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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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|  |  |  |
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|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

1. INTRODUCTION 8

1.1. General Description 8

1.2. Purpose 8

1.3. Implementation 8

1.3.1. Change process 8

1.4. Communications Means 11

2. Governing body, SERVICE PROVIDERS & USERS 11

2.1. Definitions 11

2.2. Responsible service providers [to be decided later] 12

3. MARITIME SERVICE AREAS 13

4. MARITIME SERVICES 14

4.1. MS 1 VTS Information Service (INS) 14

4.1.1. Submitting Organisation 14

4.1.2. Description of the maritime service 14

4.1.3. Purpose 15

4.1.4. operational approach 15

4.1.5. User needs 15

4.1.6. Use Case - Vessel Arrival 15

4.1.7. information to be provided 16

4.1.8. Associated technical services 16

4.1.9. Relationship to other MSs 17

4.2. VTS Navigational Assistance Service (NAS) 18

4.2.1. Submitting Organisation 18

4.2.2. Description of the maritime service 18

4.2.3. purpose 18

4.2.4. Operational approach 19

4.2.5. User needs 19

4.2.6. Use Case Vessel deviates from planned route 19

4.2.7. Use Case– assistance to a vessel to an anchoring position; 20

4.2.8. information to be provided 20

4.2.9. Associated technical services 20

4.2.10. Relationship to other MSs 21

4.3. MS 3 VTS Traffic Organization Service (TOS) 22

4.3.1. Submitting Organisation 22

4.3.2. Description of the maritime service 22

4.3.3. purpose 23

4.3.4. operational approach 23

4.3.5. User needs 23

4.3.6. Use case – vessel leaves quay 24

4.3.7. Use case – vessel transiting protected area 24

4.4. information to be provided 25

4.5. 3.7 Associated technical services 25

4.5.1. Relation to other MSs 25

4.6. MSP4 Local Port Service (LPS) IHMA 26

4.6.1. Definition 26

4.6.2. Area of operation 26

4.6.3. Objective 26

4.6.4. User requirements 26

4.6.5. Examples 26

4.6.6. Relation to other MSPs 26

4.6.7. Associated Technical Services 26

4.7. MSP5 Maritime Safety Information service (MSI) (PDA+TC) 27

4.7.1. Definition 27

4.7.2. Area of operation 28

4.7.3. Objective 28

4.7.4. User requirements 30

4.7.5. Examples 30

4.7.6. Relationship to other MSPs 30

4.7.7. Associated technical Services 30

4.8. MSP6 Pilotage service [IMPA] 31

4.8.1. Definition 31

4.8.2. Area of operation 31

4.8.3. Objective 31

4.8.4. User requirements 31

4.8.5. Examples 31

4.8.6. Relation to other MSPs 31

4.8.7. Associated Technical Services 31

4.9. MSP7 Tugs service (IHMA?)(ITA?) 32

4.9.1. Definition 32

4.9.2. Area of Operation 32

4.9.3. Objective 32

4.9.4. User requirements 32

4.9.5. Examples 32

4.9.6. Relation to other MSPs 32

4.9.7. Associated Technical Services 32

4.10. MSP8 Vessel shore reporting [Fred POT] 33

4.10.1. Definition 33

4.10.2. Scope 33

4.10.3. Objective 33

4.10.4. User requirements 33

4.10.5. Examples 34

4.10.6. Relationships with other MSPs 34

4.10.7. Associated Technical services 34

4.11. MSP9 Telemedical Assistance Service (TMAS) [NORWAY]+NTnu 35

4.11.1. Definition 35

4.11.2. Area of Operation 35

4.11.3. Objective 35

4.11.4. User requirements 37

4.11.5. Examples 37

4.11.6. Relationship with other MSPs 37

4.11.7. Associated Technical Services 37

4.12. MSP10 Maritime Assistance Service (MAS) 38

4.12.1. Definition 38

4.12.2. Area of operation 38

4.12.3. Objective 38

4.12.4. User requirements 38

4.12.5. Examples 38

4.12.6. Relationship with other MSPs 38

4.12.7. Associated Technical Services 38

4.13. MSP11 Nautical Chart Service 39

4.13.1. Definition 39

4.13.2. Area of operation 40

4.13.3. Objective 40

4.13.4. User requirements 40

4.13.5. Examples 41

4.13.6. Relationship to other MSPs 41

4.13.7. Associated Technical Services 41

4.14. MSP12 Nautical publications service 43

4.14.1. Definition 43

4.14.2. Area of operation 44

4.14.3. Objective 44

4.14.4. User requirements 45

4.14.5. Examples 46

4.14.6. Relationship to other MSPs 46

4.14.7. Associated Technical Services 46

4.15. MSP13 Ice navigation service 47

4.15.1. Definition 47

4.15.2. Area of operation 47

4.15.3. Objective 47

4.15.4. User requirements 53

4.15.5. Examples 53

4.15.6. Relationship to other MSPs 54

4.15.7. Associated Technical services 54

4.16. MSP14 Meteorological information service [WMO]+NORWAY 56

4.16.1. Definition 56

4.16.2. Area of operation 58

4.16.3. Objective 58

4.16.4. User requirements 59

4.16.5. Examples 59

4.16.6. Relationship to other services 59

4.16.7. Associated technical services 59

4.17. MSP15 Real-time hydrographic and environmental information services (IHO)(WMO) 61

4.17.1. Definition 61

4.17.2. Area of Operation 61

4.17.3. Objective 61

4.17.4. User requirement 62

4.17.5. Examples 62

4.17.6. Relationship to other services 62

4.17.7. Associated technical Services 62

4.18. MSP16 Search and Rescue (SAR) Service [NORWAY] +IMRF+sweden 63

4.18.1. Definition 63

4.18.2. Area of Operation 63

4.18.3. Objective 63

4.18.4. User requirements 63

4.18.5. Examples 63

4.18.6. Relationship with other MSPs 63

4.18.7. Associated Technical Services 63

4.19. MSP17 Aids to Navigation services (AtoN) 63

4.20. MSP18 Communication services [IALA] 64

4.21. MSP19 PNT and augmentation services [UK GLA] 64

4.22. [MSP20 Anti-piracy information] [IMB](US) 64

