6th HSSC MEETING

Viña del Mar, Chile 11-14 November 2014

Report of the TSMADWG to HSSC 6

Transfer Standard Maintenance and Application Development Working Group

Submitted by:	Chairman, TSMADWG
Related Documents:	List of Actions HSSC6-03B
Related Projects:	NA

Chair:	Barrie Greenslade, UKHO
Vice Chair:	Julia Powell, NOAA
Secretary:	Anthony Pharaoh, IHB
Member States:	Australia, Brazil, Canada, Denmark, Finland, France, Germany, Japan, Republic of Korea, Netherlands, New Zealand, Norway, Russia, Sweden, United Kingdom, United States of America.
Expert Contributors:	The International Centre for ENCs (IC-ENC), PRIMAR Stavanger, Caris, ESRI (USA), Furuno (Finland), GEOMOD (France), Hydundai e-Marine (ROK), Jeppesen Marine, IIC Technologies (Canada), NAVTOR AS (Norway), SevenCs (Germany), TKartor (Sweden), and Transas (Russia), Frank Hippmann (Australia)

1   Meetings Held During Reporting Period

   a.   TSMAD 28: 31 March – 4 April, 2014, Sydney, Australia (in conjunction with DIPWG6)
   b.   TSMAD 27: 2-6, December, 2013, IHB, Monaco
   c.   TSMAD DCEG Sub-WG Meeting: 29 -30 November, IHB, Monaco
   d.   TSMAD DCEG Sub-WG Meeting: 27-28 March 2014, Wollongong, Australia
   e.   TSMAD S-100/S-101 Test Strategy Meeting: 16-18 September, Arlington, Va, USA

2   Work Program

Progress continues on the work items assigned by HSSC as follows:

2.1 S-100 (Workplan: A and A.1)

S-100 Edition 1.00 is currently being used as the basis for several IHO product specifications. This has led to several new corrections, clarifications and extensions being made to various models in order to accommodate the requirements of these products. The following table lists the affected parts of S-100:

S-100 #	Part Name	Description	Change Type
1	Conceptual Schema Language	Added Support for: • Codelists • truncated datetime types • Uniform Resource Identifiers	Extension
2A	Feature Concept Dictionaries	Added Support for: • Codelists • truncated datetime types • Uniform Resource Identifiers	Extension
3	General Feature Model	Added Support for: • Codelists • truncated datetime types • Uniform Resource Identifiers • Expanded Roles	Extension
4A	Metadata	Inclusion of metadata schemas and clarification of the S-100 catalogue UML model	Correction
5	Feature Catalogue	Added Support for: • Codelists • truncated datetime types • Uniform Resource Identifiers • New Spatial Types (ArcByCenterPoint, CircleByCenterPoint)	Extension
7	Spatial Schema	Added Support for: • New Spatial Types (ArcByCenterPoint, CircleByCenterPoint)	Extension
9	Portrayal	Inclusion of the S-100 Portrayal Model	Extension
10A	ISO-IEC 8211 Encoding	Corrections to the ISO 8211 encoding	Correction
10B	GML Encoding	Inclusion of GML as an available encoding format	Extension
11	Product Specifications	Inclusion of the S-10X template for building new product specifications	Extension
12	Maintenance Procedures	Alignment of procedures to S-99	Correction

According to TR 2/2007 S-100 was sent out for a wider stakeholder review on June 2011 and those comments have been incorporated into Edition 2.0.0 of S-100. **It is recommended that HSSC endorse S-100 and send it out via IHO Circular Letter for Member State approval.**

2.2 S-100 Product Specification Identifiers (HSSC5/28)

The UKHO drafted a paper outlining a proposed registry based procedure for the allocation of S-100 Product Specification Identifiers. TSMAD agreed to the approach presented by the UKHO and agreed that it should be presented to HSSC for endorsement (Action: HSSC5/28). **This paper is presented an separate**

paper to this report and recommends the insertion of a new clause 6 to S-99 and sub sequentially renumbering of the following clauses.

3   S-101 ENC Product Specification (Workplan: G.1)

S-101 is the new Electronic Navigational Chart product specification that is based on S-100. The intent of S-101 is to utilize the flexibility of S-100 to allow the IHO and Member States to respond to the changing needs of the mariner. S-101 will include machine readable feature catalogues and portrayal catalogues that will facilitate updating of changes to shipboard systems.

