

RESOLUTION MSC.467(101) (adopted on 14 June 2019)  
GUIDANCE ON THE DEFINITION AND HARMONIZATION OF THE FORMAT AND STRUCTURE OF MARITIME  
SERVICES IN THE CONTEXT OF E-NAVIGATION

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**ANNEX 19**

**RESOLUTION MSC.467(101)**  
**(adopted on 14 June 2019)**

**GUIDANCE ON THE DEFINITION AND HARMONIZATION OF  
THE FORMAT AND STRUCTURE OF MARITIME SERVICES  
IN THE CONTEXT OF E-NAVIGATION**

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING ALSO the *E-navigation Strategy Implementation Plan – update 1* (MSC.1/Circ.1595) approved by it, in particular, the need to harmonize the exchange of maritime-related information and data to enhance berth-to-berth navigation and related services for safety of navigation and security at sea and protection of the marine environment,

NOTING the available Maritime Services which provide and/or exchange maritime information and data with shipping related, but not limited to, vessel traffic service information, navigational assistance, traffic organization, maritime safety information, pilotage, tugs, vessel shore reporting, telemedical assistance, local port information, nautical charts and publications, ice navigation, meteorological, hydrographic and environmental information, search and rescue and other Maritime Services that may be developed and implemented in the future,

RECOGNIZING the responsibilities of the Organization and other international organizations, among others, the International Hydrographic Organization (IHO), the World Meteorological Organization (WMO), the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), the International Maritime Pilots Association (IMPA) and the International Harbour Masters Association (IHMA), in defining specific services under their respective domains, including technical and product specifications, standards, guidelines and recommendations,

RECOGNIZING ALSO the need to harmonize the format and structure of Maritime Services and the maritime-related information and data provided by them in order to enhance the safety and efficiency of shipping,

RECOGNIZING FURTHER the need to work in collaboration with all involved international organizations in order to harmonize the exchange of maritime information and data provided through different Maritime Services,

NOTING the willingness of international organizations to act as domain coordinating bodies for Maritime Services under their respective domains, in collaboration with other relevant stakeholders,

HAVING CONSIDERED the recommendation made by the Sub-Committee on Navigation, Communications and Search and Rescue, at its sixth session,

1 ADOPTS the *Guidance on the definition and harmonization of the format and structure of Maritime Services in the context of e-navigation*, set out in the annex to the present resolution;

2 AGREES to consolidate the descriptions of Maritime Services and to consider them together with all involved international organizations and interested Member States in order to harmonize the provision and exchange of maritime information and data;

3 INVITES Member States and international organizations acting as domain coordinating bodies to submit descriptions of Maritime Services to the Organization, taking into account the present guidance.

## ANNEX

### **GUIDANCE ON THE DEFINITION AND HARMONIZATION OF THE FORMAT AND STRUCTURE OF MARITIME SERVICES IN THE CONTEXT OF E-NAVIGATION**

#### **1 Introduction**

1.1 Modern shipping relies on a large amount of data and information to safely navigate from berth to berth. A very important set of information is promulgated as maritime safety information (MSI), as defined in resolution A.705(17), as amended, on *Promulgation of maritime safety information* and MSC.1/Circ.1310/Rev.1 on *Revised Joint IMO/IHO/WMO Manual on Maritime Safety Information (MSI)*. MSI includes navigational warnings, meteorological information and other urgent safety-related information. In addition to being safety-relevant, marine information services are used for optimizing voyage routes, which can include the best passage through ice, a security-risk area or avoiding the known path of marine mammals. Route optimization may also include taking advantage of favourable winds and currents and engine loads may be adjusted accordingly.

1.2 To assess the dynamic effects mentioned above, the ship's bridge team needs up-to-date information for the ship's planned operation. The information flow also comprises ship-to-shore communications, in particular prior to entering the coastal waters of a State, as ships are usually requested to provide details of their voyage, cargo, crew and passengers on board, advising on the next port of call and other information. Shore-to-ship, ship-to-ship, ship-to-shore and shore-to-shore information exchange enable new services and technologies to improve safety and efficiency of shipping. All those marine information services, referred to as Maritime Services in the e-navigation Strategy Implementation Plan (SIP) (MSC.1/Circ.1595, as may be revised), are being considered to be transitioned from conventional transmission methods to contemporary digital technologies.

