use case is generic and simplified through example for description purposes only. Actions and template categories may differ for different countries. *Content in the column named “Template Info (technical)” is pending submissions from relevant stakeholders.*

Information provided electronically could complement and/or replace VHF communication.

For example:

* Pre arrival reporting can be done digitally without VHF communication for update of route of voyage plan in order to avoid collisions, groundings and assist in safe navigation.
* The content of the VHF communication can be transmitted digitally and be displayed as text in parallel to voice communication.

### Future Scenarios

#### Example – vessel approaching pilot boarding area

The vessel approaches the Pilot Boarding Area according to received voyage plan. In the template, this is categorised as Traffic and Route Information.

The vessel deviates from voyage plan. The deviation is detected by the VTS, who instructs the vessel to change course. (In the template, no categories are relevant. Recommend to include *Navigation instruction* in the template.)

The vessel changes course. Course change is confirmed by the VTS. In the template, no categories are relevant. (Recommend to include *Instruction* *acknowledge* in the template.)

| Time | Ship Action | VTS Action | Template Info (category) | Template Info (technical) |
| --- | --- | --- | --- | --- |
| 01:00 | Approaches Pilot Boarding Area | Is alerted | Traffic and Route Information |  |
| 01:30 | Deviates from voyage plan | Instructs the vessel to change course | Navigational advice (revise to include *Navigation* *instruction* in template) |  |
| 01:35 | Changes course | Confirms that vessel has changed course | (Revise to include *Instruction* *acknowledge* in template) |  |

Vessel approaches pilot boarding area. The VTS application observes and analyses the situation. It alerts the VTS operator, who then confirms that the vessel has deviated from its voyage plan. For example based on statistical data/deep learning, the application then provides decision support to the VTS operator on the next course of action. The VTS operator validates and acknowledges the advice, and instructs the vessel to change course via VHF. The proposed instruction is also presented on the vessel’s own navigation system. The VTS operator confirms that the vessel has changed course accordingly to the instruction. The VTS application continues to monitor the vessel’s voyage. It will alert the VTS operator if new deviation occurs.

#### Example – vessel approaches shallow waters

The VTS operator concludes that the vessel wanted to make a lee for the pilot boat. Course given by the pilot boat would put the vessel into an even worse situation regarding shallow waters. VTS interrupted the boarding operation and gave instruction and guided the ship into a safe area for the embarkation of the pilot.

The VTS requests that the ship states its intention in the VTS area. In response the ship provides its sailing route. In the template, this action is categorised as Navigational information.

The VTS gives a warning when the ship has run into shallow waters, upon which the ship confirms that the information has been received. In the template, this action is categorised as Navigational warning.

The VTS advices the ship to change course. The ship confirms. In the template, this action is categorised as Navigational advice.

The VTS instructs the ship to alter its course, upon which the ship confirms. In the template, this action is categorised as Navigational instruction.

| Time | VTS Action | Ship Action | Template Info (category) | Template Info (technical) |
| --- | --- | --- | --- | --- |
| 00:00 | Question: What is your intention? | Provides sailing route | Navigation Information |  |
| 02:00 | Warning: You are running into danger - shallow waters... | Confirms | Navigational warning |  |
| 02:10 | Advice: Recommended course to make good... | Confirms | Navigational advice |  |
| 02:20 | Instruction: Alter course to south-west... | Confirms | Navigational advice (revise to include *Navigation instruction* in template) |  |

The VTS application indicate to the VTS operator the situation and suggests an appropriate decision. The VTS operator selects the correct decision from the VTS application and provides it digitally to the vessel .The vessel verifies the decision and takes appropriate action.

### Relation to other MSPs

MSP2 has relationships with other MSPs where it affects the VTS:

May be different depending on the coastal state arrangements.

|  |  |
| --- | --- |
| MSP 1 VTS INS | Associated |
| MSP 2 VTS NAS |
| MSP3 VTS TOS |
| MSP 4 Local Port Service | Delays, obstruction, cargo operations, port availability, |
| MSP 5 Maritime Information Service | All information depending on structure of MIS |
| MSP 6 Pilotage Service | Updates, delays, |
| MSP 7 Tug Service | Updates, delays, |
| MSP 8 Vessel Shore Reporting | Notification of arrival, dangerous cargo etc |
| MSP 9 Telemedical | Delays, |
| MSP 10 Maritime Assistance Service | Notifications, routing, places of refuge |
| MSP 11 Nautical Chart Service | Local Area updates, chart updates |
| MSP 12 Nautical Publication Service | Updates to publication |
| MSP 13 Ice Navigation Service | Ice channels, ice information |
| MSP 14 Meteorological Service | VTS area weather |
| MSP 15 Real Time Hydro and Inf Service | Tidal information in VTS area |
| MSP 16 Search and Rescue service | Search pattern and delays |

## MSP3 Traffic Organization Service (TOS)

### Definition

Traffic Organization Service (TOS) is defined by IMO 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” (IMO Res.A857(20)).

The traffic organisation 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. (IMO Res. A.857(20)

IALA Guideline No. 1089 defines the Provision of Vessel Traffic Services (INS, TOS & NAS).

1. Examples of types of information that may be provided by the VTS within a Traffic Organization Service:

|  |  |
| --- | --- |
| Information related to: | Examples |
| Traffic clearance | Give authorization under conditional circumstances to a vessel when: prior to or entering a VTS area;  departing from a berth or an anchorage position within a VTS area;  entering into a fairway within a VTS area; or  prior to commencing a manoeuvre that may be detrimental to safe navigation.  Examples of conditions:  a VTS sailing plan before entering a VTS area;  lock and bridge passage planning;  report position at determined reporting point/line/pilot station;  use a second fairway in case of bad visibility/weather;  use a tug boat in case of strong wind;  dredging or compass swing in confined waterway. |
| Anchorage | Examples of anchorage situations:  organizing the movements to/from an anchorage position/area;  assignment of an anchorage position;  assisting vessels into anchorage position. |
| Enforcement | Examples of enforcement:  speed limits;  adherence to rules regarding traffic routeing measures;  pilotage requirements;  other traffic regulations and possibly local by‐laws |
| Waterway (sea, channels and fairway) management | Examples of management measures:  the use of one‐way traffic as an alternative of two way traffic, depending on the dimensions of ship or the weather conditions;  organizing other traffic when a vessel has passed point of no return;  slot management to allocate ships in a time window;  organizing the traffic concerning vessel dimensions in comparison to fairway restrictions;  instruct vessels when overtaking is not permitted;  establish and organise ship safety zones in case of particular operations;  establish and organise exclusion zones;  instruct vessels to keep clear from special areas/positions;  organizing the traffic as regards to meteorological, hydrographical or other restrictions such as visibility, wind speed, current, sea state and under keel clearance. |

### Area of Operation

MSP3 can be delivered in sea areas 1-4.

### Objective

The aim is to give guidance on new complementary functionalities to Traffic Organisation Service (TOS). The purpose is to reduce administrative burden and information overload, reduce miscommunication due to external interference, simplify work procedures, and increase navigational safety.

Complementary functionalities could include:

* Transfer of ship-shore data, internal VTS data, external data, etc.
* IT infrastructure
* Human-machine interface
* Machine-to-machine interface

The categories of services and the associated details are listed in annex 3, MSP3 Traffic Organization Service template.

### User requirements

All information provided electronically should be displayed in real time on the ship.

Information provided electronically could complement and/or replace VHF communication.

Examples:

* Slot management; provide vessels electronically with timestamp, priority of arrival and distance between two vessels
* Traffic clearance; provide vessels permission to proceed, impose conditions or deny entry electronically

### Future Scenario

The use case is generic and simplified through example for description purposes only. Actions and template categories may differ for different countries. *Content in the column named “Template Info (technical)” is pending submissions from relevant stakeholders.*

Information provided electronically could complement and/or replace VHF communication.

For example:

* Traffic clearance, reporting can be done digitally without VHF communication for example time slot allocation send and received.
* The content of the VHF communication can be transmitted digitally and be displayed as a text in parallel to voice communication for no go area sent received and displayed, for example for its draft, closed fairway/port/quay.

#### Example – vessel leaves quay

The vessel requests permission to leave the quay. The VTS instructs the vessel to remain alongside. Permission is granted to leave in five minutes. In the template, this action is categorised as Traffic clearance.

The vessel passes reporting point before entering fairway A. The VTS gives instruction and provides sequence slot due to other traffic. In the template, this action is categorised as Waterway management.

While vessel is underway, the VTS provides information on speed limit in fairway. The vessel is instructed to keep safe speed. In the template, this action is categorised as Enforcement.

The vessel requests anchorage, upon which the VTS provides anchorage position. In the template, this action is categorised as Waterway management.

| Time | Ship Action | VTS Action | Template Info (category) | Template Info (technical) |
| --- | --- | --- | --- | --- |
| 00:00 | Requests permission to leave quay | Instruction: Remain alongside. Permission to leave in five minutes | Traffic clearance |  |
| 02:00 | Vessel passing reporting point before entering fairway A | Instruction: Provides sequence slot due to other traffic | Waterway management |  |
| 02:10 | Vessel had exceeded speed limit in the fairway | Instruction: speed limit in fairway 8 knots, keep safe speed | Enforcement |  |
| 02:20 | Requests anchorage | Provides position for anchorage | Waterway management |  |

Vessel sends planed ETD digitally to VTS where it is presented in the VTS application and the VTS operator takes action and instructs vessel digitally to remain alongside for five more minutes. The instructions are graphically displayed in applications, acknowledged and provided to other traffic via digital and/or verbal means for non MSP-ready vessels. The application alerts operator on upcoming traffic conflicts and advice on a solution, which is acknowledged and transmitted to vessels.

