S-11 PART C

GUIDANCE FOR THE COORDINATION AND MANAGEMENT OF THE DEVELOPMENT OF S-100 ELECTRONIC NAVIGATIONAL DATA SERVICES (other than S-101 ENC) IN REGIONAL HYDROGRAPHIC COMMISSIONS

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1. PREFACE

1.1 The International Hydrographic Organization (IHO) was formed in 1921 as the result of a desire for greater standardization of nautical charts and associated publications and consequently for greater safety of mariners. It was felt that this standardization could be achieved in such a way that language and symbol differences would be minimized and that a chart produced by one country would be perfectly comprehensible to a navigator from another country.

1.2 Standardization as one of the main goals leads to a significant number of documents. Seeking a sufficient library structure, the IHO has arranged their publications under the following groups:

- B - Bathymetric Publications (Mainly related to GEBCO).
- C - Capacity Building Publications
- M - Miscellaneous Publications (including Basic Documents)
- P - Periodic Publications
- S - Standards and Specifications

1.3 When S-100 ECDIS is available, it is necessary that S-11 also focuses on harmonisation of products falling within an Electronic Navigational Data Service (ENDS).

1.4 Bearing in mind that Part A of the S-11 standards provide guidance for the Preparation and Maintenance of the S-57 and S-101 ENC Schemes, the S-101 ENC scheme is excluded from Part C. The ENC scheme could be used as reference for ENDS provision coordination, though.

1.5 S-124 and S-129 are included in an Informative Section to acknowledge their relevance and potential interaction with other S-100-based products. These products are not typically provided or coordinated by Hydrographic Offices and their inclusion is intended to raise awareness of their operational context and interoperability considerations, without implying implementation responsibility or oversight by Regional Hydrographic Commissions (RHCs).

2. PART C: SECTION 100, GENERAL GUIDANCE FOR THE COORDINATION AND MANAGEMENT OF THE DEVELOPMENT OF S-100 ELECTRONIC NAVIGATIONAL DATA SERVICES (other than S-101 ENC) IN RHCs

1. INTRODUCTION

1.1 Regional Hydrographic Commissions (RHC), the creation of which was encouraged under IHO Resolution 2/1997 (as amended), bring together those Member States having common regional interests in nautical charting, research or data collection, provision of Electronic Navigational Data Services (ENDS), so that harmonized solutions from various national approaches may be reached.

1.2 RHC are encouraged to appoint a regional S-100 Coordination Working Group led by an S-100 Regional Coordinator. The Working Group will focus on coordinating S-100 Products schemes and collaborate closely with other S-100 relevant bodies to ensure a unified approach between S-100 related initiatives. S-100 Coordination Working Group members are usually related to Member States of the relevant RHC.

The S-100 Coordination Working Group advises, reports and provides recommendations to the relevant RHC in order to:

- resolve coverage overlap and gap cases within the concerned region;
- provide high-quality data consistency at regional level; and
- support the provision of coordinated end-user ENDS within their region.

2. OBJECTIVE AND CONCEPT

2.1 The Electronic Navigational Data Service (ENDS) is a special-purpose database compiled from nautical charts and publications data. It fulfils the following purposes:

- standardized in terms of content, structure and format;
- issued for use with ECDIS by or on the authority of a government, authorized hydrographic office or other relevant government institution;
- conforming to IHO-standards; and
- designed to meet marine navigation and carriage requirements in accordance with SOLAS regulations V/19 and V/27. The ENDS's navigational base layer is the electronic navigational chart (ENC); Definition from IMO Resolution MSC.530(106) / Rev.1.

A detailed description of the ENDS can be found in S-66.

2.2 Certain ENDS products could be used as stand-alone products outside ECDIS. They are not considered as ENDS in this case. Proportionate information is provided in the relevant ENDS product section.

3. PROCEDURE

3.1 ENDS Provision Area Selection

3.1.1 The ENDS coverage areas other than S-101 should be selected by the coastal State compliant to the charting needs for navigation (plan, execute, monitor, modify) and fulfilling the regulations specified by the International Convention for the Safety of Life at Sea (SOLAS), Chapter V (Safety of Navigation).

3.1.2 Following criteria support the determination of ENDS provision:

- major routes along the coasts and in the approaches to ports used by international shipping;
- ports used by international shipping; and
- other criteria specified by the relevant RHC Member State.

3.1.3 Information from the S-128 Catalogue of Nautical Products should be used to support the coordination of ENDS development and management.

3.2 Overview of existing ENDS products

3.2.1 Ideally, existing ENDS products coverage and scales would be obtained from the S-128 Catalogue of Nautical Products which is issued by the relevant Member State.