1.3 The *Strategy for the development and implementation of e-navigation* (MSC 85/26/Add.1, annex 20) assigns the governance of the e-navigation concept to IMO as the organization responsible for establishing mandatory standards for enhancing the safety of life at sea, maritime security and protection of the marine environment, as well as having global remit.

#### **2 Purpose**

2.1 The purpose of this Guidance is to ensure that Maritime Services are implemented internationally in a standardized and harmonized format. To support this purpose, a template to describe Maritime Services is provided in appendix 1 and descriptions of Maritime Services are consolidated under MSC.1/Circ.1610, as may be revised, as appropriate.

2.2 The SIP requires that all Maritime Services be S-100 conformant as a baseline. The International Hydrographic Organization (IHO) S-100 framework standard specifies the method for data modelling and developing product specifications.

#### **3 Application**

This Guidance is recommended for Member States providing Maritime Services, international organizations acting as domain coordinating bodies and other service providers.

## **4 Terminology**

For the purpose of the Guidance, unless expressly provided otherwise:

- .1 *Maritime Service* refers to the provision and exchange of maritime-related information and data in a harmonized, unified format.
- .2 *Technical Service* comprises a set of technical solutions including data model and communications means to provide a Maritime Service.
- .3 *S-100 IHO Universal Hydrographic Data Model* is a standard that makes provision for the development of data models and associated product specifications.

## **5 Three levels of responsibility**

### ***Overarching coordination level***

5.1 IMO, in its role in leading e-navigation development, is responsible for guiding the establishment and harmonization of information and data transfers relating to Maritime Services. This includes providing leadership to harmonize Maritime Services through the provision of guidance.

### ***Functional and operational level***

5.2 International organizations and Member States propose the description of specific Maritime Services, using the template as provided in appendix 1, to the Organization and manage and maintain the agreed description through harmonized operational and technical specifications.

5.3 International organizations as domain coordinating bodies, such as IHO, WMO, IALA and others, provide guidelines to stakeholders and domain management. This should include descriptions of current and future Maritime Services and identification and specification of associated technical services.

5.4 When domain coordinating bodies for Maritime Services are unknown or may not exist, descriptions and specifications derived from other Maritime Services may assist with harmonizing technical specifications.

### ***Service level***

5.5 Member States and other service providers within Member States (e.g. port authorities, Hydrographic Offices, SAR services, etc.) are responsible for the provision of Maritime Services.

## **6 Flow chart for the development of a new Maritime Service**

6.1 Figure 1 reflects a recommended process of steps to be followed for the development of a new Maritime Service.

6.2 The domain coordinating bodies and Member States should submit the descriptions of Maritime Services, using the template in appendix 1, to the Organization (1).

6.3 Descriptions of Maritime Services should contain references to relevant international standards, recommendations and guidelines which may contain criteria for the implementation of these Maritime Services, as well as identified user requirements for data and information (2).

6.4 The assigned IMO body should consider the submitted descriptions of Maritime Services (3) and decide, as appropriate, the steps needed to resolve any issues and agree to update the relevant IMO instrument (4).