### Relation to other MSPs

MSP3 has relationships with other MSPs where it affects the VTS:

May be different depending on the coastal state arrangements.

|  |  |
| --- | --- |
| MSP 1 VTS INS | Associated |
| MSP 2 VTS NAS |
| MSP3 VTS TOS |
| MSP 4 Local Port Service | Delays, obstruction, cargo operations, port availability, |
| MSP 5 Maritime Information Service | All information depending on structure of MIS |
| MSP 6 Pilotage Service | Updates, delays, |
| MSP 7 Tug Service | Updates, delays, |
| MSP 8 Vessel Shore Reporting | Notification of arrival, dangerous cargo etc |
| MSP 9 Telemedical | Delays, |
| MSP 10 Maritime Assistance Service | Notifications, routing, places of refuge |
| MSP 11 Nautical Chart Service | Local Area updates, chart updates |
| MSP 12 Nautical Publication Service | Updates to publication |
| MSP 13 Ice Navigation Service | Ice channels, ice information |
| MSP 14 Meteorological Service | VTS area weather |
| MSP 15 Real Time Hydro and Inf Service | Tidal information in VTS area |
| MSP 16 Search and Rescue service | Search pattern and delays |

## MSP4 Local Port Service (LPS) [M BErgmann]+s KOREA+Sweden+singapore+IHMA

### Definition

LPS is applicable to those ports where it has been assessed that a VTS, as described above, is excessive or inappropriate.

The main difference arising from the provision of LPS is that it does not interact with traffic, nor is it required to have the ability and/or the resources to respond to developing traffic situations and there is no requirement for a vessel traffic image to be maintained.

Provision of LPS is designed to improve port safety and co-ordination of port services within the port community by dissemination of port information to vessels and berth or terminal operators. It is mainly concerned with the management of the port, by the supply of information on berth and port conditions. Provision of LPS can also act as a medium for liaison between vessels and allied services, as well as providing a basis for implementing port emergency plans. Examples of LPS may include:

* berthing information;
* availability of port services;
* shipping schedules;
* meteorological and hydrological data.

### Area of operation

### Objective

### User requirements

### Future Scenario

### Relation to other MSPs

## MSP5 Maritime Safety Information service (MSI)

### Definition

The Global Maritime Distress and Safety System (GMDSS) as described in SOLAS Chapter IV defines the seventh functional requirement as: 'Every ship, while at sea, shall be capable of transmitting and receiving maritime safety information'.

The MSI service is an internationally co-ordinated network of broadcasts of Maritime Safety Information from official information providers, such as:

* National Coastal administration or shipping authority, for navigational warnings;
* National Meteorological Offices, for marine weather warnings and forecasts;
* Rescue Co-ordination Centres (RCCs), for shore-to-ship distress alerts;
* The International Ice Patrol, for Oceanic ice hazards.

SOLAS Chapter V, regulations 4 through 7 governs the contracting government’s responsibilities with regards to providing MSI information.

Examples of Maritime Safety Information Service are listed in Table x.

1. Maritime Safety Information Service

| Information related to: | Examples: |
| --- | --- |
| Impediments to shipping and areas to avoid | Dangerous wrecks, obstacles not otherwise promulgated, diving operations, cable laying operations, vessels not under command, etc.  The routes of large unwieldy tows;  Drifting hazards (including derelict vessels, ice, mines, containers, other large items, etc.);  The establishment of offshore structures in or near shipping lanes and the positioning of rigs;  Areas where search and rescue (SAR) and anti-pollution operations are being carried out (for avoidance of such areas)  Military practice areas. |
| Status of navigation aids | Casualties to lights, fog signals, buoys and other aids to navigation affecting main shipping lanes;  Establishment of major new aids to navigation or significant changes to existing ones. |
| Other urgent safety-related information | unexpected alteration or suspension of established routes;  acts of piracy and armed robbery against ships;  tsunamis and other natural phenomena, such as abnormal changes to sea level;  New or amended mandatory ship reporting systems or maritime regulations affecting ships at sea;  Significant malfunctions or changes to maritime communications systems.  World Health Organization (WHO) health advisory information;  security-related requirements. |
| Marine weather warnings and forecasts | 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.  Gale, storm, tsunami, restricted visibility, etc. |

### Area of operation

MSP5 can be delivered in all sea areas (1-6).

### Objective

The joint IHO/IMO/WMO Publication S-53 states that the Maritime Safety Information Service of the GMDSS is the internationally and nationally coordinated network of broadcasts containing information which is necessary for safe navigation, received on 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 figure 4.5-1.



Figure 4.5‑1 The maritime safety information service of the Global Maritime Distress and Safety System (Source: S-53)

\*Note that search and rescue information is outside of scope for this MSP.

Additionally, local and regional governments may provide MSI information in other formats such as through a website, push e-mail service and social media.

Within GMDSS, navigational warnings promulgation is done in defined areas that are managed by area coordinators as illustrated on figure 4.5-2.



Figure 4.5‑2 NAVAREAs for coordinating and promulgating navigational warnings under the World-Wide Navigational Warning Service (Source: S-53)

Marine meteorological warnings are, within GMDSS, promulgated in defined areas which are under the coordination of defined area coordinators. Within other distribution channels, other areas and operators are possible.



Figure 4.5‑3 METAREAs for coordinating and promulgating meteorological warnings and forecasts within the GMDSS (Source: S-53)

### User requirements

Two principal methods are used for broadcasting maritime safety information in accordance with the provisions of the International Convention for the Safety of Life at Sea, 1974, as amended, in the areas covered by these methods, as follows:

* NAVTEX: broadcasts to coastal waters; and
* SafetyNET: broadcasts which cover all the waters of the globe except for Sea Area A4, as defined by IMO resolution A.801(19), annex 3, as amended.

Additionally, HF NBDP may be used to promulgate maritime safety information in areas outside Inmarsat or NAVTEX coverage (SOLAS regulation IV/7.1.5).

Ships are required to be capable of receiving maritime safety information broadcasts for the area in which they operate in accordance with the provisions of the International Convention for the Safety of Life at Sea, 1974, as amended. The NAVTEX receiver should operate in accordance with the technical specifications set out in Recommendation ITU-R M.540, as amended. The SafetyNET receiver should conform to the Maritime Design and Installation Guidelines (DIGs), annex B, issue 6 of April 2008 published by Inmarsat. In Sea Area A4, outside of the coverage of NAVTEX, where MSI is received using HF NBDP, the HF NBDP receiver should operate in accordance with the technical specifications set out in Recommendation ITU-R M.688, as amended, and should meet the performance standards adopted by IMO resolution A.700(17), as amended.

Future MSI services should provide information in formats and by means that allow it to be better integrated with other systems on board, especially ECDIS. IHO is developing the S-124 standard which is expected to be the next generation MSI exchange standard. It is envisioned that these will interact in various forms with the ENC within the ECDIS.

### Relationship to other MSPs

Information related to ENC data such as updates to the status of navigation aids will supplement information that is part of MSP11 and MSP 17. Anti-piracy warnings transmitted as MSI will overlap with MSP 20 and will probably be summary information that is expanded on in MSP20 services. Meteorological information such as forecasts will overlap information that is part of MSP 14 and MSP 15, and again will potentially be extracts or summaries of information that is provided in more detail as part of those services.

## MSP6 Pilotage service [IMPA]

### Definition

The aim of the pilotage service is to safeguard traffic at sea and protect the environment by ensuring that vessels operating in pilotage area have navigators with adequate qualifications for safe navigation. Each pilotage area needs highly specialized experience and local knowledge on the part of the pilot.

Efficient pilotage depends, among other things, upon the effectiveness of the communications and information exchanges between the pilot, the master and the bridge personnel and upon the mutual understanding, each has for the functions and duties of the other.

Establishment of effective co-ordination between the pilot, the master and the bridge personnel, taking due account of the ship's systems and equipment available to the pilot, will aid a safe and expeditious passage.

### Area of operation

MSP 6 can be used in

### Objective

### User requirements

### Future Scenarios

### Relation to other MSPs

## MSP7 Tugs service

### Definition

Efficient tug operations depend on, among other things, the effectiveness of the communications and information exchanges between relevant stakeholders. The primary aim of the tugs services is to assist in the manoeuvring of ships in narrow waterways and when berthing. The tugs service may also be used for :

* transportation (personnel and staff from port to anchorage) operations;
* ship assistance (ex: mooring) operations;
* salvage (grounded ships or structures) operations;
* shore operations;
* towage (harbour/ocean) operations;
* escort operations;
* oil spill response operations.

### Area of Operation

### Objective

### User requirements

### Future Scenario

### Relation to other MSPs

## MSP8 Vessel shore reporting [s Korea+ norway+italy+sweden+SINGAPORE+CIRM]

### Definition

The aim of vessel shore reporting is to safeguard traffic at sea, ensure personnel safety and security, ensure environmental protection and increase the efficiency of maritime operations.

