

9th IHO-HSSC Meeting

**Report and Recommendations of the HSSC Project Team on
Standards for Hydrographic Surveys (HSPT)**

Submitted by:	Chair, HSPT
Related Documents:	S-44
Related Projects:	None

Chair:	Christophe Vrignaud, France
Vice-Chair:	Nickolás de Andrade Roscher (Brazil)
Secretary:	David Wyatt, IHO
Member States:	Australia, Brazil, Canada, France, Germany, Italy, Netherlands, Norway, Portugal, Republic of Korea, Sweden, United Kingdom and United States.
Expert Contributor:	International Federation of Hydrographic Societies (IFHS), ARGANS, Fugro, IIC Technologies, iXblue and the University of Southern Mississippi
	See <i>Annex A for full details on HSPT membership</i> <i>Annex B for workplan 2018 – 2019</i> <i>Annex C for example matrix table</i>

Meetings Held During Reporting Period

HSPT1	20 - 22 June 2017	Paris, France
-------	-------------------	---------------

Future Meetings

HSPT2	tbc July 2018	Niterói, Brazil
-------	---------------	-----------------

Objective of the HSPT

The Project Team on Standards for Hydrographic Surveys (HSPT), is tasked by the IHO Hydrographic Services and Standards Committee (HSSC) to “...review the existing edition (5th) of the IHO publication S-44 Standards for Hydrographic Surveys, identify deficiencies...” and “...when undertaking this task, to consider, as a minimum,...” the need to prepare a draft for the 6th Edition “...in support of safety of navigation data products and services...” (HSPT TORs refer) for subsequent approval by IHO Member States,.

Outcomes from the first meeting

The project team held its 1st meeting (HSPT1), organized by the French Hydrographic Office (Shom), at the Palais de la Porte Dorée, Paris, France from 20 to 22 June 2017 under the chairmanship of Christophe Vrignaud (France).

28 representatives from 13 Member States (Australia, Brazil, Canada, France, Germany, Italy, Netherlands, Norway, Portugal, Republic of Korea, Sweden, United Kingdom and United States), an observer from the International Federation of Hydrographic Societies (IFHS), expert contributors from ARGANS, Fugro, IIC Technologies, iXblue and the University of Southern Mississippi, and the IHO Secretariat attended the meeting.

The HSPT received presentations covering SHOM's MBES/SBES and LIDAR quality management with reference to S-44 (France), The referencing and use of S-44 for commercial surveys (iXblue), CATZOC S-57 (Australia), The CHS Exclusive Order survey standard (Canada), Standards for LIDAR surveys (Fugro),

Unmanned survey platforms (Republic of Korea), Satellite Derived Bathymetry (SDB) and efforts to create data which meets current S-44 standards (ARGANS), EMODnet and Crowd-Sourced Bathymetry (France) and The relation of S-44 to commercial port surveys (Australia, on behalf of Precision Hydrographic Services). The IHO secretariat representative reminded the scope of the project, highlighted by the Chair during his introduction, and provided some general considerations.

Basically, three points of discussions were highlighted:

- Does the S-44 need to be more constrained or at the opposite, more flexible in order to accommodate data that might be less accurate but remain priceless when information is missing?
- Does the S-44 have to deal exclusively with safety of navigation, without taking into account other hydrographic needs?
- Knowledge of the existence of hydrographic surveys standards is very important not only the hydrographic community, but also for private/public contracting bodies.

The participants identified a number of the limitations in the current version of S-44 and discussed why they were considered to be weaknesses.

So far, ten limitations or deficiencies were underlined, and proposal for solutions were discussed:

- 1 - S-44 only focused for a final objective which is the nautical chart, with a depth classification (possible solution: matrix or updated table)
- 2 - Difficulty to have an overview of all requirements (possible solution: matrix or updated table)
- 3 - Limited number of definitions (possible solution: support and liaison with the DQWG and VIM3¹)
- 4 - Misalignment between S-44 and CATZOC (possible solution: contacts with S-101WG and DQWG)
- 5 - Grid resolution and bathymetric surfaces not addressed (contact with S-102)
- 6 - Confusion between a-priori TPU² and a-posteriori Qualification (review specific chapters of the S-44)
- 7 - S-44 should remain specific technologies-neutral (review specific chapters of the S-44)
- 8 - Confusion of attribute in metadata
- 9 - Outdated chapters
- 10 - Annexes A & B to be placed in C-13 - *Manual on Hydrography* -

Except for limitation #1, all others are mostly corrections or amendments.

