IALA GUIDELINE

G1105
SHORE-SIDE PORTRAYAL ENSURING HARMONIZATION WITH E-NAVIGATION RELATED INFORMATION

Edition 2.0
December 2022

urn:mrn:iala:pub:g1105:ed2.0

DOCUMENT REVISION

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

Date	Details	Approval
December 2013	First issue	Council 56
December 2022	Edition 2.0, The contents of some paragraphs in the main body are condensed and revised. New referred documents are added. Status of documents and standards cited are updated and listed in one form.	Council 76

CONTENTS

1.   INTRODUCTION

The objective of this document is to provide guidance to shore-side providers of Marine Aids to Navigation on how to achieve a more synchronized presentation of information ashore with the presentation that is displayed onboard ships. The goal is to achieve improved common understanding of situations by shore side users and ship navigators by having similar portrayals of common information in order to enhance navigation safety and efficiency.

2.   SCOPE

This Guideline is intended to be descriptive – not prescriptive, and as such, the intent is to publish a general, goal-based guideline whereby over-arching objectives are defined, but freedom to innovate is left to both developers and users. This document is not intended to provide guidance for navigational information portrayal on the ships as this is defined by other competent bodies, but rather takes both existing and currently under development ship portrayal standards and guidelines into consideration to guide shore-side system development used to convey Marine Aids to Navigation information.

2.1.   CORE OBJECTIVES

The following is a non-exhaustive list of core objectives that are associated with the presentation and display (i.e., portrayal) of Marine Aids to Navigation related navigation information. Objectives include:

- facilitate safe and secure navigation of vessels with regards to hydrographic, meteorological and navigational information and risks;

- facilitate vessel traffic observation and management from shore/coastal facilities, where appropriate;

- facilitate communications, including data exchange, between ship to ship, ship to shore, shore to ship, shore to shore and other users;

- provide opportunities for improving the efficiency of transport and logistics;

- support the effective operation of contingency response and search and rescue services;

- demonstrate defined levels of accuracy, integrity and continuity appropriate to a safety-critical system;

- integrate and present information onboard and ashore through a human-machine interface which maximizes navigational safety benefits and minimizes any risks of confusion or misinterpretation on the part of the user;

- integrate and present information onboard and ashore to assist in managing the workload of the users, while also motivating and engaging the user and supporting decision-making;

- incorporate training and familiarization requirements for the users throughout the development and implementation process;

- facilitate global coverage, consistent standards and arrangements, mutual compatibility and interoperability of equipment, systems, symbology, and operational procedures, so as to avoid potential conflicts between users; and

- support scalability, to facilitate use by all potential maritime users.

2.2. BASIC PREMISE AND CAVEATS

The basic, over-riding premise of this Guideline is that:

Shipborne and shore-based equipment, systems and services should portray Marine Aids to Navigation (AtoN) related information to all users (both onboard and ashore) in a consistent manner.

However, there are several caveats:

- How information is portrayed onboard or ashore depends on the particular tasks, function, and needs of the user.
- The current situation or task-at-hand can influence the amount of information necessary to make informed decisions.
- The portrayal of information onboard ships or ashore does not necessarily have to be identical but should have like meaning.

Considering the similarity between ship-side and shore-based related strategies in terms of technical and equipment portrayal standards, the IMO prescriptive documents play an important role in setting the portrayal standards for shore-based navigation. In particular, IMO Resolution *MSC.466(101) The Performance Standards For The Presentation Of Navigation-Related Information On Shipborne Navigational Displays* updated the performance standards for navigation-related information display in onboard navigation display on 14 June 2019. This resolution, which addresses standards for the description of metadata (Part 4.0) and equipment (Part 5.0), has significant implications for the synchronization of standards for data and information portrayal.

3. GENERAL REFERENCES

IMO and IEC have adopted several standards (i.e., references) that provide general guidance related to presentation, display or portrayal of navigation-related information. Based on the premise that "shipborne and shore-based equipment, systems, and services should portray navigation-related information to all users (both onboard and ashore) in a consistent manner",[1] much of this guidance is relevant to the presentation, display or portrayal of navigation related information at shore-based facilities as well (e.g., at a VTS centre or port authority).

The following sections provide a brief summary of the key contents of each standard.

IMO Resolution MSC.191 (79), Performance Standards for the presentation of navigation-related information on shipborne navigational display, 6 December 2004.

The purpose of this standard is to "harmonize the requirements for the presentation of navigation-related information on the bridge of a ship to ensure that all navigational displays adopt a consistent human machine interface philosophy and implementation." Further, it supplements and, in case of conflict, takes priority over presentation requirements of the individual performance standards. This standard also includes the consistent use of navigational terms, abbreviations, colours and symbols, as well as other presentation characteristics. This standard also addresses the presentation of information related to specific navigational tasks by recognising user-selected presentations in addition to presentations required by the relevant individual performance standards.

