INTERNATIONAL HYDROGRAPHIC ORGANIZATION

ANNUAL REPORT 2015

PART 1 – GENERAL

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MEMBER STATES OF THE INTERNATIONAL HYDROGRAPHIC ORGANIZATION (IHO) – 31 December 2015

Algeria	Monaco
Argentina	Montenegro
Australia	Morocco
Bahrain	Mozambique
Bangladesh	Myanmar
Belgium	Netherlands
Brazil	New Zealand
Brunei Darussalam	Nigeria
Cameroon	Norway
Canada	Oman
Chile	Pakistan
China	Papua New Guinea
Colombia	Peru
Croatia	Philippines
Cuba	Poland
Cyprus	Portugal
Democratic People's Republic of Korea	Qatar
Democratic Republic of the Congo*****	Republic of Korea
Denmark	Romania
Dominican Republic*****	Russian Federation
Ecuador	Saudi Arabia
Egypt	Serbia*****
Estonia	Singapore
Fiji	Slovenia
Finland	South Africa
France	Spain
Georgia	Sri Lanka
Germany	Suriname
Greece	Sweden
Guatemala	Syrian Arab Republic
Iceland	Thailand
India	Tonga
Indonesia	Trinidad and Tobago
Iran (Islamic Republic of)	Tunisia
Ireland	Turkey
Italy	Ukraine
Jamaica	United Arab Emirates
Japan	United Kingdom of Great Britain and Northern Ireland
Kuwait	United States of America
Latvia	Uruguay
Malaysia	Venezuela (Bolivarian Republic of)
Mauritius	Viet Nam
Mexico	

Pending Member States: Bulgaria, Congo, Haiti, Malta, Mauritania, Sierra Leone, Solomon Islands, Vanuatu.

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INTERNATIONAL HYDROGRAPHIC BUREAU
DIRECTING COMMITTEE

President	Directors
Robert WARD, Australia	**Mustafa IPTES,** Turkey **Gilles BESSERO,** France

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LIST OF ACRONYMS

A	
ABLOS	Advisory Board on the Law of the Sea
ACCSEAS	Accessibility for Shipping, Efficiency Advantages and Sustainability
AIS	Automatic Identification System
ARHC	Arctic Regional Hydrographic Commission
B	
BSH	*Bundesamt für Seeschifffahrt und Hydrographie*
BSHC	Baltic Sea Hydrographic Commission
C	
CB	Capacity Building
CBSC	Capacity Building Sub-Committee
CBWP	Capacity Building Work Programme
CHART	Cartography, Hydrography and Related Training (Project)
CIRM	Comité International Radio-Maritime
CL	Circular Letter
COMNAP	Council of Managers of National Antarctic Programs
CSB	Crowd-Sourced Bathymetry
CSPCWG	Chart Standardization and Paper Chart Working Group
D	
DCDB	Data Centre for Digital Bathymetry
DG Mare	Directorate-General for Maritime Affairs and Fisheries
DHN	*Dirección de Hidrografía y Navegación*
DIPWG	Digital Information Portrayal Working Group
DQWG	Data Quality Working Group
E	
EAHC	East Asia Hydrographic Commission
EAtHC	Eastern Atlantic Hydrographic Commission
EC	European Commission
ECDIS	Electronic Chart Display and Information System
EIHC-5	5th Extraordinary International Hydrographic Conference
EMODnet	European Marine Observation and Data Network
ENC	Electronic Navigational Chart
EU	European Union
F	
FIG	International Federation of Surveyors
G	
GEBCO	General Bathymetric Chart of the Oceans
GGC	GEBCO Guiding Committee
GIS	Geographic Information System

H

HE	His Excellency
HO	Hydrographic Office
HSH	His Serene Highness
HSSC	Hydrographic Services and Standards Committee

I

IAEA	International Atomic Energy Agency
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IAPH	International Association of Ports and Harbours
IBCSO	International Bathymetric Chart of the Southern Ocean
IBSC	International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers
ICA	International Cartographic Association
IC-ENC	International Centre for Electronic Navigational Charts
ICCWG	International Charting Coordination Working Group
IEC	International Electrotechnical Commission
IENWG	IHO-EU Network Working Group
IGO	Inter-Governmental Organization
IHB	International Hydrographic Bureau
IHC	International Hydrographic Conference
IHO	International Hydrographic Organization
IMO	International Maritime Organization
IMSO	International Mobile Satellite Organization
INT	International
IOC	Intergovernmental Oceanographic Commission
IRCC	Inter-Regional Coordination Committee
ISO	International Organization for Standardization
IT	Information Technology

J

JCOMM	Joint Technical Commission for Oceanography and Marine Meteorology
JHOD	Japan Hydrographic and Oceanographic Department