3.1   S-101 Progress

S-101 is a multi-part product specification when put together will form the basis for the creation and display of Electronic Navigational Charts. The major components of S-101 and their current status are as follows

S-101 Component	Current Status	Comment
Main Document	Baselined – April 2014	Will be sent out for TSMAD/DIPWG + Stakeholder Review in September 2014
Data Classification and Encoding Guide	Baselined – April 2014	
8211 Annex	Baselined – April 2014	
Feature Catalogue	Baselined – September 2014	Created using the Feature Catalogue builder that has been developed by KHOA
Portrayal Catalogue	In Progress (estimated Feb 2015)	Portrayal Catalogue builder has been developed. Needed to wait until a baseline Feature Catalogue was developed
Implementation Guidance	In Progress	Will continue to be refined during the S-101 test bed process
Validation Checks	TBD	

As noted above, most of the main components have reached a baseline status – meaning that they are stable enough to be used for testing.
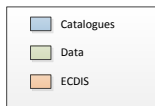
TSMAD maintains an S-101 Roadmap (found here) which provides a more detailed look at the sequence of events that need to happen in order for S-101 to become an official IHO Product Specification.

S-101 Development and S-100 Testbed Timeline

Updated October 15, 2014
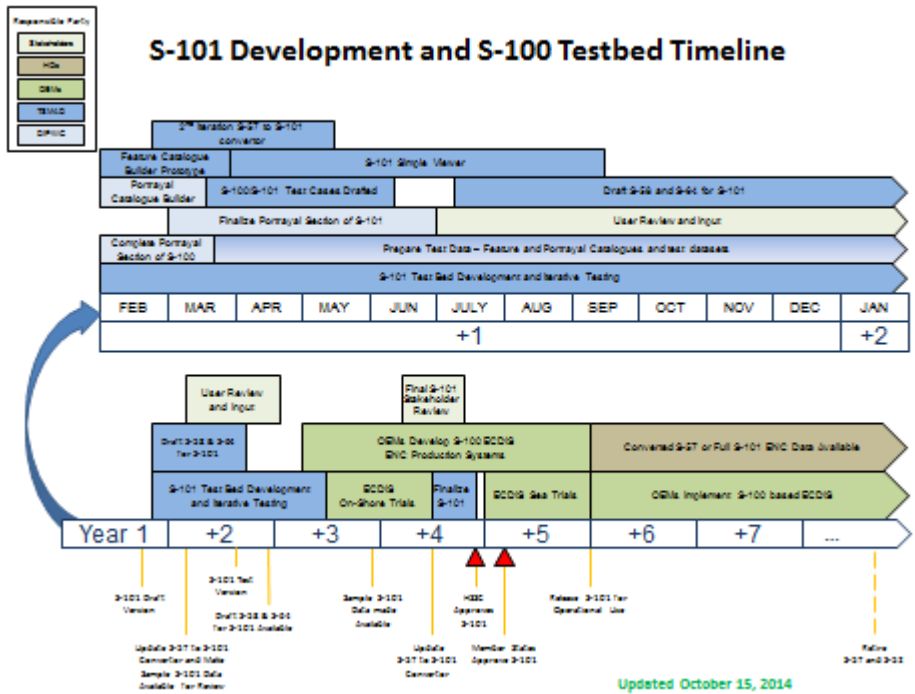
In addition, TSMAD maintains an S-100/S-101 risk register highlights the areas where more work needs to be done and where progress is on track.