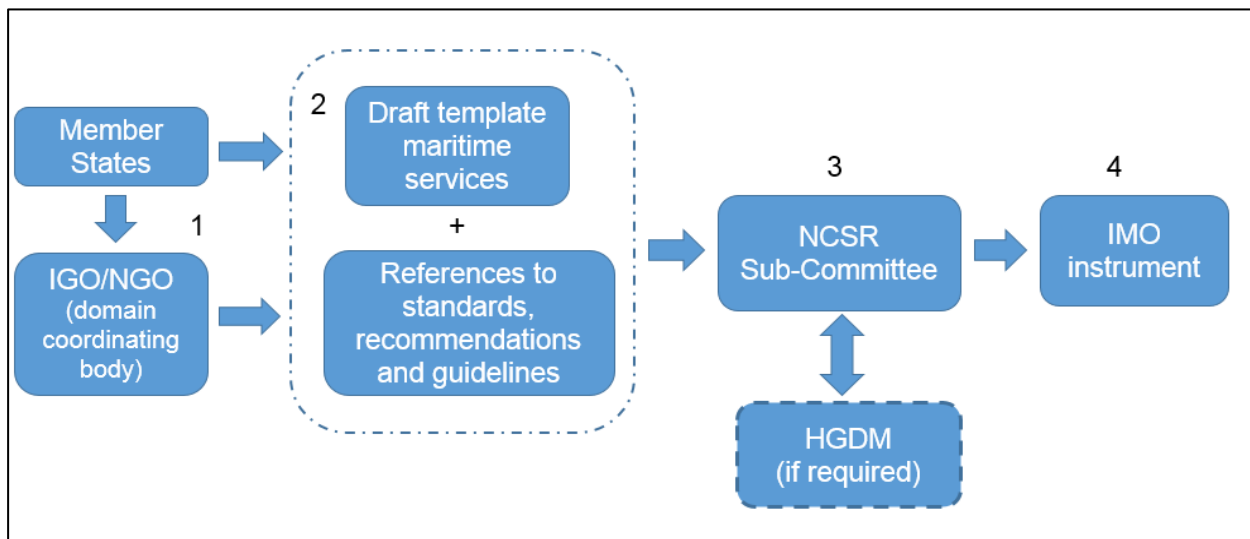


Figure 1: Recommended process for the development of Maritime Services

## 7 Relationship between the different levels of service descriptions

7.1 Figure 1 illustrates the interactions between service levels.

7.2 The description in the template reflects a common understanding and definition of a Maritime Service. This safeguards the harmonization of the information needed as decision support based on the user needs and operational requirements. The information could be presented on a graphical display on board in accordance with e-navigation solution 4 (see MSC.1/Circ.1595, as may be revised). The harmonized development of S-100 based specifications aims at ensuring userfriendliness for all relevant stakeholders in receiving and using the information in addition to enable the industry to develop systems based on the same data language.

7.3 Technical services are needed to coordinate a seamless combination between different product specifications. Information provided using S-100 based product specifications is brought together by technical services to deliver a Maritime Service.

7.4 Digital information regarding, for instance a restricted area, will combine several attributes from a set of S-100 products to provide the navigator with a complete information picture.