K

KHOA	Korea Hydrographic and Oceanographic Agency

L

M

MACHC	Meso-American and Caribbean Hydrographic Commission
MBSHC	Mediterranean and Black Seas Hydrographic Commission
MEIP	Maritime Economic Infrastructure Programme
METAREA	METeorogical Area
MoU	Memorandum of understanding
MOWCA	Maritime Organization for West and Central Africa
MS	Member State
MSC	Maritime Safety Committee
MSDI	Marine Spatial Data Infrastructure
MSDIWG	Marine Spatial Data Infrastructures Working Group
MSI	Maritime Safety Information
MSP	Maritime Spatial Planning

N

NATO	North Atlantic Treaty Organization
NAVAREA	NAVigational Area
NAVTEX	NAVigational TEXt Messages
NCSR	IMO Sub-Committee on Navigation, Communications and Search and Rescue
NGA	National Geospatial-Intelligence Agency
NGIO	Non-Governmental International Organization
NGO	Non-Governmental Organization
NHC	Nordic Hydrographic Commission
NIOHC	North Indian Ocean Hydrographic Commission
NOS	National Ocean Service
NSHC	North Sea Hydrographic Commission

O

OGC	Open Geospatial Consortium

P

PI	Performance Indicator
PMB	Project Management Board

Q

R

RENC	Regional ENC Coordinating Centre
RHC	Regional Hydrographic Commission
ROK	Republic of Korea
RoP	Rules of Procedure
ROPME	Regional Organization for the Protection of the Marine Environment
RSAHC	ROPME Sea Area Hydrographic Commission

S

SAIHC	Southern African and Islands Hydrographic Commission
SCRUM	Sub-Committee on Regional Undersea Mapping
SCUFN	Sub-Committee on Undersea Feature Names
SCWG	Surface Current Working Group
SDI	Spatial Data Infrastructures
SEPRHC	South East Pacific Regional Hydrographic Commission
SHOM	Service Hydrographique et Océanographique de la Marine
SOLAS	International Convention for the Safety of Life at Sea
SPI	Strategic Performance Indicator
SWAtHC	South West Atlantic Hydrographic Commission
SWPHC	South West Pacific Hydrographic Commission

T

TALOS	Technical Aspects of the UN Convention on the Law of the Sea
TC	Technical Committee
TSCOM	Technical Sub-Committee on Ocean Mapping
TWLWG	Tidal and Water Level Working Group
ToR	Terms of Reference

U

UAE	United Arab Emirates
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
UN	United Nations Organization
UNESCO	United Nations Educational, Scientific and Cultural Organization
UN-GGIM	United Nations Committee of Experts on Global Geospatial Information Management
UNH	University of New Hampshire
USA	United States of America
USCHC	USA-Canada Hydrographic Commission

V

W

WEND	Worldwide ENC Database
WG	Working Group
WMO	World Meteorological Organization
WP	Work Programme
WPI	Working-level Performance Indicator
WWNWS	World Wide Navigational Warning Service
WWNWS-SC	WWNWS Sub-Committee

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INTRODUCTION

The Directing Committee is pleased to present the Annual Report of the activities of the Organization for 2015. This report provides an account of the principal activities and achievements of the IHO, the subordinate bodies of the Organization and the IHB during the year. The report also describes the cooperation and participation of other international organizations and stakeholders in the execution of the IHO Work Programme.

This Report consists of two parts:

Part 1– General

Part 1 provides short summary reports and observations on the execution of the IHO Work Programme. Part 1 is structured based on the three parts of the Work Programme: Corporate Affairs, Hydrographic Services and Standards and Inter-Regional Coordination and Support. In this way the Report is also directly related to the technical structure of the Organization which is based on the Secretariat (Corporate Affairs) function and the two principal Committees - the Hydrographic Services and Standards Committee (HSSC) and the Inter-Regional Coordination Committee (IRCC). As far as possible, Part 1 of the Report follows the same structure and uses the same headings as in the approved Work Programme.

Part 2 – Finance

Part 2 provides the financial statement and accounts for 2015 together with the report of the external auditor.

Summary and Highlights

Status of Approvals

By the end of 2015, 46 of the required minimum of 48 Member States had formally approved the Protocol of Amendments to the Convention on the IHO. It is hoped that the remaining minimum of two more approvals will be achieved in 2016. The principal amendments to the Convention will enable the Organization to follow a three-yearly planning cycle, establish a Council and enable States that are already Member States of the United Nations to become Member States of the IHO without the need for a lengthy vote of acceptance procedure. This is likely to see several States applying for membership as soon as the amended Convention enters in to force.

In the meantime, having received the required number of acceptances by the existing Member States in 2014, Georgia and Viet Nam formally became the 83rd and 84th Member States of the IHO on 2 March 2015. In the same way, Brunei Darussalam acceded to the Convention on the IHO on 26 March 2015 and became the 85th Member State of the IHO (see IHO CLs 30 and 33 of 2015).