3.2   S-101 Test beds (Workplan: G.2)

Before the IHO Member States can approve S-101 as a functional standard, it must undergo a rigorous testing process that will require the implementation of test bed projects. It is important to understand that this test bed will need to be S-100 based, capable of testing other product specifications which can be either supplementary to S-101 ENCs or non-related GIS applications. The overarching test bed strategy is depicted in the following figure which shows the logical progression from catalogue creation to use within an ECDIS.
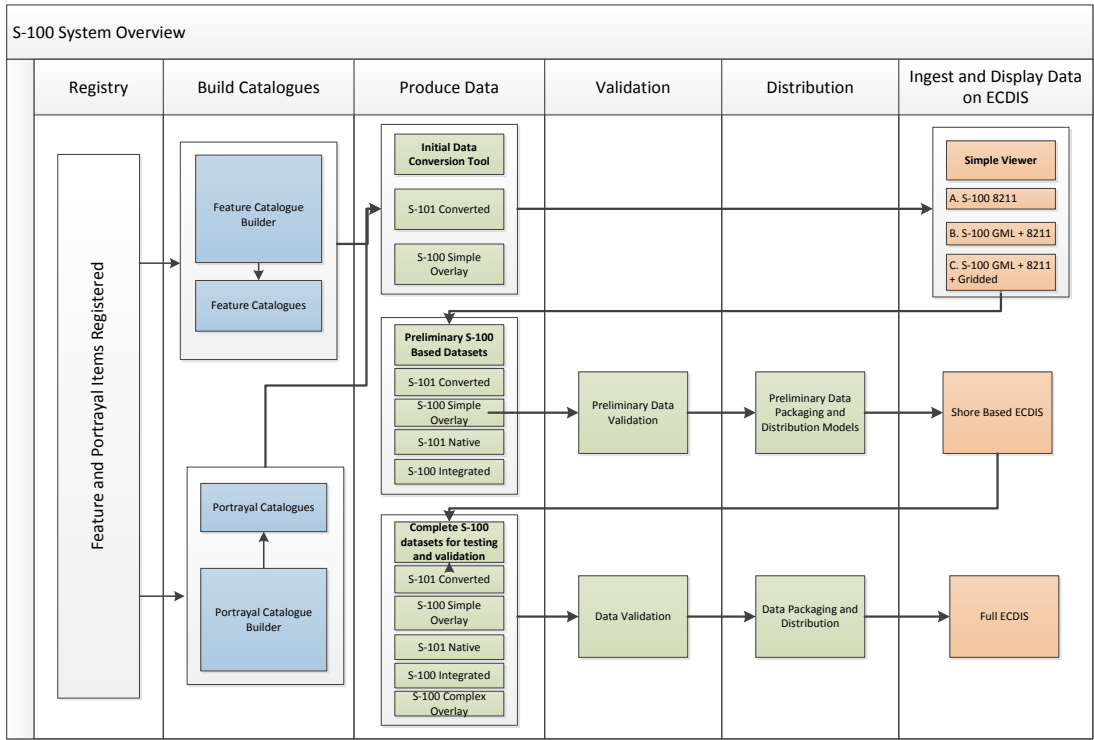
S-100 System Overview

Registry	Build Catalogues	Produce Data	Validation	Distribution	Ingest and Display Data on ECDIS

Feature and Portrayal Items Registered

Build Catalogues:
- Feature Catalogue Builder
- Feature Catalogues
- Portrayal Catalogues
- Portrayal Catalogue Builder

Produce Data:
- **Initial Data Conversion Tool**
  - S-101 Converted
  - S-100 Simple Overlay
- **Preliminary S-100 Based Datasets**
  - S-101 Converted
  - S-100 Simple Overlay
  - S-101 Native
  - S-100 Integrated
- **Complete S-100 datasets for testing and validation**
  - S-101 Converted
  - S-100 Simple Overlay
  - S-101 Native
  - S-100 Integrated
  - S-100 Complex Overlay

Validation:
- Preliminary Data Validation
- Data Validation

Distribution:
- Preliminary Data Packaging and Distribution Models
- Data Packaging and Distribution

Ingest and Display Data on ECDIS:
- **Simple Viewer**
  - A. S-100 8211
  - B. S-100 GML + 8211
  - C. S-100 GML + 8211 + Gridded
- Shore Based ECDIS
- Full ECDIS