The main point of discussion was about limitation number 1, to know how the table of S-44 should be updated, with very diverse views being expressed, ranging from minimal revision to a radical new approach. The minimal revision consists on a document that preserves the current structure, maintaining the table, with some updates. A completely new approach should be a matrix to classify the surveys according to the requirements achieved for different criteria and class. An in-between approach can be hybrid, and maintains the table to classify the surveys made specifically for navigation safety and nautical cartography and present a broader matrix that can be used to classify more demanding surveys (engineering / dredging) and also for all the other less demanding (environment, pollution, biology, habitats, ...). It was agreed that a "backward compatibility" with the S-44 5th edition Orders is mandatory. A prototype of a "matrix" is given in Annex C, as an example of this new approach. More investigations will be done on these approaches by HSPT. Besides, because the "matrix" point of view is a radical new approach, it was agreed that the Chair would seek advice from HSSC on the way forward: should the HSPT continue to study these 3 different approaches (table, matrix, hybrid table/matrix)?

Furthermore, the participants worked on a questionnaire intended to gauge the views of users and stakeholders on this S-44 topic (closing date for response is Friday 17th November 2017 - web link:

https://www.surveymonkey.co.uk/r/HSPT_S-44_Q).

Work Program

It was agreed that a further meeting would be beneficial once the outcomes and further direction had been received from the next HSSC meeting in November (HSSC9). This would also allow time to receive the results of the Customer Requirements Survey questionnaire, which is being coordinated by the observer from IFHS, and to continue the intersessional works on S-44 limitations. The next HSPT meeting (HSPT2) is tentatively planned for July 2018 in Niterói, Brazil, subject to the outcomes of HSSC9.

¹ International Vocabulary of Metrology - <http://www.bipm.org/en/publications/guides/vim.html>

² Total Propagated Uncertainty

Progress on HSSC Action Items

All related actions from HSSC8 for the H2SPT have been completed.

Problems Encountered

Because the “matrix” point of view is a radical new approach, it was agreed that the Chair would seek advice from HSSC on the way forward: should the HSPT continue to study these 3 different approaches (table, matrix, hybrid table/matrix)?

Any Other Items of Note

Conclusions and Recommended Actions

Based on the resources available, the HSPT Chair recommends the following course of action:

- Step 1: with the agreement of HSSC, work on the three different approaches in order to propose a draft to HSSC10 (April 2018), and seek advices.
- Step 2: meanwhile this study on the three different approaches, work on the other limitations already defined during HSPT1, and provide solutions for HSPT2 (July 2018).
- Step 3: Merge all considerations and work on S-44 6th edition (2018-2019)

Justification and Impacts

At this step HSPT would like an agreement from HSSC, to consider new approaches of the S-44 using a Matrix or a table/Matrix. If HSSC is strongly opposed to new approach, then HSPT will stay focused on a table update (and will still consider the other limitations).

Action Required of HSSC

The HSSC is invited to:

- a. Note this report
- b. Provide further guidance on the conclusions and recommended actions listed above
- b. Endorse the continuation of HSPT to pursue its work under its Terms of Reference
- c. Review and endorse the work program at Annex B