Congo, Malta, Solomon Islands and Vanuatu applied to become Member States of the IHO in 2015 (see IHO CLs 32 and 62). By the end of the year, none of these States had received the required number of acceptances from the existing Member States as required under the existing version of the Convention on the IHO.

Mauritania (application approved in April 1991), Bulgaria (application approved in April 1992), Sierra Leone (application approved in September 2010) and Haiti (application approved in November 2012) had yet to submit their instrument of accession to become Member States.

Technical Programme

The technical programme remained focused on developing the S-100 series of new standards while keeping the current IHO standards fit for purpose. The implementation of the re-organized structure of the working groups of the HSSC reflected more clearly these two objectives.

Edition 2.0.0 of S-100 - *Universal Hydrographic Data Model* was approved by the Member States and published. Much efforts were devoted to the continuing development of S-100 based product specifications, including S-101 - *ENC Product Specification* and various product specifications related to nautical information, tides and surface currents, maritime limits and boundaries. A new work item on the development of a draft product specification for the display of under keel clearance management information was decided. The initial scoping of an S-100 interoperability specification for ECDIS was completed.

Edition 6.1.0 of S-52 - *Specifications for Chart Content and Display Aspects of ECDIS*, Edition 4.0(.1) of S-52 Annex A - *IHO Presentation Library for ECDIS* and Edition 3.0(.1) of S-64 - *IHO Test Data Sets for ECDIS* became the normative IHO references for the type approval of new ECDIS as the International Electrotechnical Commission (IEC) published the 4th Edition of its ECDIS test standard, IEC 61174. Edition 1.2.0 of S-63 - *IHO Data Protection Scheme* was approved by the Member States and published.

Under the continuous maintenance of S-4 - *Regulations for International (INT) Charts and Chart Specifications of the IHO*, a revised edition 4.6.0 was drafted and circulated to the Member States for approval. The Hydrographic Offices of Germany and Spain published new editions of the official English and Spanish language versions of INT 1 - *Symbols, Abbreviations and Terms used on Charts* on behalf of the IHO.

Capacity Building Programme

The level of activity in the IHO Capacity Building (CB) Programme continued to increase. Expenditure (930k€) was more than double the budget for the previous year. The programme continued to benefit from significant financial contributions provided by the Republic of Korea and the Nippon Foundation of Japan.

Financial Situation of the IHO

As indicated in Part 2 of this Report, the financial situation of the Organization at the end of the year remained good. The conservative budgetary approach pursued by this and previous Directing Committees and approved by the Member States has once again resulted in a significant positive outcome by the end of the year. It is proposed that the bulk of this surplus be transferred to the Capacity Building Fund, thereby enabling a number of approved but otherwise unfunded Capacity Building projects to proceed in 2016.

Conclusion

In conclusion, the Directing Committee, on behalf of all IHO Member States, would, once again, like to express its gratitude to His Serene Highness Prince Albert II of Monaco and His Government for the continuing generous support and interest in the Organization.

WORK PROGRAMME 1
Corporate Affairs

Introduction

IHO Work Programme 1 "Corporate Affairs" covers the provision of the services of the secretariat of the IHO and, through the IHB, the management and fostering of relations with other international organizations. Work Programme 1 is executed primarily by the Directing Committee.

Element 1.1 Cooperation with International Organizations

This element covers liaison and cooperation between the IHO and other international organizations. Notable activities during the year are described hereinafter. The IHO was represented in most cases by a Director or an Assistant Director.

Task 1.1.1 Antarctic Treaty Consultative Meetings

The 38th Antarctic Treaty Consultative Meeting (ATCM) took place in Sofia, Bulgaria, in June. The ATCM is an annual meeting comprising the States Parties to the Antarctic Treaty together with observer States and organizations, including the IHO. The meeting considers Measures, Decisions and Resolutions, which are adopted at the ATCM by consensus, to give effect to the principles of the Antarctic Treaty and the Environment Protocol and to provide regulations and guidelines for the management of the Antarctic Treaty area.

Monaco presented the report of the IHO, which, once again, highlighted the poor state of survey progress in the waters of Antarctica and pointed out the inherent risks that this imposes on all marine related human activity taking place in the region.

Task 1.1.2 Comité International Radio Maritime (CIRM)

President Ward (right) congratulates the President of CIRM on his re-election

The Comité International Radio-Maritime (CIRM) held its Annual Meeting in Kouklia, Cyprus, from 27 to 29 April. CIRM is the body representing the maritime electronics industry in the development of relevant international regulations and standards and enjoys observer status with the IHO as a Non-Governmental International Organization (NGIO). CIRM maintains an active role in the IHO Hydrographic Services and Standards Committee (HSSC), with a number of its members also participating as Expert Contributors in various HSSC working groups.