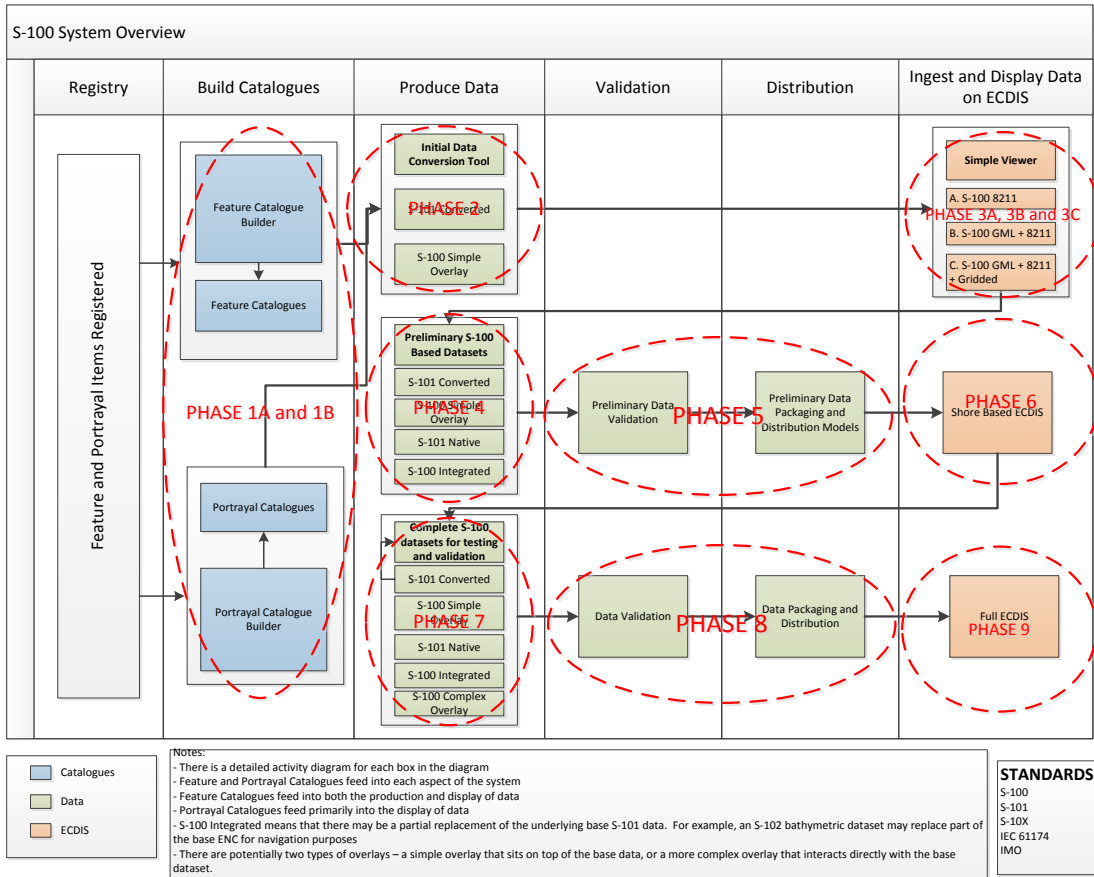Legend:
- Catalogues
- Data
- ECDIS

Notes:
- There is a detailed activity diagram for each box in the diagram
- Feature and Portrayal Catalogues feed into each aspect of the system
- Feature Catalogues feed into both the production and display of data
- Portrayal Catalogues feed primarily into the display of data
- S-100 Integrated means that there may be a partial replacement of the underlying base S-101 data. For example, an S-102 bathymetric dataset may replace part of the base ENC for navigation purposes
- There are potentially two types of overlays – a simple overlay that sits on top of the base data, or a more complex overlay that interacts directly with the base dataset.

STANDARDS
S-100
S-101
S-10X
IEC 61174
IMO

However, in order to manage the complexity of the testing process it has been divided into nine phases that cover the entire end-to-end process as depicted in the following diagram.

S-100 System Overview

Registry	Build Catalogues	Produce Data	Validation	Distribution	Ingest and Display Data on ECDIS

Feature and Portrayal Items Registered

PHASE 1A and 1B

Feature Catalogue Builder → Feature Catalogues

Portrayal Catalogues

Portrayal Catalogue Builder

Initial Data Conversion Tool — *PHASE 2* — S-101 Converted — S-100 Simple Overlay

Simple Viewer — A. S-100 8211 — B. S-100 GML + 8211 — C. S-100 GML + 8211 + Gridded — *PHASE 3A, 3B and 3C*

Preliminary S-100 Based Datasets — S-101 Converted — *PHASE 4* — S-100 Simple Overlay — S-101 Native — S-100 Integrated

Preliminary Data Validation — *PHASE 5* — Preliminary Data Packaging and Distribution Models

Shore Based ECDIS — *PHASE 6*

Complete S-100 datasets for testing and validation — S-101 Converted — S-100 Simple Overlay — *PHASE 7* — S-101 Native — S-100 Integrated — S-100 Complex Overlay

Data Validation — *PHASE 8* — Data Packaging and Distribution

Full ECDIS — *PHASE 9*

Notes:
- There is a detailed activity diagram for each box in the diagram
- Feature and Portrayal Catalogues feed into each aspect of the system
- Feature Catalogues feed into both the production and display of data
- Portrayal Catalogues feed primarily into the display of data
- S-100 Integrated means that there may be a partial replacement of the underlying base S-101 data. For example, an S-102 bathymetric dataset may replace part of the base ENC for navigation purposes
- There are potentially two types of overlays – a simple overlay that sits on top of the base data, or a more complex overlay that interacts directly with the base dataset.

Legend: Catalogues, Data, ECDIS

STANDARDS
S-100
S-101
S-10X
IEC 61174
IMO

Breaking out the testing through phases allows for the iterative development of future ECDIS as a system by gradually expanding requirements and the different types of test scenarios that are needed to validate S-101 as a functional standard.