5. ASSESSMENT OF SUITABLE SERVICES 65

5.1. Introduction 65

5.2. Services 65

5.2.1. Assessment – MSP 1 65

5.2.2. Assessment – MSP 2 65

5.2.3. Assessment – MSP 3 65

5.2.4. Assessment – MSP 4 66

5.2.5. Assessment - MSP 5 Maritime Safety Information Services 66

5.2.6. Assessment – MSP 6 66

5.2.7. Assessment – MSP 7 66

5.2.8. Assessment – MSP 8 66

5.2.9. Assessment – MSP 9 66

5.2.10. Assessment – MSP 10 66

5.2.11. Assessment - MSP 11 Nautical Chart Services 66

5.2.12. Assessment - MSP 12 Nautical Publication Services 67

5.2.13. Assessment - MSP 13 Ice Navigation Services 68

5.2.14. Assessment - MSP 14 Meteorological Information Services 68

5.2.15. Assessment - MSP 15 Real-time Hydrographic and Environmental Services 69

5.2.16. Assessment – MSP 16 Search and Rescue (SAR) 70

5.2.17. Assessment – MSP 17 Aids to Navigation 70

5.2.18. Assessment – MSP 18 Communication Service 70

5.2.19. Assessment – MSP 19 PNT and Augmentation 71

5.2.20. Assessment – MSP 20 Anti-piracy information 71

6. RELEVANT ASSOCIATED IMO GUIDELINES 71

6.1. Guidelines on SQA and HCD 71

6.2. Guidelines on Display of navigation information from communications 71

6.3. Guidelines on test beds reporting 71

7. LIST OF PUBLICATIONS THAT CAN BE DIGITAL 71

8. ACRONYMS To be checked 71

List of Tables

Table 1 Responsible Authorities 7

# 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, the IMO introduced the concept of “Marine Service Portfolios” (MSPs). ‘A “Maritime Service Portfolio (MSP)” that define and describe the set of operational and technical services and their level of service provided by a stakeholder in a given area, navigable waterway or port, as appropriate.

The IMO has identified a preliminary list of 16 MSPs. Under its remit, IALA has recognised that additional MSPs are were needed for items such as AtoNs and PNT.

## 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 needs 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 Future 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 an 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 conventional 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 future 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 enable interoperability between the different providers and systems. It must also establish a working protocol to guarantee the responsibility levels and the flow of information.
  6. Coordinate the intended work by users and organizations creating tools for utilizing MSP output to ensure usability by intended end users.
  7. Implement the onshore technical structures (infrastructures, hardware and software) necessary for the delivery of the MSP’s.
  8. An experimental phase in order to allow assessment of 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 conventional and digital 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)



## Communications Means

The following table shows examples of current and future communications means available for MSPs

1. Status of digital communication means

***Table 1a: Current 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 |
| Web service | In force | XML  (Conforming to ISO 8879) | Cellular: 1, 2  Satellite: all areas |

***Table 1b: Future communication means***

|  |  |  |  |
| --- | --- | --- | --- |
| **Mean of communication**  **(e-Navigation)** | **Status** | **Standards** | **Area(s) of application** |
| 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 |

PICTURE TO BE ADDED

# Governing body, SERVICE PROVIDERS & USERS

## 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 for the collection or creation of 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 IALA and the IHO]

## Responsible service providers [to be decided later]

In each country there will be authorities responsible for providing Maritime 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

| Service No | Identified Services | Identified Responsible Service Provider |
| --- | --- | --- |
| MSP1 | VTS Information Service (INS) | VTS Authority and/or National Competent Authority |
| MSP2 | Navigational Assistance Service (NAS) | VTS Authority and/or National Competent Authority |
| MSP3 | Traffic Organisation Service (TOS) | VTS Authority and/or National Competent Authority |
| MSP4 | Local port Service (LPS) | Local Port/Harbour Authority |
| MSP5 | Maritime Safety Information (MSI) Service | National Competent Authority |
| MSP6 | Pilotage service | Pilotage Authority/Pilot Organization |
| MSP7 | Tug Service | National Competent Authority; Local Port/Harbour Authority |
| MSP8 | Vessel Shore Reporting | National Competent Authority and appointed service providers |
| MSP9 | Telemedical Assistance Service (TMAS) | National health organization / dedicated health organization |
| MSP10 | Maritime Assistance Service (MAS) | Coastal/Port Authority / Organization |
| MSP11 | Nautical Chart Service | National Hydrographic Authority / Organization |
| MSP12 | Nautical Publications service | National Hydrographic Authority / Organization |
| MSP13 | Ice navigation Service | National Competent Authority /Organization |
| MSP14 | Meteorological information service | National Meteorological Authority Public Institutions |
| MSP15 | Real time hydrographic and environmental information service | National Hydrographic and Meteorological Authorities |
| MSP16 | Search and Rescue Service | SAR Authorities |