President Ward represented the IHO at the Annual Meeting where he participated in a panel discussion on various topics in which CIRM is taking an active interest: in particular, e-navigation, the need for established software maintenance requirements for navigational systems in ships and cyber-security.

During the meeting, the members of CIRM re-elected Mr Michael Bergmann as their President and re-appointed the governing Board.

After the meeting, the President visited the Cyprus Hydrographic Office, where he was greeted by Mr Andreas Sokratous, Director of the Department of Lands and Surveys of Cyprus, with overall responsibility for hydrography and nautical charting in Cyprus. The President was given a tour of the facilities and was particularly impressed with the way that the Department was focusing on spatial data infrastructures and successfully incorporating hydrography and the fundamental hydrographic data sets into the national geodata infrastructure.

Mr Andreas Sokratous, Director of the Department of Lands and Surveys of Cyprus and President Ward

Task 1.1.3 Council of Managers of National Antarctic Programs (COMNAP)

In the absence of a meeting of the Hydrographic Commission on Antarctica in 2015, there was no significant contact or activity with the Secretariat of COMNAP.

Task 1.1.4 European Union Initiatives

IHO-EU Network WG

The IHO-EU Network Working Group (IENWG), set up by the Inter-Regional Coordination Committee (IRCC) to monitor and deal with activities and processes developed under the aegis of the European Union (EU), held two meetings.

- *Second IENWG Meeting*

The second IENWG meeting took place in Saint-Mandé, France, on 28 and 29 January, at the invitation of the French Hydrographic Office (SHOM).

The meeting, chaired by France, was attended by representatives from Denmark, France, Germany, Norway, Spain, Sweden and the United Kingdom. Director Gilles Bessero represented the IHB. The meeting was organized in three sessions. The first two sessions were devoted to reviewing the status and perspective of respectively the European Marine Observation and Data Network (EMODnet) and Maritime Spatial Planning. Representatives of the European Commission (Directorate-General for Maritime Affairs and Fisheries – (DG Mare)) attended these sessions. The last session focused on the work plan of the Working Group.

IENWG-2 in session

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EMODnet and related issues

The Working Group was informed by DG Mare that the outcome of the call for tenders on coastal mapping, to which a consortium led by SHOM, including 11 other Hydrographic Offices (HOs) had responded, was expected to be announced in March. DG Mare indicated that a new call for tenders on the ingestion and safe-keeping of marine data held by both public and private operators was in preparation with a budget of 4 million euros. Another call for tenders was expected later in 2015, probably in the last quarter of the year[1], to initiate the third phase of EMODnet (EMODnet III), with a budget of 5 million euros. The objective was to move from low resolution (approximately 250 m) digital terrain models to multiple resolution models aligned on the resolution at which the survey data was captured. Noting the requirement of the European Commission that the data and models be made freely available, the IENWG highlighted policy issues related to national security and cost recovery.

Maritime Spatial Planning

The IENWG reviewed the EU Directive on Maritime Spatial Planning (MSP) which came into force in September 2014. This required EU Member States to reflect the Directive in their national legislation by September 2016. By that date, the national authority responsible for Marine Spatial Planning (MSP) was to be nominated and a process for consulting the public and the stakeholders established. The Directive also required that plans covering the territorial waters and the Exclusive Economic Zones of each EU Member State be in place by 2021. The Working Group noted that although the role of HOs could be limited to the provision of low resolution bathymetry in support of the general planning phase, MSP offered an opportunity for HOs to position themselves as the national focal point for MSP, as part of the implementation of Marine Spatial Data Infrastructures.

- *Third IENWG Meeting*

The IENWG held its third meeting in Saint-Mandé, France, on 9 and 10 June, at the invitation of the French Hydrographic Office (SHOM).

The meeting was attended by representatives from Denmark, France, Germany, Greece, Norway, Sweden and the United Kingdom. Assistant Director Yves Guillam represented the IHB.

At the beginning of the meeting, Mr Laurent Kerléguer (SHOM's Deputy Director-General, France) was elected as Chair, succeeding Mr Michel Even who had stepped down due to his taking up a new role in SHOM.

EMODnet and related issues

The Chair informed the participants that DG Mare) had recently awarded a contract on coastal mapping to the consortium led by SHOM and including 11 other HOs. Several administrative requirements still needed to be addressed but a kick-off meeting was planned at the end of June in Saint-Mandé when the contract should be formally signed. Three years after the signature of the Memorandum of Understanding between the European Commission (EC) and the IHO, this Coastal Mapping project was the first significant success for a consortium of HOs taking the lead in an important EU project.

The meeting participants worked on a draft strategy for building a new consortium in order to prepare for the future call for tenders on EMODnet III-bathymetry.