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 on-board systems. Some of the ways the administrative burden of vessel shore reporting can be reduced are:

* single-entry of reporting information into ICT collection tools that store it in a repository and ICT tools that assists with the generation all required reports from this repository;
* automated collection of information from ship-board systems that is required for reporting (for example Ballast Management System, Emissions Control System, Waste Management System, Navigation System, etc., etc.);
* ICT tools that allow mariners to delegate to shore-based personnel (at the discretion of the ship’s owner/operator) the tasks of information collection, generation and submittal of required reports;
* reduce the administrative burden by encouraging all national reporting requirements to use standardized digital reporting formats based on the S-200 Product Specification of the Common Maritime Data Structure;
* automated or semi-automated digital distribution/communication of required reports via available networks.

### Scope

Submission and distribution of all reports required by all shore-based authorities in the required format and in the required timeframe.

### Objective

Reduce the burden of submittal and distribution of required reports

### User requirements

Provide ICT tools for shipboard and shore-based personnel to streamline the processes and procedures associated with submittal, 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., etc.) and from shore-based sources (cargo and passenger booking offices, crewing agents, stevedores, etc., etc.).

Such tools should alert the user what information is missing in the repository that prevents generation of the required reports for an upcoming port call, which reports will need to be submitted when, to whom in what format and via which communications network.

The repository structure shall comply with the latest version of the S-200 Product Specification for the Common Maritime Data Structure.

The reports shall fulfil the exact requirements of each and every shore-based authority. This means adhering to the requirements for report format (hard copy, fax, MS Word, PDF, RTF, XML, Excel, CSV, etc.), its graphical layout, it’s language(s), the specification of its fields, its units of measure, allowed abbreviations, its deadline (relative to the arrival at the next port), how it is authenticated, how it is to be submitted, who it should be addressed to, etc., etc.

The reports should be created in the proper time and time period to report before her arrival at ports or sea area automatically and authorised by master before submission.

The information related to ship operation should not be revised intentionally by mariner and should be collected directly from ship’s automatic monitoring system.

To fulfil the above user requirements an eco-system shall be established in which developers of such ICT Tools can thrive and provide shipping lines with a number of alternative solutions.

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., etc. (FONASBA, which is an association of shipping agents that has 'Observer' status at IMO may be enticed to build and maintain the report library). The eco-system also requires developing and maintaining an S-200 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. A prime candidate for such standards are those developed by the Open Connectivity Foundation for the Internet of Things (IoT).

## MSP9 Telemedical Assistance Service (TMAS) [NORWAY]+NTnu

### Definition

According to the IMO/ILO resolution 164 the TMAS centre should provide medical advice for seafarers 24 h/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 onboard ship.

Within the maritime medicine the prevailing view has for a long time been that a standardization of the TMAS services is both necessary and wanted. This would firstly enhance the quality of the medical practice, and secondly, a standardization of reporting and registering of medical events will make a much better basis for advancement. MSC.1/Circ.1218 MSC/Circ.960

### Scope

### Objective

### User requirements

## MSP10 Maritime Assistance Service (MAS)

### Definition

The primary mission of MAS is to handle communication between the coastal State, ship's officers requiring assistance, and other players in maritime community. These can be fleet owners, salvage companies, port authorities, brokers, etc.

The MAS is on 24-hour alert to deploy rapid assistance and professional support for ships in connection with:

Combating pollution, fire and explosions on board, collision, grounding, , etc.

The Ship Security Alert System enables a vessel to send a distress call if it is attacked by pirates, etc. On receiving such a call, the MAS is responsible for alerting the relevant authorities responsible for a response. (is this right)

The MAS is responsible only for receiving and transmitting communications and monitoring the situation. It serves as a 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.

Situations where the MAS apply are as follow:

* A ship involve in an incident (loss of cargo, accidental discharge of oil, etc.) that does impair its seakeeping ability but nevertheless has to be reported;
* a ship in need of assistance according to the master's assessment, but not in distress situation that requires the rescue of personnel on board;
* a ship in distress when 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.

The MAS entails the implementation of procedures and instructions enabling the forwarding of any given information to the competent organization and requiring the organizations concerned to go through the MAS in order to make contact with the ship.

### Scope

text

### Objective

text

### User requirements

## MSP11 Nautical Chart Service

### Definition

The aim of the nautical chart service is to safeguard navigation at sea by providing information such as nature and form of the coast, water depth, tides table, obstructions and other dangers to navigation, location and type of aids to navigation and is most often signatories to IMO SOLAS where the responsibilities of a hydrographic service is defined as follows

Contracting Governments to SOLAS V undertake to arrange for the collection and compilation of hydrographic data and the publication, dissemination and keeping up to date of all nautical information necessary for safe navigation. In particular, Contracting Governments undertake to co-operate in carrying out, as far as possible, the following nautical and hydrographic services, in

the manner most suitable for the purpose of aiding navigation:

* to ensure that hydrographic surveying is carried out, as far as possible, adequate to the requirements of safe navigation;
* to prepare and issue nautical charts, sailing directions, lists of lights, tide tables and other nautical publications, where applicable, satisfying the needs of safe navigation;
* to promulgate notices to mariners in order that nautical charts and publications are kept, as far as possible, up to date; and
* to provide data management arrangements to support these services.

Contracting Governments undertake to ensure the greatest possible uniformity in charts and nautical publications and to take into account, whenever possible, relevant international resolutions and recommendations, which means the appropriate resolutions and recommendations adopted by the International Hydrographic Organization (IHO).

IHO facilitate co-ordination of the hydrographic office activities to the greatest possible degree in order to ensure that hydrographic and nautical information is made available on a world-wide scale as timely, reliably, and unambiguously as possible.

In nearly all countries, chart data is currently available to end-users only on a commercial basis, either directly from the hydrographic office, via commercial data vendors, or chart agents. This model is expected to continue for the foreseeable future. Updates are available by both physical media (CD/DVD) and online, over the Internet or by e-mail. Online update services are accessible either directly via off-the-shelf tools (e.g., Web browsers) or via custom applications or software modules in applications.

Vendors supply value-added data (VAD) supplied by vendors (this means VAD that is intrinsically chart data, not an overlay of other information). Such information is considered unofficial data.

Raster charts services also continue to be available and there is expected to be a continued demand during the transition period at least.

Examples of Nautical Chart Service is listed in Table x.

Table x – Nautical Chart Service

| Information related to: | Examples: |
| --- | --- |
| Navigational charts | Paper charts  Raster Navigational Charts (RNC)  Electronic Navigation Charts (ENC) |
| Chart catalogue | Catalogue of available products |
| Bathymetric charts | Bathymetric Information with greater details than normally given in a navigational chart |
| Notice to Mariners | Regular updating service for products issued by the individual Nautical Chart Service. |
| Hydrography | 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. |

### Scope

MSP11 can be delivered in all sea areas (1-6).

### Objective

A hydrographic service produces and distribute paper charts, ENCs and other products to safeguard navigation at sea. These services are carried out as defined in the IHO publications M-3 and for ENCs the WEND (Worldwide Electronic Navigational Chart Database) principles (M-3, Resolutions of the IHO – Resolution 1/1997 (as amended)) which note that:

“The purpose of WEND is to ensure a world-wide consistent level of high-quality, updated official ENCs through integrated services that support chart carriage requirements of SOLAS Chapter V, and the requirements of the IMO Performance Standards for ECDIS.”

The IHO S-65 standard note that hydrographic offices are responsible for:

* The preparation and provision of digital data and its subsequent updating for waters of national jurisdiction.
* Ensuring that, mariners, anywhere in the world, can obtain fully updated ENCs for all shipping routes and ports across the world and that their ENC data are available to users through integrated services.
* Assuring the high quality of its ENC services through the use of a Quality Management System that is certified by a relevant body as conforming to a suitable recognised standard; typically this will be ISO 9001.
* Ensuring compliance with all relevant IHO and IMO standards and criteria (including IHO S-57, IHO S-52, or their replacements).
* Providing timely updates to the ENC for the mariner; these should be at least as frequent and timely as those provided by the Contracting Government for the correction of paper charts.

Similar arrangements and principles apply to nautical charts and other nautical products (e.g. S-102 high definition bathymetry) made available by hydrographic offices.

[This section reuses material from S-65. S-65 contains this copyright statement: In the event that this document [S-65] or partial material from this document [S-65] is reproduced, translated or distributed under the terms described above, the following statements are to be included:

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### User requirements

Nautical chart service should offer both paper charts as well as digital charts in raster and vector formats for use in ECDIS or ECS, depending on vessel classification. Nautical charts should be made available as widely as possible utilizing various distribution channels, including direct distribution, agents and other service providers. ENC may be distributed via a RENC, which distribute them onward with the distributor network.



Figure 4.11‑1 - General principle of ENC distribution (Source: S-65)

A chart catalogue service should be included as a part of a Nautical Chart service to give service users a quick reference guide to products offered by the nautical chart service.

IHO is developing the next version of ENC, called S-101. It should be expected that a new ECDIS or ECS system may be needed to utilize these next generation ENC. For future nautical chart services, the commercial model of distribution is expected to continue. Chart vendors provide for licensing and payment on a when-needed basis even now, and this will continue to be a requirement. The technical specifications of this service must support licensing, payment (both subscription-based and spot payments), and data protection.