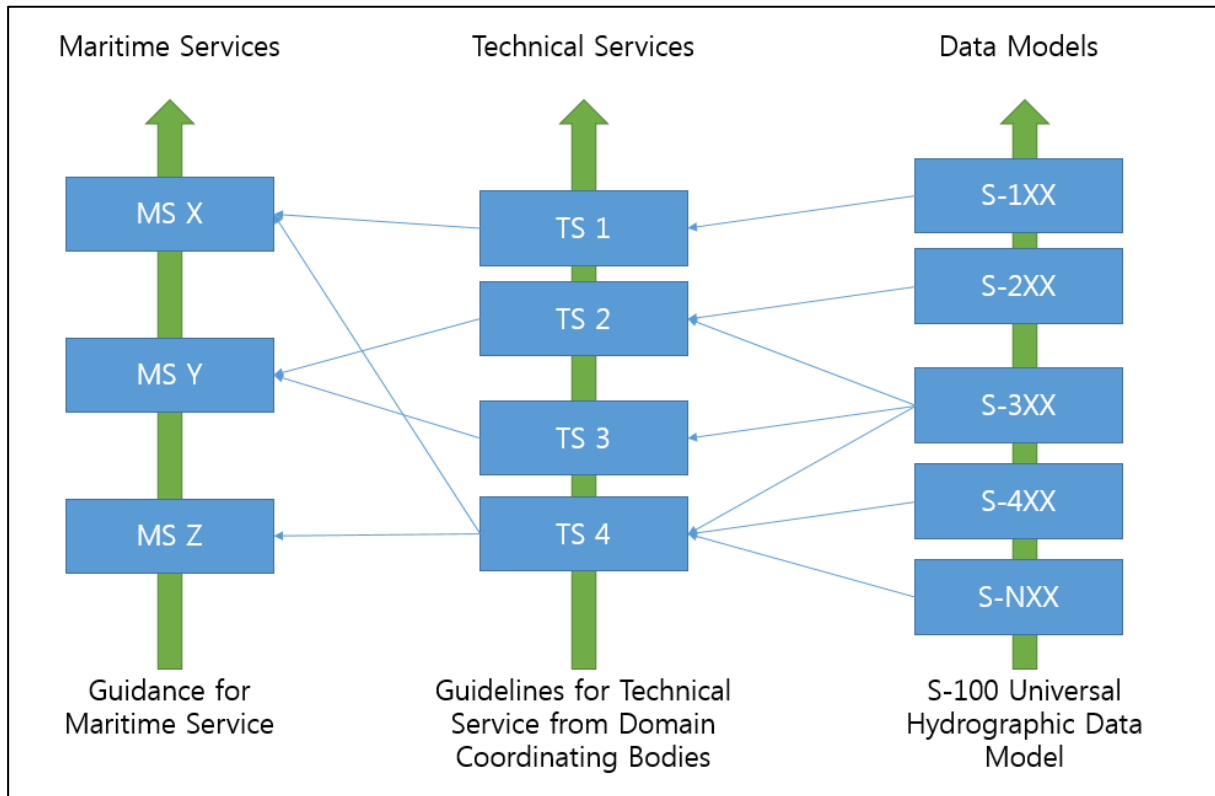


Figure 2: Interaction between different service levels

## 8 Description for the harmonized specification of technical services

8.1 Maritime Services are described by using a common template, as set out in appendix 1. This template includes references to relevant technical services.

8.2 The interoperability of technical services is ensured by a coordinated approach of the domain coordinating bodies to define needed communication means and data models.

8.3 Technical services should follow the appropriate guidance and product specification developed by the appropriate domain coordinating body and, where appropriate, be based on the S-100 framework with associated S-100 based product specifications.

8.4 Appendix 2 provides a description for the harmonized specification of technical services.

## 9 Relationship between Maritime Service and S-100 based product specification

9.1 Some Maritime Services and their associated technical services may rely on information from multiple S-100 based products. In cases where information is produced by different domain stakeholders, care should be taken to ensure compatibility at both the feature/attribute and data products levels.

9.2 The IHO GI Registry is the mechanism to ensure consistency in the way that different stakeholder communities model real-world concepts and define them as features/attribute combinations. To ensure complete service provision, stakeholders should consult the IHO GI Registry, in particular the Feature Data Dictionary and the test-bed registers.

## APPENDIX 1

### TEMPLATE FOR DRAFT DESCRIPTIONS OF MARITIME SERVICES IN THE CONTEXT OF E-NAVIGATION

This template should be used to describe Maritime Services. Descriptions of Maritime Services provided to IMO using this template will enable IMO to exercise leadership and overarching oversight and to provide a globally harmonized list of recognized Maritime Services.

To ensure a standardized approach in the development and implementation of Maritime Services, the content should include a general description of the operational services, and a reference to associated technical services that will enable the exchange of information in digital format:

**1 Title of the Maritime Service (Maritime Service number)**

**2 Submitting organization**

**3 Coordinating body**

**4 Description of the Maritime Service**

Stating the exact nature and scope of the Maritime Service in accordance, if applicable, with existing IMO instruments. Additional details might be added for clarity as required.

**5 Purpose**

What is the purpose of the Maritime Service?

What value does it bring to its intended stakeholders?

Is the Maritime Service compliant with regulatory requirements, if applicable?

In the case that the Maritime Service covers existing services, a description of the steps required to transition from analogue to digital information promulgation must be included.