[1] The EMODnet III call for tenders was subsequently postponed to 2016, for administrative reasons.

Working Lunch: The *"French Baguette"* session of the meeting!

Horizon 2020, Research and Innovation Programmes

The Working Group was informed of the recent events sponsored by the EC Directorate-General for Research and Innovation (DGRI) and presentations were given on various maritime projects already supported by this Directorate such as *EfficienSea2*. It was agreed that these activities provided an excellent opportunity to experiment with new concepts, and to use and promote the IHO S-100 framework, IALA and JCOMM standards. The Working Group acknowledged that it will need to prepare a strategy to identify the resources needed within HOs for submitting new attractive proposals to DGRI.

European Maritime Day 2015

The EMODnet Bathymetry project was presented at the European Maritime Day in Piraeus - Greece on 28 May by Mr Gaël Morvan of SHOM (France) on behalf of the IENWG. The presentation focused on the approach and achievements of the project, the ongoing pilot for enrichment with high resolution coastal Digital Terrain Models (DTMs), the scope of the new Coastal Mapping project, and the prospects for EMODnet.

Coastal Mapping Project

The Coastal Mapping Project started on 26 June. It is run by a consortium including the HOs of France (project leader), Belgium, Germany, Greece, Ireland, Italy, Latvia, Norway, Portugal, Slovenia and Sweden. The HOs of Spain and the United Kingdom participate as observers. The objectives of the project are to assess the current availability of digital coastal maps in the EU, to disseminate this information by EMODnet, to share experience of coastal mapping in the EU, to develop standards for best practices and to propose how a future Joint European Coastal Mapping Programme (JECMaP) could operate. The milestones met during the year were the specification review which took place during the EMODnet Jamboree on 21 and 22 October and the public opening of a dedicated portal on 23 December (see http://coastal-mapping.eu/).

Meeting with the Seas, Rivers, Islands and Coastal Areas Intergroup of the European Parliament

The Seas, Rivers, Islands and Coastal Areas Intergroup is one of the 28 Intergroups of the European Parliament. It was launched on 2010 as the "Seas and Coastal Areas Intergroup" and its objectives are to promote the maritime dimension in European policies and initiatives and to ensure that the specific issues faced by the islands are taken into account. A delegation composed of Mr Laurent Kerléguer, Chair of the IENWG, Dr Mathias Jonas, National Hydrographer of Germany and Dr Corine Lochet (France) participated in a meeting on "Marine data: What role for Europe" hosted by the Intergroup on 2 July at the European Parliament in Brussels, Belgium. The delegation highlighted the important role of European HOs in supporting European policies, in particular in relation to the implementation of MSP and the development of marine renewable energy, and presented the Coastal Mapping project.

Task 1.1.5 International Federation of Surveyors (FIG)

There was no requirement to communicate formally with the secretariat of the FIG during the year. The nominated FIG representatives on the FIG/IHO/ICA International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers (IBSC) continued to work with the other members of the Board (see Task 3.3.7).

Task 1.1.6 International Federation of Hydrographic Societies (IFHS)

The International Federation of Hydrographic Societies (IFHS) is a non-governmental partnership of learned national and regional hydrographic societies dedicated to the promotion of hydrography and related sciences. Liaison between the IFHS and the IHO is governed by a Memorandum of Understanding signed in 2006. The IHO was represented by Captain Abri Kampfer, National Hydrographer of South Africa and Chair of the Southern Africa and Islands Hydrographic Commission, at the Hydro15 Conference which took place in Cape Town, South Africa from 23 to 25 November. Captain Kampfer delivered a presentation on the status and future of hydrography in Southern Africa. On this occasion, the IHO-IOC GEBCO Ocean Bathymetry training programme was also presented and the IBSC held a stakeholder seminar on training and education in hydrography and nautical cartography.

Task 1.1.7 International Association of Antarctic Tour Operators (IAATO)

In the absence of a meeting of the Hydrographic Commission on Antarctica in 2015, there was no significant contact or activity with the secretariat of IAATO.

Task 1.1.8 International Association of Aids to Navigation and Lighthouse Authorities (IALA)

Annual secretariat liaison meeting

The recently appointed Secretary General of IALA, Mr Francis Zachariae visited the IHB in April. The Directing Committee briefed him on the role of the IHO and on current issues being considered by the Organization, as well as the increasing levels of cooperation between the two organizations regarding the use of the IHO S-100 data standard and the delivery of capacity building in conjunction with the IALA Academy.