IMO Resolution MSC.1/Circ.1593 Interim guidelines for the harmonized display of navigation information received via communication equipment, 25May2018.

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[1] Terms Of Reference for IALA e-Navigation Committee, Information Portrayal Working Group(WG6).

IMO SN1/Circ.243/Rev.2, Guidelines for the presentation of Navigation-related symbols, terms and abbreviations, 14 JUNE 2019.

The purpose of these guidelines is "to provide guidance on the appropriate use of navigation-related symbols to achieve a harmonized and consistent presentation."

There are two Annexes:

- Annex 1 - Guidelines for the Presentation of Navigation-related Symbols; and
- Annex 2 - Guidelines for the Presentation of Navigation-related Terms and Abbreviations.

IMO MSC/Circ.982, Guidelines on Ergonomic Criteria for Bridge Equipment and Layout, 20 December 2000.

This guideline was developed to facilitate a successful ergonomic design of the bridge and the equipment on the bridge in order to improve the reliability and efficiency of navigation. The Guideline contains ergonomic requirements as well as a user-centred design for a functionally-oriented bridge layout to support watch-keeping personnel in their tasks. While these guidelines were primarily intended for shipborne equipment, much of the guidance applies to shore-based workstations as well.

IEC 60945, Maritime navigation and radiocommunication equipment and systems- General Requirements, Methods of testing and required test results, Edition 4, 2002. (Corrigendum 1 in April,2008).

This standard specifies the general requirements, methods of testing, and required test results, for shipborne radio navigation equipment and electronic navigation aids in support of IMO Resolution *A.694.* More specifically, it specifies minimum performance requirements for equipment that are required carriage under SOLAS 1974, Chapter V. Key sections that pertain to the presentation, display or portrayal of navigation-related information include:

- Ergonomics and Human Machine Interface (HMI)
- Screen display and indicators
- Alarms and Indicators
- Illumination

IEC 62288, Maritime navigation and radiocommunication equipment and systems - Presentation of navigation-related information on shipborne navigational displays - General requirements, methods of testing and required test results, Edition 3.0, 2021.

This standard specifies the general requirements, methods of testing, and required test results for the presentation of navigation-related information on shipborne navigational displays in support of IMO resolution *MSC.191(79).* This standard also addresses ergonomic criteria published in circular *MSC/Circ.982.*

4. OPERATIONAL REQUIREMENTS

The primary factor that influences the portrayal of navigation information is the operational situation. In turn, what information is required depends on the voyage requirements, situational needs, operational perspective (shipborne or shore-based), and levels of information.

4.1. VOYAGE REQUIREMENTS

The type or amount of navigation-related information that will be portrayed by shipborne or shore-based users falls into two main categories: strategic and tactical overviews.

- Strategic overview is associated with maintaining overall situational awareness within the surrounding areas. This can include both monitoring and active engagement.

- Tactical overview involves more direct action and decision-support within the immediate or designated area.

4.2. SITUATIONAL NEEDS

"Current situation" includes the various phases of navigation during a voyage and can be related to the prevailing conditions. Examples of different navigation phases include open-ocean, coastal, and approach. Prevailing conditions can include, but are not limited to, traffic density, alerts, time of day ship movement, and meteorological and hydrological conditions.

Regardless of the current situation, the *task-at-hand* can be the determining factor in deciding what information is crucial in making informed decisions. This includes time-critical information necessary for grounding avoidance, collision avoidance, or maintaining overall situational awareness. Information based on a planning system may also be part of this process.

Special attention should be given to Maritime Safety Information and emergency warning systems regarding EPIRB, MOB devices, and other devices providing emergency alert functionality.

Also, communication capabilities such as VHF, AIS, Mobile AtoN, etc. should be considered according to the situational needs.

General principles for the presentation of symbology on shore-based displays:

- The international onboard symbology and chart standards should be used as much as possible.

- Symbology already identified for existing onboard use should not normally be assigned a different meaning for shore-based purposes; however, these symbols may be adapted to suit specific requirements.

- Any adaptations to symbology must not modify the agreed standard for data transfer.

- The clarity of the presentation and operator workload should be carefully considered.

4.3. CATEGORIES OF INFORMATION

Three different categories of navigational information, both at the present time and likely in the future, could be considered. While these categorizations are focused on ship-based information and not related to shore-based portrayal, the knowledge of these potential categories may be considered useful when aligning portrayals on shore with those on ship:[2]

1   Required by IMO – Information on systems required onboard ships mainly through SOLAS Chapter IV and SOLAS Chapter V.

2   Required by Flag or Port States in national waters – Additional information may be required by individual Flag or Port States due to individual conditions in those areas or regions.

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2   ' e-Navigation: A vision and its Practical Implementation', Dr. Andy Norris, (IALA eNAV11/11/4).