# MARITIME SERVICE AREAS

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

## MS 1 VTS timely and relevant Information ~~Service~~

### Submitting Organisation

IALA

### Coordinating bodies

IMO and IALA

### Description of the maritime service

Vessel Traffic Service (VTS) means a service implemented by a Government with the capability to interact with vessel traffic and respond to developing situations within a vessel traffic service area to improve the safety and efficiency of navigation, contribute to safety of life at sea and support the protection of the environment.

IMO Resolution A.XXX(XX) states that:

*“The purpose of VTS is to contribute to safety of life at sea, safety and efficiency of navigation and the protection of the environment within the VTS area by mitigating the development of unsafe situations through:*

1. *The provision of timely and relevant information on factors that may influence the ship's movements and assist on-board decision making.*
2. *The monitoring and management of ship traffic to ensure the safety and efficiency of ship movements.*
3. *Responding to developing unsafe situations.*

~~The IALA Guideline G1089 “Provision of Vessel Traffic Services (VTS)” has the purpose to provide guidance for the provision of VTS to participating ships in a harmonized manner in accordance with internationally approved guidelines and IALA Standards.~~

Timely and relevant information;

The provision of timely and relevant information on factors that may influence the ship's movements and assist on-board decision making ~~should be provided where:~~ this may include:

1. position, identity, intention and movements of ships;

2. maritime safety information;

3. limitations of ships in the VTS area that may impose restrictions on the navigation of other ships (e.g. manoeuvrability), or any other potential hindrances;

4. other information such as reporting formalities and International Ship and Port Facility Security Code details; and

5. support to, and cooperation with, allied services;

~~Deemed necessary by the VTS; or~~

* ~~Requested by the participating ship.~~

~~Timely and relevant information may include but is not limited to:~~

* ~~The position, identity, intention and movements of ships;~~
* ~~Maritime safety information;~~
* ~~Limitations of ships in the VTS area that may impose restrictions on the navigation of other ships (e.g. manoeuvrability), or any other potential hindrances; or~~
* ~~Any information concerning the safe navigation of the vessel.~~
* ~~Other information such as reporting formalities and International Ship and Port Facility Security Code details;~~
* ~~Support to, and cooperation with, allied services;~~
* ~~Amendments and changes in promulgated information concerning the VTS area such as boundaries, procedures, radio frequencies, reporting points;~~
* ~~The mandatory reporting of vessel traffic movements;~~
* ~~Meteorological and hydrological conditions, notices to mariners, status of aids to navigation;~~

~~Depending on the type of information and the situation, this may be delivered by:~~

* ~~Broadcasting the information at fixed times and intervals, as promulgated in the appropriate navigational publications, or~~
* ~~Through direct communication with individual vessel/s.~~

1. ~~Examples of timely and relevant information that may be provided by the VTS (IALA Guideline 1089)~~

| ~~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, DGPS, AIS, RACON, etc.~~ |
| ~~Other information~~ | ~~Port information, pilot or tug request, cargo information, health condition, PSC, ISPS, etc.~~ |

### Purpose

The purpose of this Maritime Service in the context of e-Navigation is to provide data in a digital format to support the provision of timely and relevant information in a Vessel Traffic Service and to create the means to reduce administrative burden and information overload, reduce miscommunication due to external interference, simplify work procedures, promote sustainable shipping, and increase navigational safety.

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

### Operational approach

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

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

### User needs

IMO resolution ~~A.857(20)~~ XXX contains examples of information that can be provided to vessels.

~~The use case,~~ ~~based on the information as reflected in table 3,~~ The example use case below is generic and intended for description purposes only. Actions and template categories may differ for individual countries. Details of information categories can be found in Appendix 1 MS1-3, Information Requirements of this document.

### 4.1.6.1Use Case - Vessel Arrival

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

~~This example is generic and intended for description purposes only. Actions and template categories may differ for individual countries.~~ Information exchange can be in real time as well as at specific times.

1. Example of MS 1, a vessel arriving

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

### information to be provided

Based on identified user needs by the submitting organisation for information covered by this Maritime Service a preliminary overview of the detailed information requirements is reflected in Appendix 1 MS1-3, Information Requirements of this guideline.

### Associated technical services

This table is an example of the associated technical services related to this Maritime Service. Additional technical services may be implemented as they develop.

1. Examples of the associated technical services related to MS 1.

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

### Relation to other Maritime Services

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

Table 6 displays examples of information needed from other Maritime Services.

Examples may be different depending on the coastal state arrangements.