MEMBERS OF HSPT

COUNTRY/ ORGANIZATION	NAME AND ORGANIZATION	TELEPHONE FAX & email
Australia	Andrew Coulls Deputy Director Bathymetric Data Assessment Australian Hydrographic Office Locked Bag 8801 Wollongong NSW 2500 Australia	Tel: +61.2.4223 6688 Fax: +61.2.4223 6599 email: andrew.coulls@defence.gov.au
Brazil	Nickolás de Andrade Roscher Brazilian Navy Hydrographic Center (CHM) Directorate of Hydrography and Navigation (DHN) Rua Barao de Jaceguai, s/n° Niteroi – Rio de Janeiro 24048-900 Brazil	Tel: +55 2121 893511 Fax: +55 2121 893066 email: nickolas.roscher@dhn.mar.mil.br hinar_m@yahoo.com
Brazil	Rodrigo de Campos Carvalho Brazilian Navy Hydrographic Center (CHM) Directorate of Hydrography and Navigation (DHN) Rua Barao de Jaceguai, s/n° Niteroi – Rio de Janeiro 24048-900 Brazil	Tel: +55 2121 893511 Fax: +55 2121 893066 email: rodrigo.carvalho@marinha.mil.br; hnrodrigocarvalho2003@hotmail.com
Canada	Stephen Parsons Canadian Hydrographic Service Canada	Tel: + Fax: + email: Stephen.Parsons@dfo- mpo.gc.ca
Canada	René Chenier Canadian Hydrographic Service Canada	Tel: + Fax: + email: Rene.Chenier@dfo- mpo.gc.ca

France	Christophe Vrignaud SHOM/DMGS/IES/ISE Système acoustique embarqué SHOM 13 rue du Chatellier CS 92803 29228 BREST CEDEX 2 France	Tel: +33 2 56 31 23 98 Fax: + email: christophe.vrignaud@shom.fr
Germany	Thomas Dehling Head of Hydrographic Surveying Division Bundesamt für Seeschifffahrt und Hydrographie Bernhard-Nocht-Str 78 20359 Hamburg Germany	Tel: +49-381-4563-719 Fax: + email: Thomas.dehling@bsh.de
Germany	Jean-Guy Nistad Hydrographic Surveying Division Bundesamt für Seeschifffahrt und Hydrographie Bernhard-Nocht-Str 78 20359 Hamburg Germany	Tel: +49-381-4563-721 Fax: + email: Jean-guy.nistad@bsh.de
Italy	Erik Biscotti Istituto Idrografico della Marina Passo Osservatorio 4 Genova 16135 Italy	Tel: +39 0102 4432?? Fax: + email: erikd.biscotti@marina.difesa.it erikbisc@libero.it
Italy	Enrico Zanone Istituto Idrografico della Marina Passo Osservatorio 4 Genova 16135 Italy	Tel: +39 0102 4432?? Fax: + email: enrico.zanone@marina.difesa.it
Italy	Ottavio Patulli Istituto Idrografico della Marina Passo Osservatorio 4 Genova 16135 Italy	Tel: +39 0102 4432?? Fax: + email: ottavio.patulli@marina.difesa.it
Japan	Kazuki Watanabe Director for Advanced Technology in Hydrography Hydrographic and Oceanographic Department Japan Coast Guard	Tel: +81-3-3595-3605 Fax: +81-3-3595-3626 email: ico@jodc.go.jp

Netherlands	John Loog Hydrographic Service Royal Netherlands Navy Ministry of Defence Frederikkazerne Building 32, room 1.10 2597 BC Den Haag Netherlands	Tel: + 31 (0)70-3162823 Fax: + 31 (0)70-3162843 email: JP.Loog@mindef.nl
Norway	Vidar Bøe Norwegian Mapping Authority Prof Olav Hanssens vei 10 4021 Stavanger Norway	Tel: +47 32 11 81 00 Fax: + email: Vidar.Boe@kartverket.no
Norway	Arne Ofstad Norwegian Mapping Authority Prof Olav Hanssens vei 10 4021 Stavanger Norway	Tel: +47 32 11 81 00 Fax: + email: Arne.Ofstad@kartverket.no
Perú	Jaime Valdez Directorate of Hydrography and Navigation Peruvian Navy	Tel: +511 207 8160 Ext. 6417 Fax: + email: jvaldez@dhn.mil.pe
Portugal	Cristina do Sameiro dos Santos Monteiro Instituto Hidrográfico – Marinha Rua das Trinas 49 1249-093 Lisboa	Tel: +351 210 943 068 Fax: + email: cristina.monteiro@hidrografico.pt
Republic of Korea	Kwanchang Lim Korea Hydrographic and Oceanographic Agency Ministry of Oceans and Fisheries #351 Haeyang-ro Yeongdo-gu BUSAN 49111 Republic of Korea	Tel: +82 51-400-4340 Fax: +82 51-400-4349 email: kclim00@korea.kr
Republic of Korea	Iji Kim Korea Hydrographic and Oceanographic Agency Ministry of Oceans and Fisheries #351 Haeyang-ro Yeongdo-gu BUSAN 49111 Republic of Korea	Tel: +82 51-400-4340 Fax: +82 51-400-4349 email: izzykim@korea.kr