3   Innovative or future applications – New innovations and systems in development, for example during test bed execution, may provide additional information not mandated but useful for the development of IALA related navigation applications.

5.   BASIC GUIDANCE ON PORTRAYAL

5.1.   SIX BASIC WAYS

There are six (6) basic ways to visually portray any type of IALA related navigation information.

1   Alpha-numeric

2   Graphical

3   Point, line or polygon

4   Symbol

5   Geo-spatial

6   Imagery

The following sections provide basic guidance with an example for each.

5.1.1.   ALPHA-NUMERIC

Unless there is a need to display pre-formatted text or numbers, use the best readable font taking into account Human Centred Design (HCD) as referred to in *MSC-MEPC.2/Circ.12/Rev.2* and *MSCMEPC.2/Circ.13* concerning Human Element Analysing Process (HEAP) as well as *MSC.1-Circ. 1512 Guideline on Software Quality Assurance and Human-Centered Design for e-Navigation (July 2015).*

5.1.2.   GRAPHS

In some situations, a time-series graph may be preferred instead of a table format. In particular, it is a useful way to show both predicted and real-time information (e.g., water levels); as well as a useful means to indicate trends (e.g., rising or falling water levels).

5.1.3.   POINT, LINE OR POLYGON

This type of information is often displayed as an overlay on chart or map-related background. An Area Notice that is transmitted via AIS Application Specific Message is one example.

5.1.4.   SYMBOL

Similar to the guidance stated in *IMO SN.1/Circ.290*, the following guiding principles apply to the display of symbols or icons:

- Use consistent symbology across all displays

- Uniqueness – only one possible meaning

- Non-ambiguous – ability to determine differences (i.e., distinct)

- Intuitively obvious – an easily recognized symbol, icon, or pattern

- Have a basic symbol for different categories. Further attributes should be enhancements (not changes) to the basic symbol.

IMO Resolution MSC.191 (79), Performance Standards for the presentation of navigation-related information on shipborne navigational display, 6 December 2004.

IMO MSC.1/Circ.1593, Interim guidelines for the harmonized display of navigation information received via communication equipment, 25May2018.

IMO ResolutionMSC.466(101), Amendments to the Performance Standards for the presentation of navigation-related information on shipborne navigational display,14 June 2019 (Resolution MSC.191(79)) (shipborne navigational displays on the bridge of a ship for radar equipment, electronic chart display and information system (ECDIS) and integrated navigation systems (INS) installed on or after 1 January 2024, all other navigational displays on the bridge of a ship installed on or after 1 July 2025).

IEC 62288, Maritime navigation and radiocommunication equipment and systems - Presentation of navigation-related information on shipborne navigational displays - General requirements, methods of testing and required test results, Edition 2.0, July 2014.

5.1.5.   GEO-SPATIAL

Many types of geo-spatial information are best provided in the form of a map or chart. The electronic chart display of an ENC in ECDIS is one example. Another example would be a radar display with chart facilities.

5.1.6.   IMAGERY

This is a broad category that includes various types of images. A still photograph of a fixed or floating AtoN is one example. Other examples include radar or satellite imagery of sea ice weather conditions. A video recording/replay of a past or simulated voyage is a type of dynamic imagery. There is also increasing interest in the use of 3-D imagery.

5.2.   GUIDING PRINCIPLES

In order to achieve closer alignment in the portrayal of IALA related navigation information for both shipborne and shore-based users, there are several guiding principles to consider:

- The portrayal of information depends on the particular tasks, function, and needs of the various users on ship and ashore.

- Critical and non-critical Information should be able to be categorized for the various users as required.

- The *portrayal of IALA information onboard ships or ashore does not have to be identical*. However, there is benefit to all users if information is displayed in a consistent and unambiguous manner. This includes the use of standard symbology, icons, and colour schemes as to be defined in IHO GI Registry (S-100 Registry).

- Displaying too much supplemental information can obscure critical information or lead to confusion. As such users should be able to determine the volume or types of non-critical information on the display for their operating tasks and navigational decision making processes.

- The portrayal should allow a user to control the system, input data and take action efficiently.

- Where possible, the portrayal should indicate invalid and erroneous user input.

- The portrayal should be able to display and log significant events.

- The portrayal should support the playback of recorded data.

5.3. EXAMPLES OF PORTRAYAL

Examples of portrayal are provided in ANNEX A to this guideline.

It should be noted that the examples of portrayal referred to may be subject to change due to developments.

6. CURRENT PRESENTATION/DISPLAY STANDARDS

The following is a list of shipborne and shore based equipment, systems, and services based on what is mentioned in existing SOLAS V/19 & 20, IMO MSC, IMO NAV,[3] and IALA related documents. The existing standards should be considered "minimum standards" in terms of what is required;

- It should be noted that the existing standards should not be reviewed in isolation but collectively with all relevant standards to gain the full picture (e.g., IEC and ISO standards);

- Besides the below existing standards, other aspects (e.g., Data Quality assurance, availability and reliability of systems and signals) and as a result of development or increasing user needs (HCD), may be considered.