At the invitation of IALA, Director Mustafa Iptes attended the annual IALA Policy Advisory Panel (PAP) meeting on 16 June at the IALA Headquarters in St Germain en Laye, France and addressed to the participants on the subject of "Hydrography in remote areas including polar region". He also presented the IHO activities related to hydrography, nautical charting and ENC, maritime safety information, e-navigation as well as joint IHO-IALA-IMO activities including maritime awareness and Capacity Building projects during the meeting.

e-NAV Committee

The IALA ENAV Committee is responsible for IALA activities relating to the implementation of e-navigation, including the management of the IALA domain of the IHO S-100 Geospatial Information Registry. Dr Edward Hosken (UK) represented the IHO at the 16th and 17th meetings of the Committee

held respectively from 20 to 24 April in Saint-Germain-en-Laye, France, and from 26 to 30 October in Brest, France.

e-Navigation Underway Conferences

The 5th International e-Navigation Underway Conference was held aboard the Baltic Sea ferry *Pearl Seaways* from 27 to 29 January. The conference was organized by the Danish Maritime Authority and IALA. A full international speaker programme led to lively discussions on how to implement the e-Navigation concept.

MV *Pearl Seaways* preparing to leave Copenhagen

The Conference was attended by over 150 representatives from many parts of the world and representing a cross-section of interests ranging from mariners, maritime administrations, significant flag States, navigation equipment manufacturers, academia, and international maritime organizations.

President Robert Ward, representing the IHO, addressed the Conference. He described the underpinning role that hydrography plays in all human activities that take place in, on or under the sea. He went on to describe how hydrography and nautical charting will underpin many aspects of e-Navigation, which he described as the "*maritime Intranet*", where mariners, ship operators and all those involved in commercial maritime activity can provide and obtain authoritative and relevant digital information in a simpler and better way than at present.

He emphasized the role of the ISO standards-based IHO S-100 data exchange standard as an underpinning element of e-Navigation in ensuring that the information can be input once only and will be interoperable with all the other related information in the e-Navigation digital information environment.

Task 1.1.9 International Association of Ports and Harbours (IAPH)

There was no communication between the IHB and the International Association of Ports and Harbours (IAPH) in 2015.

Following the recognition of the International Harbour Masters' Association (IHMA) as an observer organization to the IHO in 2014, two representatives of the IHMA called at the IHB on 26 May to identify and establish appropriate liaison with IHO activities that might support the IHMA's initiative on "Port Call Optimization", in particular in relation with the development of S-100.

Task 1.1.10 International Cartographic Association (ICA)

There was no requirement to communicate formally with the secretariat of the ICA during the year. The nominated ICA representatives on the IBSC continued to work with the other members of the Board (see Task 3.3.7).

Task 1.1.11 International Electrotechnical Commission (IEC)

The International Electrotechnical Commission (IEC) is an NGIO that publishes consensus-based international standards and manages conformity assessment systems for electric and electronic products, systems and services. The primary IHO contact is the Technical Committee 80 (TC80) that is responsible for maritime navigation and radio-communication equipment and systems and produces the testing standards required to implement the performance standards adopted by the International Maritime Organization (IMO). TC80 is responsible in particular of the testing standard for ECDIS, IEC 61174. Following approval of the final draft version by IEC National Committees, the 4th Edition of IEC 61174 was published in August (see Task 2.2.2).

Mr Yong Baek (Republic of Korea) represented the IHO at the biennial plenary meeting of TC80 which took place in Busan, Republic of Korea, on 19 and 20 October. The development and implementation of e-navigation in relation with the IMO Strategic Implementation Plan was

recognized as a driver for the future work of the Committee. The interoperability of marine equipment with shore-based systems and the use of the S-100 framework were identified as important issues. The Committee decided to establish a working group dealing with IEC standardization issues related to e-navigation.

Task 1.1.12 International Maritime Organization (IMO)

The Secretariat of the IHO represented the Organization at all IMO sessions where the agenda contained items of relevance to the Member States, submitting papers for consideration as appropriate. The following paragraphs provide summaries of IHO involvement in various bodies of the IMO that met during the year.

Assembly

The 29th session of the IMO Assembly was held at the IMO Headquarters in London, UK, from 23 November to 2 December. The IHO was represented by Director Mustafa Iptes.

The Assembly endorsed the Council's decision to appoint Mr Ki-Tack Lim (Republic of Korea), as the next Secretary-General for a period of four years from 1 January 2016.

Maritime Safety Committee

IMO MSC 95 in plenary session

The Maritime Safety Committee (MSC) is the highest technical body of the IMO. The functions of the MSC are to consider matters related to aids to navigation, construction and equipment of vessels, rules for the prevention of collisions, handling of dangerous cargoes, maritime safety procedures, hydrographic information, salvage and rescue and any other issues directly affecting maritime safety.