#	Phase Name	Status	Comment
1A	Feature Catalogue Builder	Completed	• Development done by KHOA • S-100 Test Cases Written
1B	Portrayal Catalogue Builder	Completed	• Developed under IHB Contract • S-100 Test Cases Written
2	Simple Production Tool	In Progress	• S-57 to S-101 Convertor • Joint NOAA/ESRI initiative
3A	Simple Viewer (ISO 8211)	In Progress	• S-100 Test Cases Written
3B	Simple Viewer (ISO 8211 +GML)	Not Started	• Initial Scoping Required
3C	Simple Viewer (ISO 8211 + GML + Gridded Data	Not Started	• Initial Scoping Required
4	Preliminary Production Tool	Not Started	• Initial Scoping Required
5	Preliminary Data Validation and Packaging	Not Started	• Initial Scoping Required
6	Shore Based ECDIS	Not Started	• Initial Scoping Required

7	Full Production Tool	Not Started	• Initial Scoping Required
8	Data Validation and Packaging	Not Started	• Initial Scoping Required
9	Full ECDIS	Not Started	• Initial Scoping Required

The outcome of testing will also enable a more detailed impact study, as prescribed by IHO Resolution 2/2007 on principles and procedures for making changes to IHO technical standards and specifications, and will provide a clear picture of the effects on the various stakeholders involved in the eventual introduction of S-101.

In addition, work has been completed on the IHO funded contract for the development of test cases for the following test bed activities:
- Feature Catalogue Builder
- Portrayal Catalogue Builder
- Simple Viewer (8211)
- S-101 Product Specification

4   S-102 (Workplan: A.4)

At TSMAD27 it was noted that S-102 needed to be updated to implement changes in the Open Navigational Surface Working Group's Bathymetric Attributed Grid (BAG) Specification which forms the basis of S-102. In addition, at TSMAD28 a paper was submitted highlighting the need to improve S-102 metadata. **Therefore TSMAD recommends HSSC approve the preparation of a new edition of S-102 for HSSC approval in 2015**.

5   S-57 (Workplan: E.1)

Member States approved Supplement 3 to S-57 and edition 4.0 of the Use of the Object Catalogue via IHO CL 18/2014. At this time there are no active proposals to amend the UOC or to issue any new encoding bulletins.

6   S-64 (Workplan: D.1)

At TSMAD27 a small sub-working group convened to finalize S-64. This new version provides more explicit tests and is aligned with the rewrite of S-52 and IEC 61174. S-64 is currently out for Member State vote via IHO CL 55/2014. If it is approved by the MS, then the date of entry into force will be aligned with the data of publication of the new edition of IEC 61174. In addition, the previous edition of S-64 will remain valid for twelve months beyond the data of entry into force of the new edition of S-64.

7   S-58 (Workplan: B.1)

A major new edition of S-58 has been completed by TSMAD. S-58 has been changed to improve the logical ordering of the tests, to provide a more programmatic language, and provide encoding advice to fix any errors or warnings. IHO member states approved the latest version of S-58 via CL 18/2014 and edition 5.0.0 has been officially published as of June 2014.

Even though, S-58 has been published, an official in force date has yet to be determined, meaning that the latest checks are not yet available for use in software packages for the IHO Member States. **TSMAD recommends that the HSSC set an in force date in alignment with S-64 and S-52 as to give the validation packages time to implement the revised checks and MS to implement the new checks.**

8   Develop an S-10X template and a guidebook on the use of S-100. (Workplan: A.2 and A.7)

Work is ongoing on the development of a "guidebook" on the use of S-100. The guidebook's aim is to develop a how-to-guide to build various types of product specifications utilizing S-100.

TSMAD completed work on a master template to aid developers of S-100 based product specifications. This template has been included as an Annex to Part 11 of S-100.

9   TSMAD Outreach (Workplan: A.9)

9.1   IALA

TSMAD members continue to coordinate with IALA. Current activities include harmonization of the S-101 lights model with IALA's lights model.

In addition, IALA has a requirement for data streaming and they have noted that S-100 does not cater for streaming. IALA expects to submit a proposal to include an encoding format for data streaming for edition 3.0.0 of S-100 sometime in 2015.

9.2   Liaison with other IHO working groups

TSMAD continues to coordinate with other IHO working groups on building S-100 compliant product specifications. Prior to TSMAD28, a joint meeting was held between the TSMAD DCEG sub-working group, DQWG and TWLWG to discuss items of common interest, including the new data model for CATZOC in S-101.