Requirements for future services in this portfolio include faster turnaround for the process between mariner reports to agencies to the issuance of chart updates, making it easier to include more types of relevant information with reports such as information in mixed media, and reporting methods that are better integrated with ENCs. For example, initial generation of a hydrographic report on an ECDIS followed by automatic transfer of the initial report to a back-of-bridge system and thence to the appropriate hydrographic office.

Provision should be made for value-added data (VAD) and value-added services (VAS) supplied by vendors (this means VAD that is intrinsically chart data, not an overlay of other information), including SENC distribution.

Raster charts services also continue to be available and there is expected to be a continued demand during the transition period at least.

### Relationship to other services

MSP 12 and MSP 13 will supplement MSP 11 data for navigation purposes. MSP5 will supplement it with up-to-date information on the status of navigation aids, obstructions to shipping and other events that impact navigational safety.

## MSP12 Nautical publications service

### Definition

The aim of the nautical publication service is to promote navigation awareness and safe navigation of ships. Nautical publications include, tidal currents, aids to navigation system, buoys and fog signals, radio aids to marine navigation, chart symbols, terms and abbreviations, sailing directions and notices to mariners and local notices. Nautical publications information often includes information necessary for navigation that cannot be included in a chart service, for example because it consists of blocks of text, or information of use to the mariner but not essential to route monitoring. When the S-100 based product specifications are in full use, the line between ENC and many nautical publications will be based on content rather than format, since both will be available as feature-based datasets.

A nautical publication service is normally provided by a hydrographic service by a nation that is most often a signatory to IMO SOLAS where the responsibilities of a hydrographic service is defined as follows

Contracting Governments to SOLAS V undertake to arrange for the collection and compilation of hydrographic data and the publication, dissemination and keeping up to date of all nautical information necessary for safe navigation. In particular, Contracting Governments undertake to co-operate in carrying out, as far as possible, the following nautical and hydrographic services, in the manner most suitable for the purpose of aiding navigation:

* to ensure that hydrographic surveying is carried out, as far as possible, adequate to the requirements of safe navigation;
* to prepare and issue nautical charts, sailing directions, lists of lights, tide tables and other nautical publications, where applicable, satisfying the needs of safe navigation;
* to promulgate notices to mariners in order that nautical charts and publications are kept, as far as possible, up to date; and
* to provide data management arrangements to support these services.

Contracting Governments undertake to ensure the greatest possible uniformity in charts and nautical publications and to take into account, whenever possible, relevant international resolutions and recommendations, which means the appropriate resolutions and recommendations adopted by the International Hydrographic Organization (IHO).

IHO facilitate co-ordination of the hydrographic office activities to the greatest possible degree in order to ensure that hydrographic and nautical information is made available on a world-wide scale as timely, reliably, and unambiguously as possible. Moreover, the IHO publication M-3 contains technical resolutions and recommendations that define how nautical publications shall be produced to be compliant with SOLAS (NAUTICAL PUBLICATIONS AND THE SOLAS CONVENTION, 3/2002 as amended).

While they have been largely book-based until now, IHO is actively working on making several of them more ECDIS-friendly in the sense of turning them into feature-based datasets.

Nautical publications are currently nearly always provided as printed and digital paper publications that are nearly always distributed via commercial channels. Updates and corrections especially to the status of navigation aids and lights are often distributed via agency web sites as well as the distribution channels for the originals.

Examples of Nautical Publications Service are listed in Table x.

Table x – Nautical Publications Service

|  |  |
| --- | --- |
| Information related to: | Examples: |
| Transits and routeing | Routes in constricted shipping lanes or  Routeing measures, traffic separation schemes, and shipping lanes |
| Summary information about port facilities | Depth alongside berths, and quay lengths  Cargo handling facilities at specified terminals and berths |
| Variations from charted information | Tendencies toward silting at river mouths, shifting sandbanks, etc., that may degrade the accuracy of charted information |
| Marine radio services | Geographic availability of services  Frequencies and channels used and broadcast schedules  Type of traffic supported – Weather forecasts, radiofax, telemedical assistance, etc. |
| Protected area information | Locations of marine protected areas  Restrictions and regulations applicable within specific areas |
| Prevailing natural conditions | Seasonal hazardous conditions  Periodic (e.g., tide-related) or irregular hazardous conditions |
| Regulatory information | Laws and regulations applicable in specific locations.  Laws and regulations applying to vessels of specific dimensions or carrying specified cargo  Local rules regarding use of specific pilot boarding places by vessels exceeding specified dimensions or carrying hazardous cargo |
| Services | Waste disposal, repair, bunkering, collection of ship pollutants such as oily wastes  Pilot services contact information and notice times |
| Navigation aids | List of Lights |
| Tide information and forecasts | Tide tables, tide stream atlases |
| Planning | Routeing guides |
| Controlled areas | VTS contact information |

### Scope

MSP12 can be delivered in all sea areas (1-6).

### Objective

A hydrographic service produces and distribute nautical publications to promote navigation awareness and safe navigation of ships. These services are carried out as defined in the IHO publication M-3. Technical resolution 1/2002 gives the following exhaustive list of nautical publications, but note that other publications may also be added.

* Distance Tables
* List of Buoys and Beacons
* List of Lights
* List of Radio Signals
* List of Symbols, Abbreviations and Terms used on Charts
* Mariners’ Handbooks
* Notices to Mariners
* Routeing Guides
* Sailing Directions
* Tidal Stream Atlases
* Tide Tables

Moreover, M 3 states that nautical publications may be in printed form or digital form (Technical resolution 2/2002 as amended). The digital form may be a digital representation of the printed version, such as is often the case with PDF files, and it may be in other forms such as XML. M-3 classifies the different types of nautical publications in the following manner;

* NP1 – Printed paper publications
* NP2 – Digital publications based upon existing paper publications
* NP3 – Digital dataset(s) fully compatible with ECDIS that serve the purpose otherwise provided by NP1 or NP2.

It should be noted that Data Specifications for NP3 have yet to be finalised and IHO is working on developing S-100 based product specifications that are functionally equivalent to the paper chart versions These are often referred to as the S-12x series of standards.

### User requirements

Users should be trained in understanding the use of nautical publications.

SOLAS V, Regulation 27 require that nautical publications must be adequate for the intended journey, and always be kept up to date. Keeping the nautical publications updated should be done using the means provided by the issuing hydrographic office or approved service provider. A shore-based Internet service that is kept up-to-date with carriage requirements and information about publication updates would help masters and navigation officers in ensuring that digital publications on board are adequate and up-to-date for an intended voyage. Such a service might accept ports of call for a voyage, vessel and cargo characteristics, and return a catalogue of required publications and their latest revision information, to be compared by on-board software aid to digital publications currently installed, resulting in generation of a compliance report for review and action by the navigation officer.

NP2 nautical publications may be used back of bridge or even on a tablet computer. NP3 is expected to interact in various degrees with the next generation ENC within the ECDIS or ECS system, though some will not be included in an ECDIS at all – e.g., routeing guides.

Short update cycles are preferable – but must be consistent with the nature of the content and the needs of the vessel. For example, port information for a destination on the current voyage is higher priority than Chart No. 1 or the List of lights – and information about changes to the status of a navaid are higher priority than most other information.

Updates should be in a form that can be applied automatically to on-board datasets.

Automated aids for reporting discrepancies should be provided.

Consumers of the service should have the ability to obtain up-to-date information pertaining to planned voyage, not just in the present area.

The services should be capable of working within multiple levels of bandwidth limitations, which will vary depending on whether the vessel is on the high seas, approaching a harbour, engaged in loading/unloading operations in port, etc. Performance should degrade gracefully with reductions in bandwidth, e.g., for low-bandwidth channels transfer of large graphics files may be deferred or replaced with lower-quality files.

Pictorial information needs to be transferred, but consistent with bandwidth limitations, if any, e.g., deferred updates for non-essential graphics, or transmission of lower-quality graphics.

Services should be compatible with WFS and WCS (Web Coverage Service) standards for providing up-to-date information about individual features, features within specified spatial constraints, and coverage data within specified spatial constraints. This will need to be integrated with licensing and subscription-based access at least, probably data protection as well.

In cases where information exists in narrative form, the information will need to be summarized or condensed by a producer before it is disseminated.

Some information (such as text from sailing directions) will have to be converted from narrative to geographic form.

### Relationship to other MSPs

May give overviews and summarize information in several other MSPs, for example MSP1, MSP13, climatological information from MSP14, MSP6, MSP3, etc. Information in this MSP supplements charted data in MSP 11. Ice navigation (MSP 13) will reuse certain information such as radio services information. The advent of S-100 and creation of S-100-based products including data traditionally in nautical publications will blur the line between MSP11 and MSP 12.

## MSP13 Ice navigation service

### Definition

The ice navigation service is critical to safeguard the ship navigation in ice-conditions. Ice navigational services use observational material from all relevant sources, which are combined into an ice chart which represents existing

Conditions. The ice centre then has the task of relaying the chart to users while it is still timely. The ice data may

also, be combined with meteorological and oceanographic parameters in a prediction model to provide further

guidance to vessels in or near the ice. Services provided by an ice navigational service typically include:

* ice condition information and operational recommendations/advice;
* ice condition around a vessel;
* vessel routing;
* vessel escort and ice breaking;
* ice drift load and momentum;
* ice patrol.