**6 Operational approach**

How is the purpose of the Maritime Service achieved, taking into account existing guidance of the Organization and other international bodies?

**7 User needs**

Describe the user needs the Maritime Service addresses. In so doing make reference to any relevant IMO instruments and, where applicable, include one or more use cases.



**8 Information to be provided**

List the information elements the Maritime Service provides. The information elements will be the starting point for data modelling, as part of the technical services to access, promulgate or exchange the information.

**9 Associated technical services**

Using the table below list existing or potential technical services associated with this Maritime Service.

<b>Name</b>	<b>ID (MRN)<sup>1</sup></b>	<b>Description (incl. measure for quality assurance<sup>2</sup>)</b>	<b>Standardization body</b>

**10 Relation to other Maritime Services**

Describe any relationships between this and other Maritime Services such as interdependencies or areas of overlap. This section should clarify the nature of interdependencies, overlaps and provide recommendations for their resolution.

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<sup>1</sup> Maritime Resource Name (MRN), see: <http://mmregistry.org>

<sup>2</sup> MSC.1/Circ.1512 on *Guideline on software quality assurance and human-centred design for e-navigation* or others, as appropriate.

## APPENDIX 2

### DESCRIPTION FOR THE HARMONIZED SPECIFICATION OF TECHNICAL SERVICES IN THE CONTEXT OF E-NAVIGATION

1 Maritime Services are implemented by a set of Technical Services. For harmonization, the Maritime Services are described by using a common template, as set out in appendix 1. This template includes references to technical services.

2 The specifications are divided into three parts:

- .1 a service specification;
- .2 a service design description; and
- .3 a service instance description.

3 The technical service specification covers the technical/digital service on a general level to implement the Maritime Services. The service specification is still technology-agnostic. The service specification should include the following information:

- .1 MRN ID for the service specification;
- .2 reference to the Maritime Services which make usage of the Technical Services;
- .3 the operational context of the service in (e.g. requirements, use cases);
- .4 the service interface descriptions (operations, parameters);
- .5 the information provided and used by the service (the service data model);
- .6 the dynamic behaviour of the service (sequence of operations, behaviour description); and
- .7 author of the service specification (organization, contact person).

4 A technical service specification will have one or several associated (technical) service design descriptions. Each technical design describes how the service is implemented using specific technologies. Service design descriptions should include the following information:

- .1 MRN ID for the service design description;
- .2 reference to the service specification;
- .3 description of the chosen technologies (data processing, communication technologies, infrastructure, networks, etc.);
- .4 detailed description of the used data structures and types (service physical data model, encoding);
- .5 mapping of the used data structures to the service specification's service data model; and
- .6 author of the technical design (organization, contact person).

5 A technical service design will have one or several associated technical service instance descriptions. Each instance description is a reference (endpoint) to a specific service provider for this specific service following the specific design description. The instance description also contains additional information such as coverage area for the service providers' instance of the service. A service instance includes the following information:

- .1 MRN ID for the service instance description;
- .2 reference to the service technical design (and thus, implicitly, to the service specification);
- .3 information about service provider;
- .4 access/information (e.g. URL, frequencies etc.); and
- .5 geographical coverage information.

6 The relationship between the different levels of service descriptions are shown in this example for a VTS service:

Maritime Service	Technical Service specification	Technical Service design description	Technical Service instance description
VTS service	Inter-VTS information exchange	Web service using REST	Provided by Sound VTS Provided by Helsinki VTS
		Web service using SOAP	Provided by Zandvliet VTS
		Other technical design for VTS information exchange	Another instance of that design provided by someone somewhere
	Route exchange ship to shore	Some technical design	Some instance
		Another design	Another instance
	Another technical VTS service	...	...
Another Maritime Service	...	...	...
...	...	...	...

7 In order to achieve a harmonized use of technical services, it is recommended to use guidelines developed by the domain coordinating bodies,<sup>3</sup> if available.

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<sup>3</sup> E.g. IALA Guideline G1128.

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