Maritime Service 1 in relation to other Maritime Services.

|  |  |
| --- | --- |
| **Maritime Service** | **Examples of information related to MS 1** |
| MS 3 VTS Monitoring and management service | Enforcement, waterway management |
| MS 2 VTS Responding service | Navigational information |
| MS 4 Port Support Service (PSS) | Access to the port, availability of port services, ISPS level |
| MS 5 Maritime Safety Information (MSI) service | MSI information |
| MS 6 Pilotage Service | Pilot availability and boarding arrangements |
| MS 7 Tug Service | Update on information |
| MS 8 Vessel Shore Reporting | Notification of arrival, dangerous cargo |
| MS 9 Telemedical Assistance Service (TMAS) | Vessels position, delays, weather information |
| MS 10 Maritime Assistance Service (MAS) | Notifications, routing, places of refuge |
| MS 11 Nautical Chart Service | Local Area updates, chart updates |
| MS 12 Nautical Publication Service | Updates to publication |
| MS 13 Ice Navigation Service | Ice routes, ice conditions, ice breaking assistance |
| MS 14 Meteorological Information Service | Weather information |
| MS 15 Real Time Hydro and Environmental Information Service | Horizontal and vertical Tidal information in VTS area, available water column |
| MS 16 Search and Rescue (SAR) service | Search pattern and vessel of opportunity |

## MS 2 VTS Responding service

### Submitting Organisation

IALA

### Coordinating bodies

IMO and IALA

### Description of the maritime service

Vessel Traffic Service (VTS) means a service implemented by a Government with the capability to interact with vessel traffic and respond to developing situations within a vessel traffic service area to improve the safety and efficiency of navigation, contribute to safety of life at sea and support the protection of the environment.

IMO Resolution A.XXX(XX) states that:

*“The purpose of VTS is to contribute to safety of life at sea, safety and efficiency of navigation and the protection of the environment within the VTS area by mitigating the development of unsafe situations through:*

1. *The provision of timely and relevant information on factors that may influence the ship's movements and assist on-board decision making.*
2. *The monitoring and management of ship traffic to ensure the safety and efficiency of ship movements.*
3. *Responding to developing unsafe situations.*

The IALA Guideline G1089 “Provision of Vessel Traffic Services (VTS)” has the purpose to provide guidance for the provision of VTS to participating ships in a harmonized manner in accordance with internationally approved guidelines and IALA Standards.

Responding to developing unsafe situations;

Responding to developing unsafe situations involves support to the navigational safety of the ship through the provision of essential navigational information to assist on board navigational decision-making. It may also involve the provision of navigational advice and/or instruction.

Developing unsafe situations may include:

* A ship unsure of its route or position;
* A ship deviating from the route;
* A ship requiring guidance to an anchoring position;
* A ship that has defects or deficiencies, such as navigation or manoeuvring equipment failure;
* Severe meteorological conditions (e.g. low visibility, strong winds);
* A ship at risk of grounding or collision; and
* Emergency response or support to emergency services.
* Vessel deviating from the VTS passage plan;
* Assistance to a vessel to support the unexpected incapacity of a key member of the bridge team.

The need for navigational support may be particularly relevant to difficult navigational or meteorological circumstances or in the event of defects or deficiencies. The provision of navigational support is likely to be required in three generic circumstances:

* At the request of a ship, irrespective of whether a pilot is on board.
* When a navigational situation is observed by the VTS and intervention by the VTS is deemed necessary, or;
* As part of a VTS’s operational procedures.

1. Examples of the types of information that may be provided by a VTS responding to developing unsafe situations (IALA Guideline 1089)

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

| **Information related to:** | **Examples:** |
| --- | --- |
| Request and identification | * start and end of navigational support; * request for ship identification such as position, course made good and speed over the ground; * status of ship's equipment. |
| 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. * provide information related to navigating into a channel/fairway/lane (i.e. track is parallel/diverging/converging with/from/to reference line). |
| Advice | * advise a ship to alter the course, speed; * advise a ship to close up/drop back on/from another vessel * advise a ship to keep clear from area/position. |
| Warning | Diverging from the recommended track towards dangerous wrecks, obstacles not otherwise promulgated; diving operations; vessels not under command; etc. |
| Instruction | Instruct a ship to keep clear from area/position.  *Note: The VTS Provider should give careful consideration to authorisations to issue an Instruction in developing unsafe situations.* |

### Purpose

The purpose of this Maritime Service is to provide data in a digital format to support responding to developing unsafe situations within a VTS and to create means to reduce administrative burden and information overload, reduce the risk for miscommunication due to external interference, simplify work procedures, promote sustainable shipping, and increase navigational safety.

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

### Operational approach

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

Information provided digitally (e.g. by electronic means) could complement voice communications in time critical situations and in addition partly replace voice communications in non-time critical situations.

Note: Example of time critical situation:

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

Note: Example of non-time critical situation:

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

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

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

### User needs

The use cases, based on the information as reflected in table 7, are generic and intended for description purposes only. Actions and template categories may differ for individual countries. Details of information categories can be found in Appendix 1 MS1-3, Information Requirements of this document.