Usually, ice forecasts are prepared once a day, or once or twice a week during the ice season, and cover periods of 24 hours to a few days, because they are tied to the frequency of the data input from sensors, stations, and satellites. Long-range predictions e.g., 30 day predictions and seasonal predictions may be shipped by ground or electronic mail to shipping companies and agents rather than ships.

WMO publication 574 (Sea Ice Information Services of the world) has comprehensive information on ice services but dates to 2010.

Examples of Ice Navigation Service is listed in Table x.

Table x – Ice Navigation Service

|  |  |
| --- | --- |
| Information related to: | Examples: |
| Ice conditions | Sea ice concentrations  Type of sea ice  Berg location and drift |
| Ice reports and bulletins | Text or voice summaries of ice conditions |
| Ice forecasts | Near-term or long range forecasts |
| Routeing aid | Recommended routes  Icebreaker assistance |

### Scope

MSP13 can be delivered in all sea areas (1-6) but delivery makes sense only in areas where ice is encountered and during seasons when ice is encountered.

### Objective

#### Ice Patrol

SOLAS V, regulation 6 governs the ice patrol service in the North Atlantic stating that “Ice Patrol contributes to safety of life at sea, safety and efficiency of navigation and protection of the marine environment in the North Atlantic. Ships transiting the region of icebergs guarded by the Ice Patrol during the ice season are required to make use of the services provided by the Ice Patrol.” This service is currently carried out jointly by USA and Canada.

#### Ice charting

Some 20 nations around the world offer an ice information service, and these organisations relay charts of existing ice conditions mostly by radio facsimile and via a digital network link. Time slots and schedules usually dictate the scale and number of charts provided by the broadcast station in the area of concern. Direct broadcast by the ice centre is obviously ideal but not always feasible. Services typically provide ice forecasts once a day for a period of 24 to 144 hours because they are tied to the frequency of the data input. These are tactical forecasts, for scheduled radio broadcast to ships which 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.

Other longer-range predictions – those covering periods from 7–10 days to 30 days and seasonal predictions – are usually based on climatological and analogue methods. They are more commonly distributed by ground or electronic mail to shipping companies and agents rather than to individual ships.



Figure 4.13‑1 - Example of Sea Ice satellite service ([www.polarview.aq](http://www.polarview.aq))

#### 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 are in operation seasonally as ice conditions dictate. These Centres generally provide up-to-date ice information, suggest routes for ships to follow through or around ice, and co-ordinate icebreaker assistance to shipping. Ice Operations Centres are generally contact with icebreakers at all times and monitor progress of shipping within their area of responsibility. Ice Operations Centres may also provide Recommended Ice Routing services, such as routing maps.



Figure 4.13‑2 Example of a Recommended Ice Route in the Gulf of St. Lawrence (source ”Ice Navigation in Canadian Waters” – Canadian Coast Guard )

### User requirements

Communications play a key role in successful ice navigation. The Master relies upon the receipt of accurate ice information and advice upon which decisions can be based for their future course and progress. Effective icebreaker support, assistance to shipping or up-to-date ice information also requires reliable communications. This portfolio needs a digital service for receiving ice reports from vessels in addition to digital services for communicating ice navigation information, ice charts and forecasts.

Data communication that is compatible with relevant OGC specifications – WFS (Web feature Service), WMS (Web Map Service), and possibly also WCS (Web Coverage Service), will also give benefits in terms of enabling services with more detailed information than traditional radio services currently provide. Moreover, future service will provide vector ice charts in the S-411 format. Navigation systems with a capability to utilize S-411 data will be required to fully utilize this service.

### Relationship to other MSPs

MSP 11, MSP 14: MSP 14 information in particular sea temperature charts and meteorological information are essential for mariners to make informed use of ice charts. MSP 13 data will be overlays to MSP 11 (chart data) in navigation systems.

## MSP14 Meteorological information service [WMO]+NORWAY

### Definition

The meteorological service is essential to safeguard the traffic at sea by providing real-time and forecast weather conditions, forecasts, warnings, and weather routeing to mariners who will use these types of information to support their decision-making. Such information includes:

* weather routeing, solar radiation;
* precipitation, visibility;
* cold/hot periods, warnings;
* air temperature, wind speed &direction;
* cloud cover, barometric pressure;
* wind speed and direction, wave height;
* water level surges due to any cause – storm surges accompanying severe weather, unusual tidal or water flow conditions, etc.

There are three types of marine meteorological information: forecasts and warnings for the High Seas, forecasts and warnings for coastal and offshore areas and services for ports and harbour areas.

SOLAS V Regulation 5 obligates contracting parties 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. Information is supposed to be distributed in text and graphic form (the latter only to the extent practicable) via appropriate radiocommunications services. The regulation also requires signatories to facilitate the collection of meteorological reports from ships at sea, and to arrange for the review and transmission of this collected information to shipping.

Information is distributed via GMDSS, which provides dissemination of warnings and weather and sea bulletins according to a broadcast schedule, via Inmarsat-C SafetyNET, public and commercial radio, specialized weather radio services, and the Internet.

Commercial and public radio and television may also disseminate meteorological information. Such third-party disseminators may not reproduce the information provided to them verbatim, but re-package or re-style the information, for example in the course of delivering weather forecasts by radio of television.

Examples of products include surface analysis, wind and wave forecasts and analyses.



Figure 4.14-1. Surface analysis, West Atlantic. (NOAA)



Figure 4.14-2. Wind and wave forecast. (NOAA)



Figure 4.14-3. Wind and wave analysis (NOAA)

Examples of Meteorological Information Service is listed in Table x.

Table x – Meteorological Information Service

|  |  |
| --- | --- |
| Information related to: | Examples: |
| Wind and wave analysis | Wind speed, direction, gust information  Wave height, swell period, direction  Graphics depicting analysis |
| Weather conditions | Current conditions  Graphics depicting current conditions and tendencies |
| Severe weather information | Warnings about location, strength, and movement of storms  Information about areas under sever weather warnings and watches |
| Bulletins and forecasts | Surface weather analysis, synoptic information  Weather forecasts  Temperature, barometric pressure, tendencies |
| Ship observations | Receipt of reports from ships in the Voluntary Observation System  Transmission of information extracted from received ship reports to shipping |

### Scope

MSP14 can be delivered in all sea areas (1-6) but content will depend on location, e.g., ocean meteorological information will be different from near-shore and off-shore marine weather broadcasts.

### Objective

SOLAS V Regulation 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.

The primary objective of this service portfolio is conveying the severe weather warnings and other weather information described in a manner that is highly accessible to shipping even in the middle of ocean voyages, immune to disruptions especially in severe weather, timely, and in a form that is of maximum practicable utility to mariners and conveys the maximum appropriate information. Information must be conveyed by means and formats that are easy for ships to receive.

A second objective, also contained in SOLAS Regulation 5, is to facilitate the transmission of weather reports by ships and the distribution of information gathered from weather reports to shipping.

Since weather information is often re-broadcast by other entities than official national meteorological services, such as public and commercial radio and television, providing warnings and forecasts to such non-official services is a third, secondary objective.

Severe weather warnings increasingly tend to include impacts of the weather, not just the weather data elements. This implies enhanced content like color-coded areas for different severity. For example, the US National Hurricane Center’s hurricane warnings system also includes the production of graphics depicting the probable path of tropical storms and hurricanes, with color-coding of coastal areas where hurricane watches and warnings are in effect. Further, JCOMM is working on an S-100-based product specification for Met-Ocean forecasts (S-412) that will include isobar graphics and WMO symbology for weather information. This portfolio must therefore support a spectrum of information types and formats especially graphical and feature-based information.

### User requirements

The basic requirements deriving from SOLAS V regulation 5 must continue to be supported:

* Communication of severe weather warnings;
* Communication of weather forecasts, synopses, and analysis for conditions relevant to shipping – wind, waves, storms, temperatures, precipitation, ice, restricted visibility, etc;
* Communication of warnings and other weather information as appropriate to shipping in ocean areas, in coastal and offshore waters, and in/near port.
* Receipt of weather reports from ships, facilitation of any processing required of such reports, and dissemination of the result to shipping as appropriate for navigation.
* Support for increasingly graphic-based weather information, including potentially animations implies a service that is compatible with the relevant OGC specifications – WFS (Web feature Service), WMS (Web Map Service), and WCS (Web Coverage Service).

Communication of weather information must be as reliable as possible under all conditions especially during severe weather or at large distances from shore, or in areas where radio communications coverage is lower, e.g., polar areas. This means that the communication of important information can be supplemented by placing it on Web sites but Web sites cannot be the sole or main source of such information.

### Relationship to other services

MSP5 for communicating warnings about extreme weather. Complements certain services in MSP13, namely ice charts.

## MSP15 Real-time hydrographic and environmental information services

### Definition

The real time hydrographic and environmental information service is essential to safeguard navigation at sea and protect the environment. The services provided include:

* current speed and direction;
* wave height;
* marine habitat and bathymetry;

Sensor networks such as ODAS, wave radar, water level gauges, anemometers, current gauges, etc., are widespread and utilized in providing data for these services. This data is often made available on web sites, web mapping services, and other appropriate Internet locations, for example Web sites of major ports or from VTS. The format in which processed data from such sensors is available to the public appears to be variable.