10 Progress on HSSC Action Items

Agenda Item	Subject	Action No	Actions	
5.1.1	S-64	HSSC3/05	**TSMAD** to investigate expanding S-64 to improve its usefulness for both OEMs and type approval authorities	**Completed (see also HSSC5/13 and HSSC5/14)**
5.1.3	S-58	HSSC3/06	**TSMAD** to investigate and propose how a minimum validation check standard can be achieved across all	**Completed (See HSS5/33)**

			ENC providers including the development of a use-case dataset.	
5.1.3	S-58	HSSC3/07	**TSMAD** to develop, in consultation with stakeholders, a migration path, guidance and appropriate tools for establishing a minimum check standard.	**Completed (See HSS5/33)**
5.1.5	S-101 Impact Study	HSSC2/07	**TSMAD** to conduct a formal impact study on S-101 in conformance with the requirements of Resolution 2/2007 taking into account paper HSSC INF-4 and report to HSSC4 .	**Completed**
3	Use of the Object Catalogue - Guidance on T&P ENC Updates	HSSC5/03	**TSMAD** to take into consideration the comments reported in paper HSSC5-INF2 (Appendix to Annex A), for inclusion in the next edition of the Use of the Object Catalogue (S-57, Appendix B.1, Annex A).	**In Progress**
5.1	New edition of S-64	HSSC5/13	**TSMAD** to finalize the draft edition 3.0.0 of S-64 at TSMAD-27 (December 2013).	**Completed**
5.1	New edition of S-64	HSSC5/14	**TSMAD Chair** to provide IHB with a clean copy of the draft edition 3.0.0 of S-64 for posting on the IHO website as a familiarization version.	**Completed**
5.1	Feature catalogue builder	HSSC5/19	**TSMAD, in liaison with DIPWG,** to provide the IHB with a statement of requirements for developing a feature catalogue builder.	**Suspended (overtaken by events)**
5.1	S-101 Value Added Roadmap	HSSC5/21	**TSMAD Chair** to incorporate in the draft S-101 Value Added Roadmap the comments expressed during HSSC5.	**Completed**
5.1	S-101 Value Added Roadmap	HSSC5/23	**TSMAD Chair** to include an additional item in the TSMAD work plan to review the S-101 Value Added Roadmap annually.	**Completed**
5.1	S-100 Master Plan	HSSC5/26	**TSMAD Chair** to include an additional item in the TSMAD work plan to review the S-100 Master Plan annually.	**Completed**
5.1	Product specification identifiers	HSSC5/28	**TSMAD** to prepare a detailed registry based procedure for the allocation of product specification identifiers.	**Completed**
5.1	S-101 Impact Study	HSSC5/30	**TSMAD Chair** to consider the impact of the recommendations contained in HSSC5-05.1F (S-101 impact study) on the S-101 Value Added Roadmap.	**Completed**
5.1	S-101 test bed projects	HSSC5/32	**TSMAD** to include the KHOA S-101 test bed program as part of the TSMAD S-101 test plan strategy.	**Completed**

5.1	New edition of S-58	HSSC5/33	**TSMAD** to finalize the draft edition 5.0.0 of S-58 at TSMAD27, in accordance with the guidance provided at HSSC5.	**Completed**
5.8	Tidal Product Specification	HSSC5/51	**TSMAD** to assist the TWLWG in the development of a tidal product specification for navigational surface and tidal data transfer that could be used for generating dynamic water levels and navigational surfaces in ECDIS.	**In Progress**
7.3	Service Lifecycle Management	HSSC5/62	**TSMAD** to consider the impact of introducing Service Lifecycle Management (SLM) in the S-101 Roadmap and S-100 Master Plan.	**Completed**

11 Problems Encountered

TSMAD has not encountered any major problems.

12 Recommendations

HSSC is invited to

- Approve the continued activity of the TSMADWG work plan.
- Endorse S-100 Edition 2.0.0 and send it out via IHO Circular Letter for Member State approval.
- Endorse the proposed registry procedure for the allocation of S-100 product specification identifiers including the modification to S-99 and to the GI Registry.
- Approve the work on a new edition of S-102
- Discuss the need to set an "in force" date for S-58.

13 Justification and Impacts

Not applicable.