6.1. ECDIS

IMO MSC.232(82), Revised performance standards for electronic chart display and information systems (ECDIS), 5 December 2006.

This performance standard applies to ECDIS equipment carried on all ships including dedicated stand-alone workstations or multi-function workstations as part of an INS and the presentation requirements set out in resolution MSC.191(79)

IMO Resolution MSC.466(101), Amendments to the Performance Standards for the presentation of navigation-related information on shipborne navigational display,14 June 2019 (Resolution MSC.191(79))

IHO S-52, Specifications for Chart Content and Display aspects of ECDIS Edition 6.1.1, October2014

IHO S-52 contains several parts, and all pertain to the presentation/display of chart and navigation-related information.
IHO *S-100 IHO Universal Hydrographic Data Model Edition 4.0.0, December 2018.*

IHO S-100 part 9 and part 9a specifies the portrayal model for defining and organizing symbols and portrayal rules necessary to portray S-100 product Features.

IHO S-101 IHO S-101 ENC Product Specification Edition 1.0.0, December 2018

IEC 61174, Maritime navigation and radiocommunication equipment and systems – Electronic chart display and information system (ECDIS) – Operational and performance requirements, methods of testing and required test results, Edition 4, August 2015.

This standard specifies the performance requirements, methods of testing and required test results of equipment conforming to performance standards adopted by the IMO in resolution MSC.232(82). This standard is also

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[3] IMO NAV 54-WP.2, Annex 1 (Existing Components of e-Navigation).

associated with IMO resolution A.694(17) and IEC 60945. This standard includes extracts from IHO S-52 when they are applicable to ECDIS.

6.2.   RADAR

IMO Resolution MSC.192(79), Revised Recommendation on Performance Standards for Radar Equipment, 6 December 2004.

This Performance Standard applies to all ship-borne radar installations as mandated by the 1974 SOLAS Convention for this purpose, radar should provide the integration and display of radar video, target tracking information, positional data derived from own ship's Electronic Position Fixing System (EPFS) and geo-referenced data.

IEC 62388, Maritime navigation and radiocommunication equipment and systems –Shipborne radar – Performance requirements, methods of testing and required test results, Edition 2.0 Corrigendum 1 12th February 2014

IMO resolution A.823(19), Performance Standards for automatic radar plotting aids, 23 November 1995

This performance standard deals with the use of Automatic Radar Plotting Aids (ARPA) to improve the standard of collision-avoidance at sea.

6.3.   AIS

IMO Resolution MSC.74(69), Annex 3, Performance Standards for a Universal Shipborne Automatic Identification System (AIS), 19 May 1998.

IMO Resolution A.1106(29), Revised Guidelines for the On board Operational Use of Shipborne Automatic Identification Systems (AIS), 2 December 2015.

IMO SN/Circ.217, Display of AIS Target Information, 11 July 2001.

This guideline deals with the graphical presentation and display of AIS target data in stand-alone or integrated navigational aids or systems.

IMO SN/Circ.236, Guidance of the Application of AIS Binary Messages, 28 May 2004.[4]

AIS can also be used as a means to communicate Binary Messages for certain types of specific applications. Binary Messages may provide a variety of capabilities for pre-defined information packages.

This standard includes seven (7) types of messages that were to be used during a four-year trial period. This standard was superseded by IMO SN.1/Circ.289.

IMO SN.1/Circ.289, Guidance on the Use of AIS Application-Specific Messages, 2 June 2010.

Formerly called AIS Binary Messages, AIS Application-Specific Messages (ASMs) are transmitted and received by shipborne mobile AIS devices and AIS base stations. Over 19 AIS message types are described capable of conveying a wide range of hydrographic, meteorological, VTS, area notice, and route information. The display, generation and transmission of the information transmitted by AIS Application-Specific Messages requires external hardware and dedicated software in addition to the AIS equipment (e.g., ECDIS, ECS or VTS display).

IMO SN.1/Circ.290, Guidance for the Presentation and Display of AIS Application-Specific Message information, 2 June 2010.

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4   As a result of the development of AIS during the last decade the use of the wording 'Binary Messages' is more commonly referred to as 'Application Specific Messages (ASM)'.

This standard provides general guidance on the presentation and display of AIS ASMs that are contained in IMO SN.1/Circ.289. It lists various types of shipborne equipment (and their associated standards) that could be used to display AIS ASMs. In addition to describing some guiding principles, this standard provides a number of portrayal examples for AIS ASMs.

IALA Guideline G1095 on Harmonized implementation of Application-Specific Messages (ASMs), Edition 1, May 2013.

This Guideline provides guidance on the implementation and use of ASMs.