The 95th session of the Committee (MSC 95) was held at the IMO Headquarters from 3 to 12 June. Director Gilles Bessero and Assistant Director David Wyatt represented the IHO.

e-Navigation

The IHO, together with IALA, CIRM, the International Chamber of Shipping (ICS), the Baltic and International Maritime Conference (BIMCO) and the Cruise Lines International Association (CLIA), co-sponsored a presentation on *An IGO/NGO view on e-Navigation*. This was delivered at the end of the first day of MSC95. It reviewed the current status of e-Navigation developments and urged the IMO to continue to take the lead in the ongoing developments. The MSC agreed to include a High-level Action on *Development and implementation of e-navigation* in the High-level Action Plan for 2016-2017 and to include on the agenda of the NCSR five outputs based on the eighteen tasks from the approved e-navigation Strategy Implementation Plan (SIP), noting the comments contained in the IHO submission.

Joint IHO-IALA-CIRM-ICS-BIMCO-CLIA presentation – An IGO/NGO view on e-Navigation.

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Sub-Committee on Navigation, Communications and Search and Rescue

IMO NCSR 2 Plenary in session

The Sub-Committee on Navigation, Communications and Search and Rescue (NCSR) is a subordinate body of the MSC. Its functions are to consider technical and operational matters related to the obligations of governments and operational measures related to safety of navigation. These include: hydrographic services, ships' routeing, aids to navigation, radio-navigation systems, vessel traffic services, and pilotage; operational requirements and guidelines relating to navigational safety and associated issues.

The 2nd session of the Sub-Committee (NCSR 2) was held at the IMO Headquarters from 9 to 13 March. The IHO was represented by Director Gilles Bessero, Assistant Director David Wyatt, Mr Peter Doherty (USA), the Chair of the World-Wide Navigational Warning Service Sub-Committee (WWNWS-SC), and Mr Christopher Janus (USA), Branch Chief, NGA Maritime Watch - NAVAREA IV/XII. Several representatives of Hydrographic Offices also attended the meeting as part of their national delegation.

NCSR 2 approved three routeing measures that were forwarded to the MSC for adoption at its 95th session.

NCSR 2 finalized a draft consolidated guideline on Software Quality Assurance (SQA) and Human Centred Design (HCD) for e-navigation prepared by a Correspondence Group.

Director Bessero in the plenary at NSCR 2

The Sub-Committee received a report from the Chair of the IHO WWNWS-SC, in which the results of a year-long customer survey were highlighted. The survey revealed an apparent lack of system knowledge and a potential gap in the Global Maritime Distress and Safety System (GMDSS) training for on-board users.

The IHO submitted a document reporting on the monitoring of ECDIS issues and chart coverage. The IHO also highlighted that some port authorities were requiring the carriage of paper charts in addition to the carriage of an adequate set of ENCs. The Cook Islands highlighted the successful meeting of the South West Pacific Hydrographic Commission (SWPHC) held in Rarotonga earlier in the year and the discussions on crowd-sourced bathymetry data. Whilst acknowledging the potential value of such data to improve nautical charts, he cautioned to ensure a quality assurance mechanism would guarantee the quality of crowd-sourced bathymetry data.

Technical Cooperation Committee

The 65th session of the IMO Technical Cooperation Committee (TC 65) was held at the IMO Headquarters from 22 to 24 June. The IHO was represented by Assistant Director Alberto Costa Neves.

The IHO had submitted a document informing the Committee on how the IHO operates an open-access policy on its country profiles used to assess the capacity building needs of the IHO Member States and other coastal States and for planning the delivery of capacity building activities in an efficient manner. The document requested the Committee to work with the IMO Secretariat to identify the non-sensitive sections of the IMO Country Maritime Profiles that could be shared among the other intergovernmental and international organizations working together under the UN theme of "delivering as one". The Committee decided to request additional input on how the information will be used before it was prepared to take a decision on the proposal.

The IHO, jointly with the other intergovernmental and international organizations - IMO, WMO, IOC, IALA, IAEA and FIG – that form the Joint Capacity Building Group, also submitted a report - *"Delivering as One in action"* that highlighted the achievements of the organizations working together on Capacity Building.

Immediately after TC 65, the IMO Secretariat and the representatives of IHO and IALA conducted an informal meeting to progress cooperation and the planning of joint programmes in 2015, 2016 and 2017.

Mr Laurent Parenté (left), new TC Vice-Chair, Assistant Director Alberto Costa Neves (centre) and Mr Zulkarnain Ayub (right), new TC Chair, during IMO TC 65.

Task 1.1.13 International Maritime Pilots' Association (IMPA)

There was no requirement to communicate formally with the secretariat of IMPA during the year. Informal discussions between members of the Directing Committee and the President and Staff of IMPA took place at several events hosted by the IMO and IALA.

Task 1.1.14 Intergovernmental Oceanographic Commission of UNESCO

IOC Assembly 28

The Assembly is the highest governing body of the Intergovernmental Oceanographic Commission (IOC) of UNESCO. It meets every two years. The functions of the Assembly are to consider matters related to managing the regional subsidiary bodies of the IOC and their programmes, including the governance of the IHO-IOC GEBCO Project in cooperation with the IHO Secretariat.