Sweden	Anders Åkerberg Hydrographic Surveys Operations Sjöfartsverket/Swedish Maritime Administration Sjögeografi/Hydrographic Office SE-60178 Norrköping	Tel: +46 (0)10 4786136 Fax: + email: anders.akerberg@sjofartsverket.se
Sweden	Hans Öiås Expert in Hydrographic Surveys and Bathymetry Sjöfartsverket/Swedish Maritime Administration Sjögeografi/Hydrographic Office SE-60178 Norrköping	Tel: +46 (0)10 4784718 Fax: + email: Hans.Oias@sjofartsverket.se
Turkey	Umit Gorur Turkish Navy Office of Navigation, Hydrography and Oceanography (SHODB) 34805 Çubuklu Istanbul Turkey	Tel: + Fax: + email: ugorur@shodb.gov.tr
UK	Jim Champman UKHO Admiralty Way Taunton Somerset TA1 2DN	Tel: +44 0183 484444 Fax: + email: James.Chapman@ukho.gov.uk
USA	Matthew Thompson Technical Lead Hydrographic Department Naval Oceanographic Office Code NP4T 1002 Balch Boulevard Stennis Space Center MS 39522-5001	Tel: +1 228-688-4954 Fax: + email: matthew.a.thompson1@navy.mil
USA	Megan P Greenaway Technical Advisor Hydrographic Surveys Division Office of Coast Survey NOAA 1315 East West Highway Building SSMC3 Silver Spring MD 20910-3282	Tel: +1 301-713-2702 x126 Fax: + email: megan.greenaway@noaa.gov
USA	Misty D. Savell, RPG Bathymetrist Maritime Safety Office National Geospatial-Intelligence Agency (NGA) 7500 GEOINT Drive Springfield VA 22150	Tel: +1 571-557-4122 Fax: + email: misty.d.savell@nga.mil

USA	Neil Weston Technical Director NOAA Office of Coast Survey Coast Survey Development Laboratory 1315 East West Highway Building SSMC3 Silver Spring MD 20910-3282	Tel: +1 301-713-2801 x 149 Fax: + email: neil.d.weston@noaa.gov
Observers		
FIG	Simon Ironside Chair, Commission 4 WG4.1 International Federation of Surveyors (FIG)	Tel: +64 27 439 6490 Fax: + email: simon.ironside@eliotsinclair.co.nz
FIG	Michael Beard Vice-Chair, Commission 4 WG4.1 International Federation of Surveyors (FIG)	
IFHS	Iain Slade 6 Providence Place Stoke Plymouth PL1 5QS United Kingdom	Tel: + Fax: + email: i.slade@fugro.com or islade@yahoo.com
Expert Contributors		
ARGANS	Jean Laporte Plymouth Science Park 1 Davy Road Plymouth Devon PL9 8BX United Kingdom	Tel: + 44 1752 764257 Fax: + email: JLaporte@argans.co.uk
ARGANS	Henri Dolou Plymouth Science Park 1 Davy Road Plymouth Devon PL9 8BX United Kingdom	Tel: + 44 1752 764257 Fax: + email: HDolou@argans.co.uk henri.dolou@wanadoo.fr
Fugro	Hugh Parker Hydrographic Services Business Development Manager 7 Valetta Road Kidman Park SA5025 Australia	Tel: +61 8 8161 4100 Fax: +61 8 8152 0008 email: h.parker@fugro.com