In addition to the messages in ITU and IMO documents, competent authorities have developed their own regional messages for use in addressing specific requirements they have identified. In some cases, different authorities have developed separate messages to address similar requirements. This has led to a lack of communication compatibility where ship board equipment may be required to be able to decode/encode several different ASMs in order to receive/send the same information (e.g., met/hydro information).

This Guideline addresses actions that are intended to aid harmonization, including the establishment and use of the IALA AIS ASM collection. The intended use of the collection is to promote harmonization through:

- a catalogue of messages for entities to consider for use to meet identified requirements; and

- providing manufacturers with a reference for messages they may implement in their equipment.

While portrayal is outside the scope of this guideline, IMO has also issued SN.1/Circ. 290 *Guidance for the Presentation and Display of AIS Application-Specific Messages Information.*

6.4.   INS

IMO Resolution MSC.86(70), Annex 3, Performance Standards for Navigational Equipment, 8 December 1998

IMO Resolution MSC.252(83), Performance Standards for an Integrated Navigation System (INS), 8 October 2007

The purpose of an Integrated Navigation System (INS) is to enhance the safety of navigation by providing integrated and augmented functions to avoid geographic, traffic and environmental hazards. By combining and integrating functions and information the INS provides "added value" for the operator to plan, monitor and/or control safety of navigation and progress of the ship. The INS supports the current operational mode and situational awareness. The INS aims to ensure that by taking human factors into consideration, the workload is not only kept within the capacity of the operator, but system functionality also complements and accounts for mariner capabilities and any existing situational limitations in order to enhance safe and expeditious navigation. INS functions that have particular relevance to IALA include:

- Route monitoring

- Collision avoidance

- Alert management

- Special manoeuvres

Functional requirements for INS displays include:

- All essential information should be displayed clearly and continuously

- Additional navigational information may be displayed, but should not mask, obscure or degrade essential information required for the display by its primary task, as specified in these performance standards

- The INS should be capable of displaying data available from the sensors

- The information should be displayed together with the indication of its source (sensor data, result of calculation or manual input), unit of measurement and status, including mode

- Display and update of essential information available in the equipment as well as safety-related automatic functions should not be inhibited due to operation of the equipment

- Default display configurations and operational modes including user-defined display modes (i.e., pre-defined or user defined)

- Mode and status awareness

- Information display

Guidance is also given related to Human Machine Interface (HMI):

- The portrayal should present information to the user intuitively;

- The portrayal should facilitate achieving an appropriate situational awareness and support effective decision-making;

- The portrayal should be designed for efficiency of operation and avoidance of information overload;

- Physical conditions and ergonomics are very important as are workload, shift arrangements and reserve capacity; and

- Human-centred design (HCD) and an ergonomic approach should be followed.

MSC.1/Circ.1512 defines HCD as "an approach to system design and development that aims to make interactive systems more usable by focussing on the use of the system; applying human factors, ergonomics and usability knowledge and techniques." More detailed information can be found in *MSC.1/Circ.1512.*

*IMO Resolution MSC.466(101), Amendments to the Performance Standards for the presentation of navigation-related information on shipborne navigational displa*y,14 June 2019 (IMO Resolution MSC.191(79)).

IMO Resolution MSC/Circ.982, Guidelines on Ergonomic Criteria for Bridge Equipment and Layout, 20 December 2000.

IEC 61924-2 Maritime navigation and radiocommunication equipment and systems - Integrated navigation systems (INS) - Part 2: Modular structure for INS - Operational and performance requirements, methods of testing and required test results,2021 Edition 2.0.

This standard specifies the minimum requirements for the design, manufacture, integration, methods of testing and required test results for an integrated navigation system (INS) to comply with the IMO requirements of Resolution *MSC 252(83)*. Specific guidance related to presentation and display considerations is provided in:

- Section 6.4 - Functional requirements for displays of INS

- Section 6.5 - Human Machine Interface (HMI)

- Section 7 (Module C) - Alert Management

- Annex D – Display Default Configurations

7. EXAMPLES OF ITEMS THAT MAY CONTRIBUTE TO A GOOD PORTRAYAL

The overarching purpose of a good portrayal is to improve safety and efficiency. To reach this goal, the following non-exhaustive list of items may be considered when determining user requirements:

- A defined area of interest

- Information that is provided when and where needed

- Standardization of portrayal configuration, which supports consistent application of operational procedures

- Role definition capabilities to support different portrayal profiles, such as Operators, Supervisors, and/or other users as required

- Ergonomic HMI considerations with the goal of reducing and mitigating operator fatigue, distraction, and other factors that may negatively impact overall safety and efficiency

- Minimizing non-essential administrative tasks in order to support the ability of the operator to focus upon critical tasks

- Where possible, automatic validation of data integrity should occur prior to presentation

- Minimal steps needed to navigate the shore-based equipment in order to retrieve the necessary information to assist in real-time decision making