14 Action Required of HSSC

The HSSC is invited to

- note this report and approve the continuance of the Work Plan.
- Endorse S-100 Edition 2.0.0 and send it out via IHO Circular Letter for Member State approval.
- Endorse the proposed registry procedure for the allocation of S-100 product specification identifiers including the modification to S-99 and to the GI Registry.
- Approve the work on a new edition of S-102
- Discuss the need to set an "in force" date for S-58.

TSMAD Work Plan

TSMAD Tasks

A   Maintain S-100 IHO Universal Hydrographic Data Model and related projects:

1. S-99 Operational Procedures for the Organization and Management of the S-100 Geospatial Information Registry
2. S-102 Bathymetric Surface Product Specification

B   Maintain S-58 Recommended ENC validation checks (IHO O3.1.1 refers)

C   Support FAQ and encoding bulletin sections of IHO web site up to date (IHO O3.1.1 refers)

D   Maintain S-64 IHO Test Data Sets for ECDIS

E   Maintain S-57 IHO Transfer Standard for Digital Hydrographic Data

F   Maintain S-65 ENCs: Production, Maintenance and Distribution Guidance

G   Develop the S-101 ENC Product Specification and associated S-100/S-101 Test Beds

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s)	Related Pubs/Standard	Task
A	S-100	H	S-100 edition 1.0.0 Published Apr 2010	2001	2010	C	Barrie Greenslade (UKHO)		
A.1	Prepare Edition 2.0.0 of S-100	H		2011	2014	C	Barrie Greenslade (UKHO)		
A.2	Develop a guide book for using S-100 product specifications	M		2010	2014	C	Barrie Greenslade (UKHO)/Julia Powell (NOAA)		
A.3	Review the S-100 Master Plan	M		2014		O	Barrie Greenslade (UKHO)		

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s)	Related Pubs/Standard	Task
A.4	Develop Edition 2.0.0 of S-102 Bathymetric Content Specification.	H	S-102 Published April 2012	2014	2016	P	Wade Ladner (NAVO)		
A.5	Investigate a suitable grid referencing system for S-100	L		2010		O	Tony Pharaoh (IHB)		
A.6	Develop S-100 Portrayal Component	H		2006	2014	C	DIPWG		
A.7	Develop an S-10X product specification for Auxiliary Informational Layer Integration.	M	See S-100 Edition 2.0.0	2010	2014	C	Julia Powell (UKHO)		
A.9	Liaise with Non-IHO Constituents, e.g. Inland ECDIS, Marine Navigation Industry, DGIWG, AML, WMO Ice, and GIS Industry.	H		2004	-	O	Barrie Greenslade (UKHO)/Julia Powell (NOAA)		
B.1	Keep S-58 Recommended Validation Checks up to date	H		2003	-	O	Richard Fowle (IC-ENC)		
B.2	1. Restructure S-58 to provide a more logical means of data validation. 2. Investigate how the new version of S-58 can be used to implement a minimum validation standard for all ENCs.	H	Edition 5.0.0 June 2014	2012	2014	C	Richard Fowle (IC-ENC)		
C.1	Support FAQ and Encoding Bulletins	H		2003	-	O	Jeff Wooton (AHO)		

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s)	Related Pubs/Standard	Task
D.1	Investigate expanding S-64 to improve its usefulness for both OEMs and type approval authorities	H	Edition 4.0.0	2012	2014	C	Tom Richardson/Tom Mellor (UKHO)		
E.1	Study the possibility to encode information features as New Objects (see S-57 supplement) to avoid caution area objects (CNTARE) in some cases, e.g. to encode T&Ps"	M		2014	2015	O	Richard Fowle (IC-ENC)		
F.1	Maintain S-65	L				O			
G.1	Develop S-101 ENC product specification	H		2006	3-5 years	O	Julia Powell (NOAA)		
G.2	Develop an S-100/S-101 Test Strategy and Test Bed	H		2013			Julia Powell (NOAA)		
G.3	Conduct an S-101 Impact Study	H		2012	2012	C	Laurent Louvart (SHOM)		

TSMAD Meetings

TSMAD

Date	Location	Activity
29 Sep – 3 Oct 03	Wollongong, Australia	10th Meeting
11-12 November 04	IHB, Monaco	11th Meeting
10-11 November 05	Wollongong, Australia	12th Meeting