For example:

* Recommended route can be sent digitally to a vessel
* Pre-arrival reporting can be automated for update of voyage plan in order to avoid collisions, allisions and groundings and assist in safe navigation.
* The content of the voice communication can be provided digitally and be displayed as text in parallel / in addition to voice communication.

#### Use Case Vessel deviates from planned route

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

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

1. Example of MS 2, a vessel that deviates from planned route.

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

#### Use Case – assistance to a vessel to an anchoring position

A vessel is inside the VTS area and needs to stop for engine repair. The vessel asks for a safe anchorage position. The VTS provides anchoring position. The vessel takes direct course to the anchoring position, over a shallow area. The VTS gives warning to the vessel and provides a safe route to anchorage position. The anchor position and route to anchor position is digitally transmitted to the vessel and presented on the vessel's own navigation system.

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

1. Example of MS 2, assisting a vessel to an anchoring position.

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

### information to be provided

Based on identified user needs by the submitting organisation for information covered by this Maritime Service a preliminary overview of the detailed information requirements is reflected in Appendix 1 MS1-3, Information Requirements of this guideline.

### Associated technical services

This table is an example of the associated technical services related to this Maritime Service. Additional technical services may be implemented as they develop.

1. Examples of the associated technical services related to MS 2.

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

### Relation to other Maritime Services

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

Table 11 displays examples of information needed from other Maritime Services.

Examples may be different depending on the coastal state arrangements.

1. MS 2 in relation to other Maritime Services.

|  |  |
| --- | --- |
| **Description** | **Examples of information related to MS 2** |
| MS 1 VTS Timely and relevant information service | Navigational hazard |
| MS 3 VTS Monitoring and management service. | Waterway management |
| MS 4 Port Support Service (PSS) | Access to the port, availability of port services, ISPS level |
| MS 5 Maritime Safety Information (MSI) Service | MSI information |
| MS 6 Pilotage Service | Pilot availability and boarding arrangements |
| MS 7 Tug Service | Update on information |
| MS 8 Vessel Shore Reporting | Notification of arrival, dangerous cargo |
| MS 9 Telemedical Assistance Service (TMAS) | Vessels position, delays, weather information |
| MS 10 Maritime Assistance Service (MAS) | Notifications, routing, places of refuge |
| MS 11 Nautical Chart Service | Local area updates, chart updates |
| MS 12 Nautical Publication Service | Updates to publication |
| MS 13 Ice Navigation Service | Ice routes, ice conditions, ice breaking assistance |
| MS 14 Meteorological Information Service | Weather information |
| MS 15 Real Time Hydro and Environmental Information Service | Horizontal and vertical tidal information in VTS area, available water column |
| MS 16 Search and Rescue (SAR) Service | Search pattern and vessels of opportunity |

## MS 3 VTS monitoring and management Service

### Submitting Organisation

IALA

### Coordinating bodies

IMO and IALA

### Description of the maritime service

Vessel Traffic Service (VTS) means a service implemented by a Government with the capability to interact with vessel traffic and respond to developing situations within a vessel traffic service area to improve the safety and efficiency of navigation, contribute to safety of life at sea and support the protection of the environment.

IMO Resolution A.XXX(XX) states that:

*“The purpose of VTS is to contribute to safety of life at sea, safety and efficiency of navigation and the protection of the environment within the VTS area by mitigating the development of unsafe situations through:*

1. *The provision of timely and relevant information on factors that may influence the ship's movements and assist on-board decision making.*
2. *The monitoring and management of ship traffic to ensure the safety and efficiency of ship movements.*
3. *Responding to developing unsafe situations.*

The IALA Guideline G1089 “Provision of Vessel Traffic Services (VTS)” has the purpose to provide guidance for the provision of VTS to participating ships in a harmonized manner in accordance with internationally approved guidelines and IALA Standards.

Monitoring and management of ship traffic;

The monitoring and management of ship traffic to ensure the safety and efficiency of ship movements is a core function of VTS to mitigate the development of dangerous traffic situations and to provide for the safe and efficient movement of vessel traffic within the VTS area. It concerns the operational management of traffic and the planning of vessel movements and is particularly relevant in times of high traffic density or when vessel movements may affect the traffic flow.

The monitoring and management of ship traffic to ensure the safety and efficiency of ship movements may include:

* Forward planning and prioritisation of ship movements to prevent congestion or dangerous situations;
* Organizing ships underway noting that special transports or vessels with hazardous or polluting cargo may affect the flow of other traffic;
* Organizing space allocation;
* Establishing a system of traffic clearances;
* Establishing a system of voyage or passage plans;
* Providing route advice;
* Establishing mandatory reporting of movements in the VTS area;
* Establishing special routes to be followed;
* Establishing speed limits to be observed;
* Organising nautical activities (e.g. sailing regattas) or marine works in-progress (such as dredging or submarine cable-laying) to avoid interference with the flow of vessel traffic; and
* Ensuring compliance with and enforcement of regulatory provisions for which they are empowered.