- In a portrayal, a distinction should be made between operational alarms (related to navigation safety) and system alarms (related to technical deficiencies with the operating system). These alarms should be configured and displayed in an appropriate manner to ensure that they are relevant to users

- A log of warnings and alarms should be maintained and readily accessible to the user

- A portrayal should not restrict the innovation of equipment manufacturers and unnecessarily interfere with the individual operational and risk-based requirements of individual shore-based Authorities

- A portrayal may also contain considerations regarding system failures and recovery, and if possible/appropriately describe business continuity measures

- A portrayal should consider local regulations considering storage and access of data

- A portrayal should consider measures to be taken against unauthorized access to the system

- A portrayal should have some flexibility to consider advanced technologies that may be adopted in the future for AtoN requirements and management (ARM), ships, VTS, etc..

8. DEFINITIONS

Unless otherwise defined below, the definitions of terms used in this Guideline can be found in the International Dictionary of Marine Aids to Navigation (IALA dictionary) and were checked as correct at the time of going to print. Where conflict arises, the IALA Dictionary should be considered as the authoritative source of definitions used in IALA documents.

Specifically, however, for this Guideline, there is benefit in using agreed terminology, in order to have a clear understanding of what various terms mean. This is particularly important when making a distinction between such terms as data and information, as well as display, presentation and portrayal. The relevant terms are included in Appendix 1.

9. ABBREVIATIONS

AIS	Universal Shipborne Automatic Identification System
ARPA	Automatic Radar Plotting Aid
ASM	Application Specific Message
AtoN	Marine Aids to Navigation
Circ.	Circular (IMO document)
COMSAR	Sub-Committee on Communications and Search and Rescue (IMO)
ECDIS	Electronic Chart Display and Information System
ECS	Electronic Chart System
EPFS	Electronic Position Fixing System
ENC	Electronic Navigation Chart
GI	Geospatial Information (IHO)
GPS	Global Positioning System
HCD	Human Centred Design
HEAP	Human Element Analysing Process
HMI	Human Machine Interface
IEC	International Electrotechnical Commission
IHO	International Hydrographic Organization
IMO	International Maritime Organization
INS	Integrated Navigation System
ISO	International Organization for Standardization
MSC	Maritime Safety Committee (IMO)
NAV	Sub-Committee on Safety-of-Navigation (IMO)
SENC	System Electronic Navigation Chart
SN	Safety of Navigation (IMO)
S-52	Standard and the portrayal of colours and symbols in ECDIS (IHO)
S-57	Transfer Standard for Digital Hydrographic Data (IHO)
S-100	Universal Hydrographic Data Model (IHO)
SOLAS	International Convention for the Safety of Life at Sea

| VTS | Vessel Traffic Services |
| WG | Working Group |

10.   REFERENCES

[1]   IMO. Resolution MSC.191 (79) Performance standards for the presentation of navigational related information on shipborne navigational displays.

[2]   IMO. ResolutionMSC.1/Circ.1593 Interim Guidelines for the Harmonized Display of Navigation Information Received via Communication Equipment.

[3]   IMO. Resolution MSC.466 (101) Amendments to the Performance Standards for the presentation of navigation-related information on shipborne navigational display.

[4]   IMO. Resolution MSC.Rev.232(82) Adoption of the revised performance standards for electronic chart display and information systems (ECDIS).

[5]   IMO. Resolution MSC.192(79) Adoption of the Revised performance standards for radar equipment.

[6]   IMO. Resolution MSC.74(69), Annex 3 Recommendation on Performance Standards for An Universal Shipborne Automatic Identification System (AIS).

[7]   IMO. Resolution MSC.252(83) Revised performance standards for integrated navigation systems (INS).

[8]   IMO. Resolution MSC/Circ.982 Guidelines on ergonomic criteria for bridge equipment and layout.

[9]   IMO. Resolution MSC.86(70) New and amended performance standards for navigational equipment.

[10]   IMO. Resolution A.694(17) General requirements for shipborne radio equipment forming part of the global maritime distress and safety system (GMDSS) and for electronic navigational aids.

[11]   IMO. Resolution A.823(19) Performance standards for automatic radar plotting aids (ARPAs).

[12]   IMO. Resolution A.1106(29) Revised Guidelines for the Onboard Operational Use of Shipborne Automatic Identification Systems (AIS).

[13]   IMO. MSC-MEPC.2/ Circ.12/Rev.2 Revised Guidelines for Formal Safety Assessment (FSA) for use in the IMO Rule-making Process.

[14]   IMO. MSC-MEPC.2/ Circ.13 Guidelines for the Application of the Human Element Analysing Process(HEAP) to the IMO Rule-making Process.

[15]   IMO. SN.1/Circ.243/Rev.2 Amended Guidelines for the Presentation of navigation-related symbols, terms and abbreviations.