Examples of Real-time Hydrographic and Environmental Information Service are listed in Table x.

Table x – Real-time Hydrographic and Environmental Information Service

|  |  |
| --- | --- |
| Information related to: | Examples: |
| Current speed and direction | databuoy information via AIS  Surface current snapshots |
| Surface conditions | Wave heights via radar |
| Environmental conditions | Temperature, pressure, tendencies (rising/falling)  Wind speed and direction  Visibility |
| Water column | Depths, salinity, temperatures |

### Scope

In general MSP 15 services can be delivered in all sea areas (1-6). Specific services may be limited to areas where the type of hydrographic and environmental information conveyed by the service is collected.

### Objective

The main objective of services in this portfolio is similar to MSP 14, and consists of conveying hydrographic and environmental information to shipping where needed, including in the middle of ocean voyages, robustly under different conditions especially severe weather, in a timely fashion, and in a form, that is of maximum practicable utility to mariners and conveys the maximum appropriate information. Information must be conveyed by means and formats that are easy for ships to receive. IHO M-3 2/1962 as amended recommend that the results of oceanographic observations be communicated for the maximum utilization by all marine scientific and hydrographic users.

The transmission of environmental conditions by ships and the distribution of information gathered from weather reports to shipping, is also an objective.

Local and regional services may transmit hydrographic and environmental information with AIS-ASM, specifically messages 6 and 8.

IHO is developing a product specification for surface currents named S-111, which is intended for use in ECDIS.

### User requirement

Real-time hydrographic and environmental information is distributed in a variety of ways, including radio, AIS-ASM, and internet.

For accurate onboard display of AIS messages, receiving vessels must be equipped with a proper Class A AIS device.

Internet access and possibly a user account is required to access real-time hydrographic and environmental information via internet.

### Relationship to other services

MSP1 for communication. MSP5 for communicating warnings about extreme cases. MSP14 for meteorological information.

## MSP16 Search and Rescue (SAR) Service [NORWAY] +IMRF+sweden

### Definition

The SAR service is responsible for assisting, coordinating search and rescue operations at sea. In maintaining a state of full readiness, the Services may assist the following search and rescue functions:

* The crew and passengers of vessels in distress;
* Victims of maritime and aircraft accidents or incidents.

The SAR services must also coordinate the evacuation of seriously injured or ill person from a vessel at sea when the person requires medical treatment sooner than the vessel would be able to get him or her to a suitable medical facility.

The Services may also be pro-actively involved in activities such as:

* Information collection, distribution, and coordination;
* Monitoring towing operations;
* Monitors and evaluates levels of risk from Maritime Safety Information (MSI) broadcasts to ensure an immediate response in case of life threatening situations developing;
* Monitoring vessels not under command;
* Pollution reports and vessels aground.

### Scope

### Objective

### User requirements

## ~~MSP17 Aids to Navigation services (AtoN) [IALA](arm)~~

## ~~MSP18 Communication services [IALA]~~

## ~~MSP19 PNT and augmentation services [UK GLA]~~

## ~~[MSP20 Anti-piracy information] [IMB]~~

# ASSESSMENT OF SUITABLE SERVICES

## Introduction

The assessments in this section are of currently known services pertaining to the MSP. At present they are assessed for the MSP as a whole. Assessments may be broken out by means of communication or other categorization where there are significant differences between different communication methods, etc. Future iterations of this document may develop details for specific sub-families of services or services for specific types of information and break out the summary tables accordingly.

The table format used in the summary assessments is explained below.

|  |  |
| --- | --- |
| Data availability | Whether data needed for the services constituting the MSP does in fact exist – whether the information carried by the services is being collected, acquired, or generated, or otherwise available |
| Transport | Means of communications by which services in this MSP are provided or can be provided. |
| Service Availability | How widespread is the availability of services and whether there are likely to be constraints on its availability. |
| Accessibility | Whether application software can easily access the service and extract necessary data elements from the service data stream. |
| Reliability | How reliable services are and |
| Interface standardization | Whether standard application interfaces for consumption of service information by software applications are available or being defined. |
| Data standardization | Whether the data payload of the services conforms to standards, or a standard for such data is being defined. |

## Services

### Assessment – MSP 1

[Text]

Summary assessment:

|  |  |
| --- | --- |
| Data availability |  |
| Transport |  |
| Service Availability |  |
| Accessibility |  |
| Reliability |  |
| Interface standardization |  |
| Data standardization |  |

### Assessment – MSP 2

### Assessment – MSP 3

### Assessment – MSP 4

### Assessment - MSP 5 Maritime Safety Information Services

MSI is available worldwide as a voice and text service (with constraints in polar regions) but digitization of MSI is an ongoing activity. Many NAVAREA coordinators as well as other state or regional authorities make navigational warnings available over the Internet but due to the incompletely structured nature of MSI information access often involves human interaction. There are exceptions where messages are communicated in XML form but this is not universal and the structure was locally developed (and therefore varies depending on the source organization). Some authorities distribute MSI including local warnings by e-mail as well as making it accessible on their internet sites. A standard for data content is under development (S-124) but at present navigational warnings are not structured enough for deconstruction by software, which means it is difficult to integrate them with other applications such as a chart display on an ECDIS.

Summary assessment:

|  |  |
| --- | --- |
| Data availability | Good but unstructured. |
| Transport | Radio (voice, text, NAVTEX, SafetyNet, radiofax, etc.); Internet: web, e-mail |
| Service Availability | Good |
| Accessibility | Radio: high;  Internet: good, but not suitable for time-critical information |
| Reliability | Good |
| Interface standardization | High for NAVTEX and SafetyNET receivers but Low for interconnected systems |
| Data standardization | S-53, Joint IHO/IMO/WMO Manual on Maritime Safety Information (MSI) structures navigational warnings to some extent but far from sufficiently for software deconstruction. Messages are in text format at present and difficult for software to decode messages currently largely in text format; standard under active development (S-124). |

### Assessment – MSP 6

### Assessment – MSP 7

### Assessment – MSP 8

### Assessment – MSP 9

### Assessment – MSP 10

### Assessment - MSP 11 Nautical Chart Services

Nautical chart services are available world-wide from several providers. Generally national hydrographic offices provide a coverage in national waters, but several also provide coverage within their region as well. Some hydrographic offices provide a world-wide nautical chart service. Nautical chart services are available in paper charts, raster charts and as Electronic Navigational Chart (ENC) for use in ECDIS and ECS. Nautical charts are usually available from chart agents and other service providers.

Summary assessment:

|  |  |
| --- | --- |
| Data availability | Widely available |
| Transport | Logistics services for paper charts, electronic means for digital data. Digital data may also be distributed via logistical services, in form of CD, DVD, USB drive or other media. |
| Service Availability | Widely available from numerous service providers. |
| Accessibility | Widely available from numerous service providers. |
| Reliability | High |
| Interface standardization | High for ECDIS |
| Data standardization | High – S-4, INT1, INT2 and INT3 for paper charts, S-61 for raster charts and S-57, S-58 and S-65 for ENC. IHO is developing S-101 for the next generation ENC. |

### Assessment - MSP 12 Nautical Publication Services

Nautical publication services are typically provided by hydrographic services that produce and distribute nautical publications in their areas of responsibility. Other government agencies, such as costal administrations, may also produce nautical publication. Some nautical publication services extend the service to a larger region if such is of importance to their national interests and some provide a world-wide service. Nautical publication services provide a number of nautical publications, such as Distance Tables, List of Buoys and Beacons, List of Lights, List of Radio Signals, List of Symbols, Abbreviations and Terms used on Charts, Mariners’ Handbooks, Notices to Mariners, Routeing Guides, Sailing Directions, Tidal Stream Atlases, Tide Tables.

Nautical publications may be in printed form or digital form. The digital form may be a digital representation of the printed version, such as is often the case with PDF files, and it may be in other forms such as XML. IHO M-3 classifies the different types of nautical publications in the following manner;

1. NP1 – Printed paper publications
2. NP2 – Digital publications based upon existing paper publications
3. NP3 – Digital dataset(s) fully compatible with ECDIS that serve the purpose otherwise provided by NP1 or NP2.

It should be noted that Data Specifications for NP3 have yet to be finalised and IHO is working on developing S-100 based product specifications that are functionally equivalent to the paper chart versions These are often referred to as the S-12x series of standards.

Summary assessment:

|  |  |
| --- | --- |
| Data availability | Widely available |
| Transport | Logistics services for paper charts, electronic means for digital data. Digital data may also be distributed via logistical services, in form of CD, DVD, USB drive or other media. |
| Service Availability | Widely available from numerous service providers. |
| Accessibility | Widely available from numerous service providers. |
| Reliability | High |
| Interface standardization | Not standardized |
| Data standardization | M-3 for NP1 and NP2. NP3 standardisation is in progress - S-122, S-123, other product specifications |

### Assessment - MSP 13 Ice Navigation Services

Ice navigation services commonly include ice reports, ice charts, and ice forecasts. Sea surface temperature charts accompany ice charts. Remote sensing imagery is commonly also distributed.