1. Examples of types of information that may be provided by the VTS by the monitoring and management of ship traffic (IALA Guideline 1089)

|  |  |
| --- | --- |
| 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 vessel or the weather conditions;  organizing other traffic when a vessel has passed point of no return;  slot management to allocate vessels 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 vessel safety zones in case of particular operations;  establish and organise exclusion zones;  instruct vessels to keep clear from special areas/positions;  organizing the traffic with regards to meteorological, hydrographical or other restrictions such as visibility, wind speed, current, sea state and under keel clearance. |

### Purpose

The purpose of this Maritime Service is to provide data in a digital format to support monitoring and management of ship traffic in a VTS and to create means to reduce administrative burden and information overload, reduce the risk for miscommunication due to external interference, simplify work procedures, promote sustainable shipping, and increase navigational safety.

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

### operational approach

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

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

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

Examples:

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

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

### User needs

The use cases, based on the information as reflected in table 12, are generic and are intended for description purposes only. Actions and template categories may differ for individual countries. Details of information categories can be found in Appendix 1 MS1-3, Information Requirements of this document.

#### Use case – vessel leaves berth

When the vessel is ready to sail, it sends its planned time of departure digitally to the VTS where it is presented in the VTS system. The VTS operator will be alerted on upcoming traffic conflicts and receives solutions. The VTS operator takes action and advises vessel digitally to delay planned departure by thirty minutes. The advised solution is presented aboard the vessel and the mariner will acknowledge the advice. The VTS operator provides renewed relevant information to other traffic participants, where appropriate, via digital and/or verbal means (for vessels not able to receive information digitally).

1. Example of MS 3, vessel leaving the berth.

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

#### Use case – vessel transiting protected area

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

1. Example of MS 3, vessel transiting protected area.

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

### information to be provided

Based on identified user needs by the submitting organisation for information covered by this Maritime Service a preliminary overview of the detailed information requirements is reflected in Appendix 1 MS1-3, Information Requirements of this guideline.

### Associated technical services

This table is an example of the associated technical services related to this Maritime Service. Additional technical services may be implemented as they develop.

1. Examples of the associated technical services related to MS 3.

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

### Relation to other Maritime Services

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

Table 16 displays examples of information needed from other Maritime Services.

Examples may be different depending on the coastal state arrangements.

1. MS 3 in relation to other Maritime Services.

|  |  |
| --- | --- |
| **Description** | **Examples of information related to MS 3** |
| MS 1 VTS Timely and relevant information service | Traffic and route information |
| MS 2 VTS Responding service | Navigational warning |
| MS 4 Port Support Service (PSS) | Access to the port, availability of port services, ISPS level |
| MS 5 Maritime Safety Information (MSI) Service | MSI information |
| MS 6 Pilotage Service | Pilot availability and boarding arrangements |
| MS 7 Tug Service | Update on information |
| MS 8 Vessel Shore Reporting | Notification of arrival, dangerous cargo. |
| MS 9 Telemedical Assistance Service (TMAS) | Vessels position, delays, weather information. |
| MS 10 Maritime Assistance Service (MAS) | Notifications, routing, places of refuge |
| MS 11 Nautical Chart Service | Local Area updates, chart updates |
| MS 12 Nautical Publication Service | Updates to publication |
| MS 13 Ice Navigation Service | Ice routes, ice conditions, ice breaking assistance |
| MS 14 Meteorological Information Service | Weather information |
| MS 15 Real Time Hydro and Environmental Information Service | Horizontal and vertical Tidal information in VTS area, available water column |
| MS 16 Search and Rescue (SAR) service | Search pattern and vessel of opportunity |

## MSP4 Local Port Service (LPS) 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

### Examples

### Relation to other MSPs

### Associated Technical Services

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | ID (MRN) | Description | Architect(s) | Standardisation Body |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

## MSP5 Maritime Safety Information service (MSI) (PDA+TC)

### 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, including no-go areas | 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  Etc. |
| 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.

### Examples

### 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.

### Associated technical Services

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | ID (MRN) | Description | Architect(s) | Standardisation Body |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

## MS6 Pilotage service [IMPA]

### Submitting Organisation

International Maritime Pilots Association

### Description of Digital Maritime Service

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

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

### Purpose

This service is limited to information provided to ships regarding the pilotage service in a given geographic area. It does not address the act of piloting, which is provided by a pilot on the bridge of a ship. The purpose of MS6 is to provide information related to the pilotage service when planning an operation before the pilot boards the vessel, by using modern technology and common standards.

### Operational Approach

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

Examples of information can be:

|  |  |
| --- | --- |
| Information related to: | Examples |
| General information | Examples of information:   * Pilot requirements in the area * Local regulations * limitations * Requirements and procedures for ordering the pilot * Requirements and procedures for pilot boarding * Contact information to pilot station * Mandatory needs for tug assistance * Pilot boarding point |
| Operational information | Examples of information:   * Contact to pilot boat, launch, helicopter * Position of pilot station, pilot boat * Required arrangements for pilot boarding * Boarding speed * Communication * Set up of ship’s radar, ECDIS and other equipment as requested for the pilot’s use. * Any other actions requested of the ship for the pilot’s benefit |

### User Needs

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

### Information to be Provided

See in section 6.4

### Associated Technical Services

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | ID (MRN) | Description | Architect(s) | Standardisation Body |
|  |  |  |  |  |
|  |  |  |  |  |

### Relation to other Maritime Services

MS 6 has relationships with other MSs where it affects the Pilot boarding operation and contribute to safe and efficient operations.