[16]   IMO. SN/Circ.217Interim Guidelines for The Presentation and Display of AIS Target Information.

[17]   IMO. SN/Circ.236 Guidance of the Application of AIS Binary Messages.

[18]   IMO. SN.1/Circ.289 Guidance on the Use of AIS Application-Specific Messages.

[19]   IMO. SN.1/Circ.290 Guidance for the Presentation and Display Of AIS Application-Specific Messages Information.

[20]   IEC. 62288, series Maritime navigation and radiocommunication equipment and systems - Presentation of navigation-related information on shipborne navigational displays - General requirements, methods of testing and required test results.

[21]   IEC. 60945, series Maritime navigation and radiocommunication equipment and systems – general requirements – methods of testing and required test results.

[22] IEC. 61174, series Maritime navigation and radiocommunication equipment and systems – Electronic chart display and information system (ECDIS) – Operational and performance requirements, methods of testing and required test results.

[23] IEC. 62388, series Maritime navigation and radiocommunication equipment and systems –Shipborne radar – Performance requirements, methods of testing and required test results.

[24] IEC. 61924-2, series Maritime navigation and radiocommunication equipment and systems - Integrated navigation systems (INS) - Part 2: Modular structure for INS - Operational and performance requirements, methods of testing and required test results.

[25] IHO. S-52, series Specifications for chart content and display aspects of ECDIS.

[26] IHO. S-100, series IHO Universal Hydrographic Data Model.

[27] IHO. S-101, series IHO S-101 ENC Product Specification.

[28] IALA. Recommendation R0125 (V-125) The Use and Presentation of Symbology at a VTS Centre.

[29] IALA. Recommendation R0128 (V-128) Operational and Technical Performance of VTS Systems.

[30] IALA. Guideline 1095 Harmonized implementation of Application-Specific Messages (ASMs).

[31] IALA. Recommendation R0127 (V-127) VTS Operations.

[32] IALA. Recommendation R0119 (V-119) Establishment of VTS.

[33] IALA. Guideline 1111 Preparation of Operational and Technical Performance Requirements for VTS Systems.

(Chapter10: VTS Human/Machine Interface and Chapter 11: Decision Support).

[34] Report of the IALA Workshop on the Portrayal of Data and Information at a VTS" [Bremen, 2013].

[35] Report of the IALA Workshop on Human Factor and Ergonomics in VTS" [Gothenburg 2015].

[36] IALA. Recommendation R1014, Edition 1.1 Portrayal of VTS Information and Data.

[37] IMO. MSC.1-Circ 1512 Guideline on Software Quality Assurance and Human-Centered Design for e-Navigation.

APPENDIX 1   DEFINITIONS OF PORTRAYAL RELATED TERMINOLOGY

The following terms are defined based on what is contained in widely recognized dictionaries or technical references. This includes the Oxford English Dictionary,[5] Merriam Webster Dictionary,[6] IALA Dictionary, IHO Dictionary,[7] and relevant ISO standards.

For ease of reference, the following terms are listed in alphabetical order. Further guidance is also provided by way of an example or context of use of these terms associated with the portrayal of IALA related information. Since there are differences in the way some terms are defined, grey highlights indicate the definition(s) that are used in conjunction with this Guideline.

Consistent

> *Oxford English Dict. - unchanging in effect over a period of time.*
>
> *Merriam-Webster Dict. – showing steady conformity to character; constant.*
>
> Example/context: The use of *consistent* symbology across all displays helps to reduce misunderstanding and confusion.

Data

> *Oxford English Dict. – computing the quantities, characters, or symbols on which operations are performed by a computer, being stored and transmitted in the form of electrical signals and recorded on magnetic, optical, or mechanical recording media.*
>
> *Merriam-Webster Dict. – factual information output by a sensing device that must be processed to be meaningful; information in numerical form that can be digitally transmitted or processed.*
>
> Example/context: *data* is a raw collection of unprocessed facts.

Display

> *Oxford English Dict. - (of a computer or other device) show (information) on a screen. - an electronic device [used] for the visual presentation of data.*
>
> *Merriam-Webster Dict. – show; an electronic device that presents information in visual form.*

Example/context: An ECDIS *display is* capable of portraying both chart and navigation-related information.

Feature

> *ISO 19117 - abstraction of real-world phenomena.*

Feature attribute

> *ISO 19117 - characteristic of a feature.*

Geographic information

> *ISO 19117 - information concerning phenomena implicitly or explicitly associated with a location relative to the Earth.*

Icon

Oxford English Dict. – a representative symbol of something; a graphic representation on a [computer] screen.

Merriam-Webster Dict. – a graphic symbol whose form suggests it meaning; a graphic symbol on a computer screen.

ISO 80416 – a graphic symbol with a particular meaning used to transmit information independently of language presented on a screen or display.

Example/context: The own-ship *icon* (i.e., symbol) on ECDIS represents the location of the vessel in real-time.