Digital ice charts are in S-411 formats but additional formats are also provided for use in current systems.

Advances in computer models for ice prediction allow more detailed data but these require more communication resources.

Analysed information is also distributed e.g., ice edge information, sea ice forecasts, ice types, ice concentration, ice drift, berg information.

Ice charts may be available in multiple digital formats. For example, BSH distribute their ice charts the following formats as AML (additional military layer), MIO (marine information overlay), and S-411 (S-100-based product specification format)

Radio forecasts are scheduled broadcasts that describe difficult ice conditions forming or dissipating, the general motion of the pack, opening and closing of leads.

Some consortia/service providers

* North American Ice Service (NAIS) – joint U.S./Canada production of ice charts, ice hazard bulletins, 30-day forecasts and seasonal outlooks for the Great Lakes.
* Baltic Sea Ice Services (BSIS) is under steady development and includes informational exchange between Denmark, Estonia, Finland, Germany, Latvia, Lithuania, the Netherlands, Norway, Poland, the Russian Federation and Sweden.
* Polarview (www.polarview.org)

Summary assessment:

|  |  |
| --- | --- |
| Data availability | Good |
| Transport | Internet (web and ftp) and subscription from service provider; radio broadcast of ice forecasts and ice reports/bulletins |
| Service Availability | Availability from hydrographic offices and other service providers; probable communication constraints including interrupted or low-bandwidth communications for ships in polar areas |
| Accessibility | Available with human intervention, by automated means, or direct delivery from on service provider |
| Reliability | High |
| Interface standardization | Custom interfaces depending on service provider |
| Data standardization | Ice charts are standardized on S-411. Other geographic information may be available as feature layers which can be loaded. |

### Assessment - MSP 14 Meteorological Information Services

Voice and text services communicating MSP 14 information over various radio methods are universally available and are expected to continue to be the best method of communicating time-and-safety-critical information. Graphical information services are widely available but generally require high bandwidth for adequate access.

Two principal methods are used for broadcasting marine meteorological information as part of MSI:

* NAVTEX: broadcasts to coastal and offshore areas; and
* 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, paragraph 4, as amended.

HF narrow-band direct printing (NBDP) may be used to transmit marine meteorological information in areas outside Inmarsat coverage.

Information has to be provided for unique and precisely defined sea areas, each being served only by the most appropriate systems. Although there will be some duplication to allow a ship to change from one system to another, the majority of messages will only be broadcast on one system.

Summary assessment:

|  |  |
| --- | --- |
| Data availability | Widely available. Depending on the nature of information, may be in the form of either analytic results or processed data. |
| Transport | Radio (NAVTEX, SafetyNet, voice broadcast, radiotelex, radiofax), Internet. |
| Service Availability | Internet sources are widely but not universally available.  Radio services are widely available in most (all?) regions of the world. |
| Accessibility | Internet services often require human intervention to access data.  Radio services: currently most are designed only for human access. |
| Reliability | High |
| Interface standardization | Reception standardization high for NAVTEX and SafetyNET receivers but low for interconnected systems like ECDIS. |
| Data standardization | S-412 is in development.  GRIB format for graphical data. |

### Assessment - MSP 15 Real-time Hydrographic and Environmental Services

Several states or organizations have installed and maintain ODAS networks and real-time hydrographic and environmental data from such networks, tide gauges, and other sensors is widely available. Real-time hydrographic and environmental information is principally distributed in three ways, including radio, AIS-ASM, and Internet. Of these, AIS-ASM and Internet are most amenable to use in digital services, since the radio transport appears to consist of text/voice messages constructed from raw or processed data by filling in templates.

Distribution via AIS-ASM has been implemented in different regions of the world. Messages 6, 8, 25 and 26 provide a structure which can accommodate data suited for a specific application. Message formats and content are different for different regions, since the organizations developed formats according to their own needs.

Perhaps the most comprehensive and accessible Internet data distribution system is NOAA’s data portal, especially NOAA PORTS® (Physical Oceanographic Real-Time System) which incorporates information from tide gauges, data buoys and other sensors. The system also integrates information from other sensor networks such as NOAA’s NWLON (National Water Level Observation Network) station data, and selectively, other sources (the Texas Coastal Ocean Observation Network is listed by NOAA as one source). ODAS, tide, water level, or current gauge, and similar data such as wind speeds is often available on other appropriate web sites as well, for example port Web sites of major ports may include local tide, current, or water level data; however, this depends on the port authority and this practice is by no means worldwide. Where available, information is generally available through web presentations, and less often as periodically updated data files that can be downloaded by software clients. The format in which processed data from such sensors is available to the public appears to be variable, though this would seem to be an excellent candidate for standardization. Efforts to develop metadata standards for instrumental data (under JCOMM auspices) are in advanced stages, which will facilitate the integration of this data into MSP services.

Internet distribution is implemented in a variety of interfaces some of which need human intervention for access.

Summary assessment:

|  |  |
| --- | --- |
| Data availability | Data for MSP 15 services is widely available. |
| Transport | Processed data distributed via AIS and Internet; derived summary messages distributed via radio. |
| Service Availability | Internet sources are widely but not universally available.  AIS MSP15 data is frequently available but less than Internet sources. |
| Accessibility | Some Internet-based services require human intervention to access the data, which would require diverting attention from more urgent tasks especially on the bridge. Others are amenable to automated access by applications.  Access to AIS data requires on-board software capable of decoding the message structure. Interfaces to other platforms or software e.g., ECDIS is feasible and often(?) already implemented by manufacturers. |
| Reliability | Localized congestion issues affecting reliability of AIS-based services have been observed.  Reliability of Internet sources for this data is sometimes inadequate since data is occasionally missing for one reason or another. |
| Interface standardization | Uncertain for software access to Internet sources.  AIS-ASM is better standardized but there are regional legacy implementations historically developed by different organizations. |
| Data standardization | IMO Circ.289 for AIS. IHO is developing S-112 for real-time water level. Uncertain or partial for Internet services. |
| Examples | NOAA PORTS® |

### Assessment – MSP 16 Search and Rescue (SAR)

[Text]

Summary assessment:

|  |  |
| --- | --- |
| Data availability |  |
| Transport |  |
| Service Availability |  |
| Accessibility |  |
| Reliability |  |
| Interface standardization |  |
| Data standardization |  |

### Assessment – MSP 17 Aids to Navigation

### Assessment – MSP 18 Communication Service

### Assessment – MSP 19 PNT and Augmentation

### Assessment – MSP 20 Anti-piracy information

# RELEVANT ASSOCIATED IMO GUIDELINES

## Guidelines on SQA and HCD

## Guidelines on Display of navigation information from communications

## Guidelines on test beds reporting

# LIST OF PUBLICATIONS THAT CAN BE DIGITAL

# ACRONYMS To be checked

AtoN Aid(s) to Navigation

Circ. Circular (IMO)

CMDS Common Maritime Data Structure

COMSAR Former Sub Committee on Communications and Search and Rescue (IMO)

CSV Comma Separated Variable(s)

fax Facsimile

FONSABA Federation of National Associations of Ship Brokers and Agents

GMDSS Global Maritime Distress and Safety System

HCD Human Centred Design

IALA International Association of Marine Aids to Navigation and Lighthouse Authorities

ICT Information and Communications Technology

IEC International Electrotechnical Commission

ILO International Labour Organization (UN)

IoT Internet of Things

IS Information Service, as part of Vessel Traffic Services

IMO International Maritime Organization (UN)

LPS Local Port Service(s)

MAS Maritime Assistance Service

MSC Maritime Safety Committee (IMO)

MSIS Maritime Safety Information Service

MSP Maritime Service Portfolio(s)

NAS Navigational Assistance Service, as part of Vessel Traffic Services

NAV Former Sub Committee on Safety of Navigation(IMO)

NCSR Sub Committee on Navigation, Communications and Search and Rescue (formerly COMSAR and NAV) (IMO)

PDF Portable Document Format

PNT Position, Navigation and Timing

RCC Rescue Co-ordination Centre(s)

Res. Resolution

RTF Rich Text Format

SAR Search and Rescue

SIP IMO e-Navigation Strategy Implementation Plan (NCSR1/28, Annex 7; as adopted by MSC94, Nov. 2014)

SOLAS International Convention for the Safety of Life at Sea, 1974 (as amended)

SQA Software Quality Assurance

S-100 Universal Hydrographic data model (IHO)

S-200 IALA domain for S-100 Product Specifications

TMAS Telemedical Assistance Service

TOS Traffic Organisation Service, as part of Vessel Traffic Services

VTS Vessel Traffic Service(s)