3.3 Extent of ENDS

3.3.1 For the calculation of the extent the information resolution in case of raster products or density in case of vector products should be considered.

3.3.2 The maximum file size is set according to the relevant S-100 product specification.

3.4 Overlaps and Scheme

3.4.1 To ensure consistency, for a certain area, ENDS products such as S-102, S-104 and S-111 must be produced and distributed by or on behalf of the same State or producing authority as the S-101 with which they are combined.

3.5 Consultation

3.5.1 Cooperation and collaboration among ENDS-producers is important and essential to ensure the optimum outcome and consistency of produced ENDS.

3.5.2 Comments received on proposed ENDS scheme and contents should be considered by the hydrographic office and discussed as necessary among S-100 Coordination Working Groups.

3.5.3 An approved ENDS scheme may need to be revised/updated by the relevant Regional S-100 Coordination Working Group. ENDS schemes should be submitted to the relevant RHC in accordance with its statutes. In general, the smaller an ENDS product scale is, the more necessary it is to obtain a consensus. This consultation could be conducted by correspondence or during a Regional S-100 Coordination Working Group meeting, in accordance with its Terms of Reference and the relevant RHC statutes.

3.5.4 All ENDS schemes shall be reported to the IHO Secretariat by the Regional S-100 Coordination Working Group for inclusion in the S-100 online catalogue.

3.6 ENDS Producers allocation

3.6.1 In most cases, the allocation of ENDS Producer Nations will be a fairly straightforward process under the umbrella of the relevant Regional S-100 Coordination Working Group or RHC. RHC member States are responsible for producing ENDS in the EEZ of their coastal State.

3.6.2 Where an ENDS product covers the waters of more than one coastal State, multiple ENDS producers may be possible. Aiming to avoid overlapping issues, agreements on data producer (including proper Maritime Resource Name management) should be made between the concerned coastal States.

3.7 Review

3.7.1 It will be necessary to keep ENDS schemes under continuous review by the Regional S-100 Coordination Working Group. Adjustments will be required in order to reflect, for example:

- the provision of better source materials;
- the appropriateness of scale and coverage;
- changes to routeing measures;
- the re-positioning of major aids to navigation; and
- appearance of new infrastructure.

3.7.2 The consultation process (see 3.5) led by the relevant Regional S-100 Coordination Working Group should seek agreement on coverage, content and product limits. The concerned responsible member States may decide about the final details.

3.7.3 For practical reasons, Regional S-100 Coordination Working Groups may wish to set a scale threshold under which an ENDS scheme coverage change does not require formal consultation/approval. It is the responsibility of the involved S-100 Coordination Working Group to determine the threshold at which a scheme change needs to be discussed/approved.

3.8 Maintenance

3.8.1 Any changes of an ENDS product affecting the regional ENDS scheme must be reported in the IHO online catalogue by the responsible RHC member State or the regional S-100 Coordination Working Group.

3.8.2 Any changes of an ENDS product by a RHC member State affecting the scheme must be reported to the Regional S-100 Coordination Working Group. The Regional S-100 Coordination Working Group will report to the IHO Secretariat for updating the IHO S-100 online catalogue.

PART C: SECTION 200, GUIDANCE FOR S-102 (BATHYMETRIC SURFACE) DATA PROVISION

1. INTRODUCTION

1.1 S-102 is the Bathymetric Surface Product Specification. The specification provides the mariner (user) with the ability to enhance maritime navigation with the representation of high-resolution bathymetry. The provision and use of such data in a standardised format are essential to support the accurate navigation of vessels and is also an important basis for many other maritime applications.

1.2 The S-102 Product Specification is an enhancement to the S-101 ENC base layer and provides significantly more bathymetric information that can be used for safety and efficiency.

2. OBJECTIVE AND CONCEPT

2.1 The objective of the S-102 Bathymetric Surface product is to provide a presentation in S-100 ECDIS, in coordination with other S-100 Products that support safe passage, precise berthing and mooring, and vessel routeing.

2.2 By providing a high-resolution bathymetric service to the mariner, decisions can be made with regard to safe passage of a vessel to maximize safety and efficiency.

3. PROCEDURE

3.1 Applicable Area

3.1.1 The producing Hydrographic Office/National Authority should determine the applicable area for the production of S-102 datasets. The following aspects should be considered before producing S-102 datasets for a given area:

- the significant amount of high-resolution bathymetric data required to support product creation;
- the consideration of marine traffic in the given area;
- the fact that such product may facilitate new marine traffic in the given area; and
- a re-survey planning in the given area to support the S-102 product update.

3.1.2 A Hydrographic Office may produce S-102 datasets in accordance with its S-101 ENC coverage to facilitate the use of legacy surveys and high-resolution data for completeness. By doing so, the meta data should be correctly attributed to allow the mariner to understand the data quality.