Fugro	Marco Filippone Chief Hydrographer and Projects Manager European and Middle East/Africa Hydrographic Survey Operations Bremen Germany	Tel: + Fax: + email: m.filippone@fugro.com
Gardline Geosurvey	Cliff Whatrup Marketing Manager (Hydro Division) Gardline Geosurvey Limited Endeavour House Admiralty Road Great Yarmouth Norfolk NR30 3NG United Kingdom	Tel: + 44 (0)1493 845614 Fax: + 44 (0)1493 852106 email: cliff.whatrup@gardline.com
Howlett Hydrographic	Chris Howlett Howlett Hydrographic Badbury Cross Barn Isle Abbots Taunton Somerset TA3 6RS	Tel: ++44(0)1460 281500 Fax: + email: chris.m.howlett@btinternet.com
IIC Technologies	David Dodd Senior Scientist IIC Technologies Inc	Tel: + Fax: + email: David.Dodd@iictechnologies.com
iXblue	Fabien Germond Head of Survey Department IXBLUE - Sea Operation Division	Tel: + 33 6 32 98 86 99 Fax: + email: fabien.germond@ixblue.com
iXblue	David Vincentelli Survey Business Developer IXBLUE - Sea Operation Division	Tel: + 33 6 47 33 01 20 Fax: + email: david.vincentelli@ixblue.com
Precision Hydrographic Services	Neil Hewitt Managing Director 2/634 South Rd, Glandore, South Australia 5037 Australia	Tel: + 61 (8) 8351 1203 Fax: + email: neil.hewitt@precisionhydrographic.com.au

UNH	Andy Armstong Centre for Coastal and Ocean Mapping University of New Hampshire Durham NH USA	Tel: + Fax: + email: andy.armstrong@noaa.gov
UNH	Brian Calder Centre for Coastal and Ocean Mapping University of New Hampshire Durham NH USA	Tel: + Fax: + email: brc@ccom.unh.edu
USM	Maxim van Norden Director Coordinator for Hydrographic Science Degree Programmes School of Ocean Science and Technology The University of Southern Mississippi 1020 Balch Boulevard Stennis Space Center, MS 39529-9904 USA	Tel: + 1-228-688-7123 Fax: + 1-228-688-1121 email: maxim.vannorden@usm.edu
IHO Secretariat		
IHO	David Wyatt Assistant Director, Survey and Operations IHO Secretariat	Tel: +377.93.10.81.00 Fax: +377.93.10.81.40 email: adso@iho.int

STANDARDS for HYDROGRAPHIC SURVEYS PROJECT TEAM (HS PT) WORK PLAN 2018-19

Tasks

A	Review the existing edition of S-44 (5 th edition) and identify any deficiencies in either the standards or explanatory content.
B	Identify Orders of Surveys (in terms of horizontal and vertical uncertainty requirements, feature detection requirements, and statistical confidence levels), which are required to meet certain user requirements, noting that user requirements include, but are not limited to, the differing levels of CATZOC (S-57) / Quality of Bathymetric Data (S-10X).
C	Define, if and as appropriate, a relationship between survey orders in the IHO S-44 Publication and CATZOC used in S-57 ENC and Quality of Bathymetric Data in S-101 ENC.
D	Following review, update the content and structure of S-44 to the extent identified during the review, with the intention of publishing revisions as a sixth edition of S-44.
E	Identify any other emergent requirements not addressed within the scope of tasks A to D, and develop a proposal and recommendations on whether the Hydrographic Survey Project Team should close, continue working on specific tasks, or be migrated to a standing Working Group with an expanded Work Plan.
F	On completion of publication of a sixth edition of S-44, submit a proposal and recommendation to HSSC on whether the Project Team should continue as a standing Working Group and, if so, what tasks have been identified to justify transition to a standing Working Group.

Work items

Work item	Title	Priority H-high M-medium L-low	Next milestone	Start Date	End Date	Status P-planned O-ongoing C-completed S-Superseded	Contact Person(s)	Related Pubs / Standard	Remarks
A-1	Review the existing edition of S-44 (5 th edition) and identify any deficiencies in either the standards or explanatory content.	H	HSSC 9	2016	2017	P C	Chair	S-44 Edition 5	
B-1	Identify Orders of Surveys (in terms of horizontal and vertical uncertainty requirements, feature detection requirements, and statistical confidence levels), which are required to meet certain user requirements, noting that user requirements include, but are not limited to, the differing levels of CATZOC (S-57) / Quality of Bathymetric Data (S-10X).	H	HSSC 10	2017	2018	P O	Chair / MS	S-44 Edition 5 S-57	
C-1	Define, if and as appropriate, a relationship between survey orders in the IHO S-44 Publication and CATZOC used in S-57 ENC and Quality of Bathymetric Data in S-101 ENC.	M	HSSC 9 & 10	2017 2018	2018 2019	P O O	MS / Experts	S-44 Edition 5 S-57 S-101	
C-2	Define, if and as appropriate, a relationship between survey orders in the IHO S-44 Publication and S-5 in order to mitigate the human element factor.	M	HSSC 9 & 10	2017 2018	2018 2019	P O O	MS / Experts	S-44 Edition 5 S-5	