XML eXtensible Markup Language

1. MSP1 INFORMATION SERVICE Template

| ENVIRONMENTAL INFORMATION | | | | |
| --- | --- | --- | --- | --- |
| Attributes | Attribute  details | Attribute units | Real time (rt) and/or forecasted | geometry/ coverage |
| wind | speed | m/s, knots | real time or/and forecasted | Area, Point, Line, Curve, Surface, 3D (Height,Depth,Width) |
| direction | cardinal degrees |
| visibility | distance | NM meters feet | real time or/and forecasted | Area, Point, Line, Curve, Surface, 3D (Height,Depth,Width) |
| wave | height | meters feet | real time or/and forecasted | Area, Point, Line, Curve, Surface, 3D (Height,Depth,Width) |
| direction | cardinal degrees |
| weather  warnings | gale | m/s beaufort knots | real time or/and forecasted | Area, Point, Line, Curve, Surface, 3D (Height,Depth,Width) |
| storm | m/s beaufort knots |
| hurricane | m/s beaufort knots |
| tsunami | ? |
| freezing spray | ? |
| weather  condition | fog | can be linked to visibility ? | real time or/and forecasted | Area, Point, Line, Curve, Surface, 3D (Height,Depth,Width) |
| rain | mm |
| snow | mm |
| temperature | water | Celcius Farenheit | real time or/and forecasted | Area, Point, Line, Curve, Surface, 3D (Height,Depth,Width) |
| air | Celcius Farenheit |
| Atmospheric  pressure | pressure | bar hPa | real time | Area, Point, Line, Curve, Surface, 3D (Height,Depth,Width) |
| metarea | Identity | number | N/A | Area |
| country | text | N/A |
| area | latitude & longitude bearing & distance | N/A |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HYDROGRAPHICAL INFORMATION | | | | |
| Attributes | Attribute  details | Attribute units | Real time (rt) and/or forecasted | geometry/ coverage |
| Tide | height | meters | real time or/and forecasted | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| stream direction | cardinal degrees |
| stream speed | knots |
| Water level | level | meters feets | real time or/and forecasted | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| Current | direction | cardinal degrees | real time or/and forecasted | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| speed | m/s knots |

| ICE SERVICE INFORMATION (Canada : Ice report)  \* Attributes : Ice chart, Ice forecast, Ice advisories, Ice routing, Ice webcams, Ice bulletins, Iceberg bulletins | | | | |
| --- | --- | --- | --- | --- |
| Attributes | Attribute  details | Attribute units | Real time (rt) and/or forecasted | geometry/ coverage |
| Ice routing | waypoints | latitude & longitude bearing & distance  YYYY:MM:DD hh:mm:ss | real time | Point, Line |
| Ice conditions / chart | thicknes | meters inch | real time or/and forecasted | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| concentration | procents |
| drift | knots |
| Icebreaker operations | icebreaker identification (Name, call sign, IMO No, MMSI No) | text number | N/A | N/A |
| position (current position of Icebreaker or randezvous) | latitude & longitude bearing & distance  YYYY:MM:DD hh:mm:ss | real time | Point, Area |
| Dynamic No-go areas | polygon & valid period | latitude & longitude bearing & distance YYYY:MM:DD hh:mm:ss | real time or/and forecasted | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| Iceberg bulletins | descripiton, polygon & valid period | Text,  latitude & longitude bearing & distance YYYY:MM:DD hh:mm:ss | real time or/and forecasted | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| Navigation condition in ice | Local Ice codes ? | ? |  |  |
| ~~Ice webcams~~ |  |  |  |  |

| NAVIGATIONAL HAZARD | | | | |
| --- | --- | --- | --- | --- |
| Attributes | Attribute  details | Attribute units | Real time (rt) and/or forecasted | geometry/ coverage |
| Construction works | bridge (new air clearence, valid period etc.) | latitude & longitude bearing & distance meters feet YYYY:MM:DD hh:mm:ss | real time or/and forecasted | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| dredging (New depth, valid period etc.) |
| Temporary Restricted Areas | marine events & valid period | latitude & longitude bearing & distance YYYY:MM:DD hh:mm:ss | real time or/and forecasted | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| regattas & valid period |
| hydrography surveying or monitoring & valid period (bottom, water sampling etc.) |
| Newly Discovered Hazards | shoals, shallows, rocks (depth) | latitude & longitude bearing & distance meters feets | real time | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| wreck (depth) | latitude & longitude bearing & distance YYYY:MM:DD hh:mm:ss |
| danger (depth, type, drift, valid period etc.) | text latitude & longitude bearing & distance YYYY:MM:DD hh:mm:ss | real time or/and forecasted |
| Bridge air gap | safe overhead clearance | meters feets | N/A | Point, Line |
| Cables air gap | safe overhead clearance | meters feets | N/A | Point, Line |
| Status of AtoNs | identity (name etc.) | text number | real time or/and forecasted | Point |
| changed status (unlit, off position, valid period etc.) | text numbers,  YYYY:MM:DD hh:mm:ss |
| position and time stamp | latitude & longitude bearing & distance YYYY:MM:DD hh:mm:ss |
| type | table 7.1 (IALA doc… ) refer to appropriate def set up by IALA |
| Diving operations | position & valid period | latitude & longitude bearing & distance YYYY:MM:DD hh:mm:ss | real time or/and forecasted | Point, Area, Line |

| WATERWAY INFORMATION | | | | |
| --- | --- | --- | --- | --- |
| Attributes | Attribute  details | Attribute units | Real time (rt) and/or forecasted | geometry/ coverage |
| Locks | Lock Identity | text numbers | N/A | Point, Area, Line |
| status (open/closed etc.) | text numbers | real time or/and forecasted | N/A |
| sequence | text numbers | real time or/and forecasted | N/A |
| lock order | number | real time | N/A |
| RTA/slot time | YYYY:MM:DD hh:mm:ss | real time or/and forecasted | N/A |
| Fairway | fairway Identity | text numbers | N/A | Point, Area, Line |
| status (closed/open, etc.) | YYYY:MM:DD hh:mm:ss | real time or/and forecasted | N/A |
| maneuverability limitations (restrictions such as UKC, Speed & XTE etc.) | text meters knots | real time or/and forecasted | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| Port | port Identity (name, No etc.) | text numbers UN LOCODE | N/A | N/A |
| status (closed/open, valid period) | text YYYY:MM:DD hh:mm:ss | real time and/or forecasted | Point, Area |
| maneuverability limitations (restrictions, UKC etc.) | knots meters feets | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| security related information (MARSEC alert / ISPS) | text numbers | area, line |
| Special Area | marine protectected areas & valid period(warnings etc.) | text YYYY:MM:DD hh:mm:ss | real time and/or forecasted | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| sensitive marine habitat & valid period (restrictions etc.) |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SECURITY | | | | |
| Attributes | Attribute  details | Attribute units | Real time (rt) and/or forecasted | geometry/ coverage |
| ISPS | status | level |  |  |
| Piracy | report (varnings etc.) | text YYYY:MM:DD hh:mm:ss | real time | Area, Point, Line, Curve, 3D (Height,Depth,Width) |

| TRAFFIC AND ROUTE INFORMATION | | | | |
| --- | --- | --- | --- | --- |
| Attributes | Attribute  details | Attribute units | Real time (rt) and/or forecasted | geometry/ coverage |
| Traffic Image to Vessels | vessel identity (name, MMSI No, call sign, IMO No) | text numbers | N/A | N/A |
| CPA | NM latitude & longitude bearing & distance hh:mm:ss | real time and/or forecasted | Point |
| TCPA | latitude & longitude bearing & distance hh:mm:ss | N/A |
| ship positions and time stamps | latitude & longitude bearing & distance hh:mm:ss | Point |
| large / special vessel movements | text numbers  hh:mm:ss | Area, Point, Line , 3D |
| vessel meeting / passing | text numbers latitude & longitude bearing & distance hh:mm:ss |
| VTS Sailing Plan | vessel identity (name, MMSI No, call sign, IMO No) | text numbers latitude & longitude bearing & distance hh:mm:ss | N/A | N/A |
| VTS area entry (name & positions etc.) | text numbers latitude & longitude bearing & distance | real time and/or forecasted | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| VTS area exit (Name & positions etc.) | text numbers latitude & longitude bearing & distance |
| destination (name, position, berth, quay, anchorge) | latitude & longitude UN LOCODE |
| route/change of route (waypoints etc.) | text numbers latitude & longitude |
| arrival (ETA, ATA) | YYYY:MM:DD hh:mm:ss | N/A |
| departure (ETD, ATD) | YYYY:MM:DD hh:mm:ss |
| Anchorage assignment | area | latitude & longitude bearing & distance | real time | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| Berthing assignment | ID | number latitude & longitude bearing & distance | real time | Point |
| Route advisories | waypoints | latitude & longitude bearing & distance YYYY:MM:DD hh:mm:ss | real time and/or forecasted | Point, Line |
| Navarea messages | report | text latitude & longitude bearing & distance YYYY:MM:DD hh:mm:ss | real time and/or forecasted | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| Navtex messages | report | text latitude & longitude bearing & distance YYYY:MM:DD hh:mm:ss | real time and/or forecasted | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| Notice to shipping | report | text latitude & longitude bearing & distance YYYY:MM:DD hh:mm:ss | real time and/or forecasted | Area, Point, Line, Curve, 3D (Height,Depth,Width) |
| Suspension or change of routes | waypoints | text latitude & longitude bearing & distance YYYY:MM:DD hh:mm:ss | real time and/or forecasted | Point, Line |
| reporting | vessel identity (name, MMSI No, call sign, IMO No) | text numbers | N/A | N/A |
| reporting point/Line | text latitude & longitude bearing & distance YYYY:MM:DD hh:mm:ss | real time and/or forecasted | Area, Point, Line, Curve, 3D (Height,Depth,Width) |