Information

Oxford English Dict. – Computing data [that is] processed, stored, or transmitted by a computer.

Merriam-Webster Dict. – the communication or reception of knowledge or intelligence.

Example/context: Data becomes *information* when it is processed and presented in a manner which can be better understood by humans.

Intuitive

Oxford English Dict. – instinctive; based on what one feels is true, even without conscious reasoning.

Merriam-Webster Dict. – known or perceived by intuition; readily learned or understood.

Example/context: Showing water as blue and land as orange/brown is an *intuitive* electronic chart colour scheme.

Obvious

Oxford English Dict. – easily perceived or understood; clear, self-evident or apparent.

Merriam-Webster Dict. – easily discovered, seen or understood; apparent.

Example/context: The use of blue for water and orange/brown colours for land is both intuitive and *obvious* as to meaning.

Portrayal

Oxford English Dict. – a description or depiction of something in a particular way (example: realistic portrayal of a real-world object).

Merriam-Webster Dict. – act or process of portraying or depicting; representation synonyms: definition, delineation, depiction, picture, portrait, rendering.

ISO 19117 – presentation of information to humans.

IMO SN.1.Circ.290 - the process of representing or depicting (i.e., showing an example of what is or could be).

Presentation

Oxford English Dict. – the manner in which something is displayed; the method by which radio, navigation or radar information is given to the operator.

Merriam-Webster Dict. – a symbol or image that represents something.

Example/context: The IHO S-52 Colours and Symbols *Presentation* Library is a prescriptive standard for ECDIS.

Symbol

Oxford English Dict. – a thing that represents or stands for something else; a mark or character used as a conventional representation of an object, function, or process.

Merriam-Webster Dict. – an arbitrary or conventional sign to represent operations, quantities, elements, relations or qualities.

ISO 80416 – A graphical symbol is a visually perceptible figure used to transmit information independently of language.

Example/context: There should be a clear difference in the type of *symbol* used to represent something that physically exists in the real-world (e.g., physical) versus a "virtual" representation.

Unambiguous

Oxford English Dict. – not open to more than one interpretation.

Merriam-Webster Dict. – clear, precise; apparent; unmistakable, straight-forward.

Example/context: the use of both "standard" and "simplified" symbols could lead to *ambiguity*.

Uniform

Oxford English Dict. – not changing in form or character; remaining the same in all cases and at all times; of a similar form or character to another or others.

Merriam-Webster Dict. – having always the same form, manner, or degree; not varying or variable; consistent; constant.

Example/context: Portraying information in a *uniform* manner reduces confusion as to meaning or intent.

Uniqueness

Oxford English Dict. – being the only one of its kind; unlike anything else.

Merriam-Webster Dict. – distinctively characteristic.

User selected presentation

IMO MSC 191(79) - An auxiliary presentation configured by the user for a specific task-at-hand. The presentation may include radar and/or chart information, in combination with other navigation or ship related data.

Data vs. Information → Portrayal

In addition to specific, individual definitions, it is important to make a clear distinction between what is "data" and what is "information". In the strictest sense, data can be simply a raw collection of facts, which can exist in any form without meaning, sequence or usability.

In terms of shore-based equipment, systems and services, "data" is usually in alpha-numeric form that is digitally transmitted via electronic means. Some examples include navigation sensor data (e.g., GPS and radar) or AIS Application Specific Messages.

However, when this data is transformed into a human-readable format (i.e., portrayal) it then becomes "information" capable of being understood by shipborne and shore-based users. This information can be portrayed in a variety of ways, including alpha-numeric text, point, line or polygon, symbols or icons, and geo-spatial (map or chart).

ANNEX A   PORTRAYAL EXAMPLES (specific to shore-based systems)

Types of shore-based tasks (examples) that should be portrayed.

- Do a command
  - Radar acquire target
  - Identify a radar track
- Modify data
  - Create or modify a vessel trip
- Manage the portrayal
  - Chart pan, zoom in, zoom out, etc.
  - Perform measurements ; CPA, Distance,…,
  - Handling of Alarms (grounding etc.) received
  - Handling from Alarms received by MOB's etc.
  - Handling of (system)errors on inputs (radar, AIS, ..)
  - Filtering of information
  - Managing AtoN
  - Managing (temporary) obstructions
- Support tasks
  - Recent information playback
  - Reporting dangerous situations/accidents
- Auxiliary tasks
  - Shift on and shift off operators
  - Maintenance tasks and diagnostics
  - Sensor controls
  - Housekeeping tasks

Examples of new applications or systems that may be related to portrayal of IALA information and data were compiled in conjunction with the preparation of this Guideline and can now be found at:

- https://www.iala-aism.org/technical/information-portrayal/portrayal-examples/
- https://www.iala-aism.org/technical/information-portrayal/iala-portrayal-guideline/