3.2 Geodetic Datum and Projection

3.2.1 The coordinate reference system should be selected from the S-102 Product Specification.

3.3 Grid/Product Extent

3.3.1 The producing Hydrographic Office/National Authority will ensure that their S-102 product coverage is consistent with S-101 underlying products.

3.4 Resolution

3.4.1 The resolution of individual S-102 products should be determined by the issuing Hydrographic Office to support safe and efficient navigation.

3.4.2 The S-102 bathymetry information is provided according to a specified grid in each S-102 dataset. For guidance on grid resolution related to the dataset scale, refer to the S-102 Product Specification in force.

3.5 Product Content

3.5.1 The S-102 product consists of high-resolution grid bathymetry providing an enhanced understanding of the seafloor structure.

3.5.2 Hydrographic Offices must ensure that the S-102 product supports the visualization of underwater structures consistent with its resolution and provides an adequate minimum depth above obstructions

3.5.3 The S-102 product resolution may differ from the original data resolution according to national data provision policies.

3.6 Updates

3.6.1 The S-102 Product Specification specifies the updates mechanism.

PART C: SECTION 300, GUIDANCE FOR S-104 (Water Level Information for Surface Navigation) DATA PROVISION

1. INTRODUCTION

1.1 The S-104 is the Water Level Information for Surface Navigation Product Specification. Water level data is the water height observed or mathematically predicted.

1.2 The water level product should be used in combination with other S-100 products. In this circumstance refer to the S-98 Interoperability Specification for further information.

1.3 S-104 products could be used as stand-alone information outside ECDIS. It is not considered as an ENDS in this case.

2. OBJECTIVE AND CONCEPT

2.1 The primary purpose for this product is to adjust displays of dynamic water depth information in combination with bathymetric data on ECDIS. Another purpose is to update water depths for under-keel clearance management.

2.2 Tidal and water level predictions are fundamental in route planning and real-time navigation. This information helps mariners to better capture tidal conditions, enhancing safety and operational efficiency.

2.3 The S-104 product provides water level information for a defined region as a surface, allowing any grid point to be queried as per a traditional single product.

3. PROCEDURE

3.1 Applicable Area

3.1.1 The producing Hydrographic Office/National Authority will determine the coverage area for S-104 datasets. The S-104 datasets should cover the spatial coverage of underlying S-102 datasets; see S-98 Interoperability Specification for further information.

3.1.2 There will be no spatial overlap between S-104 datasets, with the exception of datasets in the same temporal series created by the same producer, which must have the same spatial extent, see S-98 Interoperability Specification for further information.

3.2 Geodetic Datum and Projection

3.2.1 The Coordinate Reference System (CRS) and projection should be in accordance with the S-104 Product Specification.

3.3 Grid/Product Extent

3.3.1 The producing Hydrographic Office/National Authority will ensure that their S-104 product coverage is consistent with S-102 underlying products.

3.4 Resolution

3.4.1 The S-104 dataset resolution will be determined by the producing Hydrographic Office/National Authority.

3.5 Product Content

3.5.1 The S-104 dataset consists of water level data along with the accompanying metadata describing the accuracy, content, variables, applicable times, locations and structure of the data product.

3.6 Updates

3.6.1 The S-104 Product Specification specifies the updates mechanism.

4. PART C: SECTION 400, GUIDANCE FOR S-111 (Surface Currents) DATA PROVISION

1. INTRODUCTION

1.1 The S-111 is the Surface Currents Product Specification.

1.2 The surface current product should be used in combination with other S-100 products. In this circumstance refer to the S-98 Interoperability Specification for further information.

1.3 S-111 products could be used as stand-alone information outside ECDIS. It is not considered as an ENDS in this case.

2. OBJECTIVE AND CONCEPT

2.1 The primary purpose of S-111 Surface Currents product is to enable displays of surface currents information on ECDIS.

2.2 Information on surface current velocities are fundamental in route planning and real time navigation. This information helps mariners and ECDIS to understand better and predict tidal conditions, enhancing safety and operational efficiency.

2.3 The S-111 data product provides surface currents information for a defined region as a surface, allowing any grid point to be queried as per a traditional single product.

3. PROCEDURE

3.1 Applicable Area

3.1.1 The producing Hydrographic Office/National Authority agency determines the coverage area for S-111 products. In order to ensure consistency between the products, the S-102, S-104 and S-111 products should be produced and disseminated by or on behalf of the same producer State/authority as the S-101 ENC they are combined with.