Date	Location	Activity
18-22 September 06	Wellington, New Zealand	13th Meeting
4-8 June 07	UKHO, Taunton	14th Meeting
14-18 January 08	IHB, Monaco	15th Meeting
5-9 May 08	Cape Town, South Africa	16th Meeting
8-12 September 08	Seattle, USA	17th Meeting
4-8 May 09	Ottawa, Canada	18th Meeting
26-30 Oct 09	Sydney, Australia	19th Meeting
3-7 May 10	Rostock, Germany	20th Meeting
29 Nov-3 Dec 10	Victoria, Canada	21st Meeting
16-20 Jan 12	Wellington, New Zealand	23rd Meeting
7-11 May	Monaco	24th Meeting
15-18 January, 2013	Tokyo, Japan	25th Meeting
10-14 June, 2013	Silver Spring, USA	26th Meeting
2-6 December, 2013	Monaco	27th Meeting
31 March – 4 April, 2014	Sydney, Australia	28th Meeting

TSMAD S-100 Sub-WG

Date	Location	Activity
25-29 April 05	Univ. of NH, USA	1st Meeting
7-9 November 05	Wollongong, Australia	2nd Meeting
15-19 May 06	Brest, France	3rd Meeting
18-22 September 06	Wellington, New Zealand	4th Meeting
27-1 December 06	Silver Spring, USA	5th Meeting
23-27 April 07	Ottawa, Canada	6th Meeting

TSMAD S-100 Sub-WG

Date	Location	Activity
17-21 September 07	Hamburg, Germany	7th Meeting
2-4 September	Taunton, UK	8th Meeting

Annex A

M-3 TR K2.21

TRANSFER STANDARD MAINTENANCE AND APPLICATIONS DEVELEMENT W.G. (TSMAD) –
Terms of Reference

1.   Objective

a)   To maintain, develop and extend:

(i)   the S-57 IHO transfer standard for digital hydrographic data;
(ii)   the S-100 IHO Geospatial Standard for Hydrographic Data;
(iii)   the S-101 IHO ENC Product Specification;

b)   To monitor the development of other related international standards.

2.   Authority

This WG is a subsidiary of the **Hydrographic Services And Standards Committee (HSSC)**. Its work is subject to HSSC approval.

3.   Procedures

a)   The WG should:

(i)   maintain the S-57 IHO transfer standard for digital hydrographic data by preparing and promulgating maintenance documents containing clarifications, corrections and extensions when required;

(ii)   maintain the S-100 IHO Geospatial Standard for Hydrographic Data as directed in Part 13 (S-100 Maintenance Procedures)

(iii)   maintain the S-100 IHO ENC Product Specification as directed in …..

(iv)   review relevant international standards and specifications and advise HSSC accordingly;

(v)   consider new topics as instructed by HSSC and advise HSSC accordingly and/or draft the relevant extension documents;

(vi)   draft new editions of the IHO transfer standard for digital hydrographic data as instructed by HSSC.

b)   The WG should work by correspondence, group meetings, workshops or symposia. Permanent or temporary sub-working groups may be created by the WG to undertake detailed work on specific topics such as: maintenance of the IHO transfer standard for digital hydrographic data, product specifications, tidal information, survey information, etc. The WG should meet at least once a year.

c)   The WG should liaise with other HSSC WG's, international organizations and industry to educate and encourage the application of IHO standards to the work of those organizations.

d)   The WG should identify and promote the availability of other navigation-related data in ECDIS and in IHO geospatial standard-compliant format

-

e)   The WG should identify a work programme for each year, including expected time frame.

4.   Composition and Chairmanship

a)   The WG shall comprise representatives of IHO Member States (M/S), Expert Contributors and Accredited NGIO Observers.

b)   Decisions should generally be made by consensus. If votes are required on issues or to endorse proposals presented to the WG, only M/S may cast a vote.   Votes shall be on the basis of one vote per M/S represented.

c)   Expert Contributor membership is open to entities and organisations that can provide a relevant and constructive contribution to the work of the WG.

d)   The Chair and Vice-Chair shall be a representative of a Member State. The election of the Chair and Vice-Chair shall be decided at the first meeting after each ordinary session of the Conference (Conference to be replaced by Assembly when the revised IHO Convention enters force) and shall be determined by vote of the Member States present and voting.

e)   If the Chair is unable to carry out the duties of the office, the Vice-Chair shall act as the Chair with the same powers and duties.

f)   Expert Contributors shall seek approval of membership from the Chairman.

g)   Expert Contributor membership may be withdrawn in the event that a majority of the M/S represented in the WG agree that an Expert Contributor's continued participation is irrelevant or unconstructive to the work of the WG.

h)   All members shall inform the Chairman in advance of their intention to attend meetings of the WG.

i)   In the event that a large number of Expert Contributor members seek to attend a meeting, the Chairman may restrict attendance by inviting Expert Contributors to act through one or more collective representatives.