Work item	Title	Priority H-high M-medium L-low	Next milestone	Start Date	End Date	Status P-planned O-ongoing C-completed S-Superseded	Contact Person(s)	Related Pubs / Standard	Remarks
D.1	Following review, update the content and structure of S-44 to the extent identified during the review, with the intention of publishing revisions as a sixth edition of S-44.	H	HSSC 10	2018	2019	P O	MS / Experts / IHO Bodies	S-44 Edition 5	
E-1	Identify any other emergent requirements not addressed within the scope of tasks A to D, and develop a proposal and recommendations on whether the Hydrographic Survey Project Team should close, continue working on specific tasks, or be migrated to a standing Working Group with an expanded Work plan.	H	HSSC 10	2018	2019	P O	Chair / MS	C-13	
F-1	On completion of publication of a sixth edition of S-44, submit a proposal and recommendation to HSSC on whether the Project Team should continue as a standing Working Group and, if so, what tasks have been identified to justify transition to a standing Working Group.	H	HSSC 9 & 10	2017	2019	P O	MS/HSSC Bodies	C-13	
G-2	Start the discussion on the way forward.	H	HSSC 10	2018	2019	P O	MS/HSSC		

Meetings

Date	Location	Activity
20-22 June 2017	Paris, France	HSPT1
tbc	Niterói, Brazil	HSPT2

PT Chair: Christophe Vrignaud

Email: christophe.vrignaud@shom.fr

PT Vice Chair: Nickolás de Andrade Roscher

Email: nickolas.roscher@dhn.mar.mil.br

PT Secretary: David Wyatt

Email: adso@iho.int

Backward compatibility: (5th edition Order still available)

Criteria	Special	1a	1b	2
Description	UKC critical	Areas <100m UKC required	Areas <100m UKC not required	Areas >100m
Total Horizontal Uncertainty (m)	1E	1J	1J	1H
Total Vertical Uncertainty (m)	2C	2D	2D	2F
Feature Detection (m ³)	3D	3E or 3I after 40m depth	-	-
Seafloor Coverage / Line Spacing	4B	4B	4H	4I
Positioning of Fixed Aids (m)	5F	5F	5F	5H
Positioning of Coastline & Topography (m)	6E	6G	6G	6G
Floating Navigation Aids (m)	7D	7D	7D	7F
Structure Heights (m)	8D	8D	8G	8G
Final Survey Data Grid Resolution(m ²)	11D	11F	11H	11I
Grid Source Sounding Density (pts/bin)	12D	12C	12B	12A

Class of surveys can be defined, using the matrix:

Purpose							
	UKC (Exclusive Order)	Harbour	Approach/ Near Shore	Marine Renewable Energy	Coastal	Continental	Oceanic
Description	High-accuracy-dredge, build, UKC critical	Declared depths/ Manoeuvring areas	Areas <100m UKC required	Surveys dedicated form wind farm	Areas <100m UKC required	Areas >100m	Oceanic soundings
Total Horizontal Uncertainty (m)	1D	1E	1F		1F	1H	1I
Total Vertical Uncertainty (m)	2B	2C	2D		2E	2F	2H
Feature Detection (m ²)	3C	3D	3E		3I	3I	3I
Sea Floor Coverage / Line Spacing	4A	4B	4B		4E	4I	4J
Positioning Grid Axes (m)	5D	5F	5F		5F	-	-
Positioning of Coastline Topography (m)	6D	6E	6G		6G	-	-
Floating Navigation Aids (m)	7D	7D	7D		7D	-	-
Structure Heights (m)	8D	8D	8D		8G	-	-
Final Survey Data Grid Resolution(m ²)	11C	11D	11F		11I	11J	100K
Grid Source Sounding Density (gts/bin)	12D	12D	12C		12A	12A	12I

Criteria

Draft (Works in progress)