## MSP7 Tugs service (IHMA?)(ITA?)

### 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.
* Ice breaking

### Area of Operation

### Objective

### User requirements

### Examples

### Relation to other MSPs

### Associated Technical Services

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | ID (MRN) | Description | Architect(s) | Standardisation Body |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

## MSP8 Vessel shore reporting [Fred POT]

### 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).

### Examples

### Relationships with other MSPs

### Associated Technical services

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| --- | --- | --- | --- | --- |
| Name | ID (MRN) | Description | Architect(s) | Standardisation Body |
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## MSP9 Telemedical Assistance Service (TMAS) [NORWAY]+NTnu

### Definition

The ILO Convention 164 adopted in 1987 provides requirements to the competent authority shall ensure by a prearranged system that medical advice by radio or satellite communication to ships at sea, including specialist advice, is available at any hour of the day or night. The ILO Maritime Labour Convention (2006) provides the same requirements and stipulate that this service shall be available free of charge to all ships irrespective of the flag that they fly.

The IMO Maritime Safety Committee, at its seventy-second session (17 to 26 May 2000), noted the general tendency to regard medical assistance at sea as an integral part of rescue and that this approach is consistent with the International Convention on Maritime Search and Rescue (SAR). Noting further that the Convention requires the search and rescue services to perform distress monitoring, communication, co-ordination and search and rescue functions, including provision of medical advice, initial medical assistance or medical evacuation, the Committee approved the MSC.1/Circ.960 on Medical Assistance at Sea and clarifying the role of Telemedical Assistance Services (TMAS).

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 on board 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. The MSC.1/Circ.1218 is providing guidance on exchange of medical information between TMAS involved in international SAR operations.

### Area of Operation

MSP9 can be delivered in all sea areas (1-6), but differences in bandwidth depending on available types of transmission techniques will result in different levels of service.

### Objective

The objective of TMAS is to give decision support and advice to medically responsible personal onboard in cases of medical emergency where treatment cannot wait. This is today mostly done by voice communication using VHF, MF or short wave radio, or mail. In a future e-navigation scenario, the quaity of remote diagnostics and even treatment can be expected to improve.

In addition to prevailing TMAS provisions, real time monitoring of the patients current health status will be important. The parameters monitored may differ in different systems, but may include hart rate, blood oxyen saturation and pressure. As an example see the telemetric medical information screen below.



1. An example of a typical telemetry screen: top (green) curve is hart rate (Beats Per Minute from two redundant connectors), below (in red) is Ambulatory Blood Pressure (ABP) in mmHg, the third curve is Peripheral Capillary Oxygen Saturation (SPO2), the oxygen saturation of the blood (normal is 95-100 %), at the bottom of the screen are Noninvasive Blood Pressure (NBP) and the patient’s temperature in degrees Celsius.

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

One may envision that in the not too distant future, what today is very expensive medical equipment could be installed on (at least some) ships, e.g. large cruise vessels. Examples of such equipment could be:

[short version] ultrasonography, computer tomography (CT) and surgical operation robots. Such equipment will then be remotely operated from land given reliable radio connections.

[long version]

**Diagnostic ultrasonography**  
is used to see internal body structures such as [tendons](https://en.wikipedia.org/wiki/Tendons), [muscles](https://en.wikipedia.org/wiki/Muscles), joints, vessels and internal organs. Its aim is often to find a source of a disease or to exclude any [pathology](https://en.wikipedia.org/wiki/Pathology). The practice of examining [pregnant](https://en.wikipedia.org/wiki/Pregnant) women using ultrasound is called [obstetric ultrasound](https://en.wikipedia.org/wiki/Obstetric_ultrasonography), and is widely used.

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

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

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

### User requirements

Now

* A digital health emergency monitoring system allowing logged text interchange between a ship and medical specialist at a shore hospital including
* Voice communication not only with the medical officer onboard, but also with the patient in the medical bay
* Real-time video for visual examination by the remote specialists using video
* Real-time transmission at length of medical telemetry
* Transmission of compressed data packages of e.g. EEG data

In the future (examples)

* Transmission of data and remote control of ultrasonography
* Transmission of data and remote control of computer tomography and the like imaging techniques
* Transmission of data and remote control of robotic surgery

### Examples

### Relationship with other MSPs

### Associated Technical Services

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | ID (MRN) | Description | Architect(s) | Standardisation Body |
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## 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, See IMO Res 950

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.

### Area of operation

Text- coastal states? SAR areas?

### Objective

Text (IMO RES?)

### User requirements

### Examples

### Relationship with other MSPs

### Associated Technical Services

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | ID (MRN) | Description | Architect(s) | Standardisation Body |
|  |  |  |  |  |
|  |  |  |  |  |
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## 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. |

### Area of operation

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.

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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.

### Examples

[Thomas P]

### Relationship to other MSPs

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.

### Associated Technical Services

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| --- | --- | --- | --- | --- |
| Name | ID (MRN) | Description | Architect(s) | Standardisation Body |
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## 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 |

### Area of operation

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.

### Examples

xxx

### 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.

### Associated Technical Services

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| Name | ID (MRN) | Description | Architect(s) | Standardisation Body |
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## MSP13 Ice navigation service

### Definition

An ice navigation service provides valuable assistance and information to ships operating in and around ice-infested waters. Information about sea ice and icebergs at varying time scales may be available as text bulletins, graphic charts or electronic data.