3.1.2 At small S-101 ENC scales for oceanic use (scale that corresponds roughly to ≤ 1:350.000), overlapping or concurrent data for S-111 products do not necessarily impede safe navigation in ECDIS. Members States will authorize the overlaps at small scales on a regional basis through Regional Hydrographic Commissions (RHCs). In this case, the end user has the flexibility to choose between the various oceanographic S-111 products that may exist for voyage optimization.

3.2 Geodetic Datum and Projection

3.2.1 The Coordinate Reference System (CRS) should be consistent with the S-111 Product Specification.

3.3 Grid/Product Extent

3.3.1 The producing Hydrographic Office/National Authority will determine the coverage and should be consistent with underlying S-101 ENC; see S-98 Interoperability Specification for further information.

3.4 Resolution

3.4.1 The S-111 database resolution will be determined by the producing Hydrographic Office/National Authority to support safe and efficient navigation.

3.5 Product Content

3.5.1 The S-111 products contain surface water current data for a particular geographic region and timescale, along with the accompanying metadata describing the content, variables, applicable times and locations, and structure of the data. Surface current data include speed and direction of the current, and may represent observed or mathematically predicted values. The data may consist of currents at a small set of points where observations and/or predictions are available, or may consist of numerous points organized in a grid as from a hydrodynamic model forecast. Quality measures of the position, speed, direction, and time are included.

3.6 Updates

3.6.1 The S-111 Product Specification specifies the updates mechanism.

PART C: INFORMATIVE SECTION

SECTION 100, GUIDANCE FOR S-124 (Navigational Warnings) DATA PROVISION

1. INTRODUCTION

1.1 The S-124 is the Navigational Warnings Product Specification. The S-124 has been designed to permit utilization of S-124 datasets in creating Navigational Warnings in an S-100 format distributed primarily through IP-based communication. Distribution of S-100 data via IP-based communications does not relieve member States of their obligations to promulgate Maritime Safety Information (MSI) and Search and Rescue (SAR) related information via the GMDSS at this time.

1.2 The S-124 Navigational Warnings are intended to be used in an overlay to nautical charts within a navigation system. If used in ECDIS, S-124 data are possibly interoperable with S-101 ENC content.

2. OBJECTIVE AND CONCEPT

2.1 The S-124 datasets contain navigational warnings information primarily targeting use in ECDIS. Navigational warnings product means a message containing urgent information relevant to safe navigation provided to ships in accordance with the International Convention for the Safety of Life of Sea (SOLAS Chapter IV).

2.2 An S-124 dataset is a vector dataset.

3. PROCEDURE

3.1 Applicable Area

3.1.1 The producing Hydrographic Office/National Authority will indicate the applicable area for each S-124 Product.

3.2 Geodetic Datum and Projection

3.2.1 The definition of the geodetic Coordinate Reference System (CRS), the Vertical Reference System information, and elevation textually when appropriate for the warning content should be in accordance with the S-124 Product Specification.

3.3 Product Content

3.3.1 An S-124 Product must include sufficient level of details and positional accuracy for the user to understand the warning messages when they overlay a chart content.

3.4 Updates

3.4.1 The S-124 Product Specification specifies the updates mechanism.

SECTION 200, GUIDANCE FOR S-129 (Under keel Clearance Management) DATA PROVISION

1. INTRODUCTION

1.1 The S-129 is the Under Keel Clearance Management (UKCM) Product Specification. UKCM Services are generally used in conjunction with S-101 ENC and route information (S-421) for supporting ships in safe passage through shallow waters.

2. OBJECTIVE AND CONCEPT

2.1 S-129 Product is a vector dataset, issued as a file containing under keel clearance data for a particular geographic region and set of times, along with the accompanying metadata describing the content, variables, applicable times and locations, and dataset structure.

3. PROCEDURE

3.1 Applicable Area

3.1.1 The producing data producer determines the coverage for each S-129 Product.

3.2 Geodetic Datum and Projection

3.2.1 The coordinate reference system should be selected from the S-129 Product Specification.

3.2.2 Different vertical reference systems can be used for the depth of heights described in UKCM datasets. The service provider must provide information on the used Vertical Datum.

3.3 Product Content

3.3.1 UKCM datasets consists of a UKC plan, UKC plan area, control points and areas considered as non-navigable and almost non-navigable.

3.3.2 Depending on the UKC calculation “purpose”, some features may or may not be included. The datasets are generally intended for use with S-101 ENC, and (optionally) with S-102 bathymetric surface datasets, S-104 datasets, and/or S-111 datasets.

3.3.3 UKCM data include vessel’s characteristic, intended voyage, and voyage specific areas assessed as being navigational safe or unsafe with regard to under keel clearance. It provides time windows definitions within which these assessments are valid, based upon observed and/or mathematically predicted values.

3.4 Updates

3.4.1 The S-129 Product Specification specifies the updates mechanism.