Services provided by an ice navigational service typically include:

* ice condition information and operational recommendations/advice;
* ice conditions around a vessel;
* vessel routing;
* vessel escort and icebreaking;
* ice drift load and momentum;
* ice observations from ships or aircraft.

Ice observations may be prepared once a day, depending upon the availability to the information. Ice forecasts may be prepared daily or less often, and cover periods of 24 hours to a few days. Long-range predictions e.g., 30 day predictions and seasonal predictions may be available online or by email.

WMO publication 574 (Sea Ice Information Services of the World) has comprehensive information on National Ice Services.

Examples of Ice Navigation Services are listed in Table x.

Table x – Ice Navigation Service

|  |  |
| --- | --- |
| **Information related to:** | **Examples:** |
| Ice conditions | * Sea ice concentrations * Sea ice stage of development (type or thickness) * Iceberg location and drift * Limit of all known sea ice or icebergs |
| Ice reports and bulletins | * Text summaries of ice conditions |
| Ice forecasts | * Near-term or long range forecasts |
| Routeing aid | * Recommended routes * Icebreaker assistance |

### Area of operation

MSP13 can be delivered in all sea areas (1-6) where and when sea ice or icebergs are present. Frequency of the data availability and the amount of detail may vary.

### Objective

Ice navigational services use data from a variety of sources, combined to represent conditions at a particular date or time. Satellite imagery is most commonly used, but ship and aircraft reports are an important source of additional data. Forecast ice information is usually based on meteorological, oceanographic and ice model output which might be automated or combined with a forecaster’s local knowledge of currents and tides. Most ice information is available online and may be transmitted through marine radio or by email.

#### International 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.





Figure 4.13-1 – Map of icebergs produces by the International Ice Patrol Credit photo Canadian Coast Guard).

#### Ice charting

Some 20 nations around the world offer an ice information service, and these organisations relay charts of ice conditions mostly by radio facsimile and online. Time slots and schedules usually dictate the scale and number of charts provided by the broadcast station in the area of concern. Services may provide ice forecasts once a day for a period of 24 to 144 hours. These are tactical forecasts and may provide advice on difficult ice conditions forming or dissipating, the general motion of the pack, opening and closing of leads, etc. They are strongly influenced by meteorological prediction and should always be used in concert with the weather forecast.

Other longer-range predictions – those covering periods from 7–10 days to 30 days and seasonal predictions – are based on climatological, analogue or statistical methods. They are more commonly available online or sent directly to shipping companies and agents or individual ships.



Figure 4.13-2 - Example of Sea Ice satellite service ([www.polarview.aq](http://www.polarview.aq))



Figure 4.13-3 – Analysis of ice charts



Figure 4.13-4 – A MODIS satellite image taken on March 17, 2015 of the Gulf of St. Lawrence. The image highlights compacted first-year ice along Anticosti Island as well as young ice and grey-white ice off the coast. (Image credit: NASA)

#### Vessel Escort and Ice breaking

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



Figure 4.13‑5 Example of a Recommended Ice Route in the Gulf of St. Lawrence (source ”Ice Navigation in Canadian Waters” – Canadian Coast Guard )



Figure 4.13-6 – Vessel escort (photo: Canadian Coast Guard).

### User requirements

The Master relies upon accurate ice information and advice to make decisions about their future course and progress. Effective icebreaker support, assistance to shipping or up-to-date ice information requires reliable communications. In northern or remote areas, internet communications may be limited. 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), as well as the use of the S-411 format will give benefits in terms of enabling services with more detailed information than traditional radio services currently provide. Navigation systems will need a capability to utilize electronic data to be able to make use of all available ice information.



Figure 4.13-7 – Ice conditions in the Gulf of St. Lawrence (photo: Canadian Coast Guard).

### Examples



### 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.

### Associated Technical services

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| --- | --- | --- | --- | --- |
| Name | ID (MRN) | Description | Architect(s) | Standardisation Body |
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## 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 |

### Area of operation

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.

### Examples

### Relationship to other services

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

### Associated technical services

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | ID (MRN) | Description | Architect(s) | Standardisation Body |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

## MSP15 Real-time hydrographic and environmental information services (IHO)(WMO)

### Definition

Check IMO 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 |
| Real time environmental conditions | Temperature, pressure, tendencies (rising/falling)  Wind speed and direction  Visibility |
| Water column | Depths, salinity, temperatures |

### Area of Operation

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.

### Examples

xxxx

### Relationship to other services

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

### Associated technical Services

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | ID (MRN) | Description | Architect(s) | Standardisation Body |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

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

### Definition

IMO definition?

The SAR service is responsible for assisting [and 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.

### Area of Operation

### Objective

### User requirements

### Examples

### Relationship with other MSPs

### Associated Technical Services

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | ID (MRN) | Description | Architect(s) | Standardisation Body |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

## MSP17 Aids to Navigation services (AtoN)

## MSP18 Communication services [IALA]

## MSP19 PNT and augmentation services [UK GLA]

## [MSP20 Anti-piracy information] [IMB](US)

# 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