The 28th session of the IOC Assembly was held at the UNESCO Headquarters in Paris, France, from 18 to 25 June. It was preceded by the 48th session of the Executive Council on 16 June and an "Ocean Science Day" on 17 June.

Executive Secretary of the IOC, Vladimir Ryabinin addressing the IOC Assembly during the opening session.

Among the delegations, the Hydrographers of the following IHO Member States were present: Brazil, Chile, Germany, Russian Federation and Turkey. Director Mustafa Iptes and Assistant Director David Wyatt represented the IHO.

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Of particular significance to Hydrographers were the discussions on the IOC's capacity development strategy, the International Polar Partnership initiative, the 50th anniversary of the International Indian Ocean Expedition and the IHO-IOC General Bathymetric Chart of the Ocean (GEBCO) Project. The latter covered two items: the consideration of proposed revised Terms of Reference (ToR) and Rules of Procedures (RoP) for the GEBCO Guiding Committee (GGC) and the consideration of a submission from the IOC Secretariat to review the role and involvement of the IOC in the GEBCO Project (see IHO CLs 63 and 70 of 2015).

The IOC Assembly adopted by consensus the revised ToR / RoP of the GGC and agreed to the proposed review of the role and involvement of the IOC inviting a report to be submitted to the IOC Executive Council meeting in 2016.

Visit by Executive Secretary IOC - June (part of World Hydrography Day)

Dr Vladimir Ryabinin, who assumed the position of Executive Secretary of the IOC in January, visited the IHB in June as part of the IHO celebration of World Hydrography Day. Dr Ryabinin was briefed on the role of the IHO and in particular the common interests of the IHO and the IOC in relation to ocean bathymetric mapping through the GEBCO Project and the development and use of common data exchange standards such as the IHO S-100 Universal Data Model.

Courtesy visit by Vice Chair IOC - IHB, Monaco, 15 January

Professor Adoté Blim Blivi, Vice-Chair of the IOC and Director of the National Oceanographic Data Centre of the Centre for Integrated Coastal Management and Environment from the University of Lomé (Togo), visited the IHB in January. Director Bessero and Assistant Director Costa Neves provided Prof. Blivi with an update on the IHO Capacity Building Strategy that might be of interest to the IOC. President Ward provided a brief of the role of the IHO and highlighted the particular hydrographic issues that may need to be considered in Togo.

President Robert Ward and Professor Adoté Blim Blivi

Task 1.1.15 International Organization for Standardization (ISO)

ISO Technical Committee 211

The IHO has for a long time been a liaison member of ISO Technical Committee 211 *Geographic information/Geomatics* (TC211) and participates in its standards development activities. The work of ISO TC211 is directly relevant to HSSC and its working groups. ISO TC211 is responsible for the development of the ISO19100 series of standards for geospatial information upon which the IHO S-100 framework standard and the supporting IHO Geospatial Information Infrastructure Registry is based.

Assistant Director Anthony Pharaoh represented the IHO at the 40th and 41st meeting of ISO/TC211 which took place respectively in Southampton, UK, from 8 to 12 June and in Sydney, Australia, from 7 to 11 December. The Committee considered the outcome of completed systematic reviews of current standards, decided on standards requiring a revision or new projects and agreed on the standards that should undergo subsequent systematic reviews.

In response to a request by the IHO to ensure that new editions of the ISO 19100 series of geographic information standards remain relevant to implementing organizations, the 41st meeting unanimously approved a resolution relating to backward compatibility in revised standards and recommending that revisions of standards and technical specifications include an informative annex which describes how backward compatibility is addressed.

Task 1.1.16 Joint Board of GIS (JB-GIS)

The JB-GIS comprises the heads of the secretariats or executive committees of a number of international organizations concerned with geospatial information. The purpose of the JB-GIS is to provide, where possible, a collective and unified voice at the international level regarding geospatial affairs, especially to the United Nations and to other global geospatial information stakeholders. Its second goal is to assist in the coordination of relevant activities between the organizations represented by the members of the JB-GIS.

The President represented the IHO at the annual meeting of the JB-GIS, held in New York in August in the margins of the meeting of the UN-GGIM (see Task 1.1.18).

The Board reviewed the progress that had been made; in particular, the success in raising the profile of the participating organizations in the UN-GGIM.

Task 1.1.17 NATO geospatial bodies

DGIWG

The Defence Geospatial Information Working Group (DGIWG) standards are built upon the generic and abstract standards for geographic information defined by ISO TC/211. DGIWG also makes use of the service specifications endorsed by the Open Geospatial Consortium (OGC). The UK continued to represent the IHO at relevant DGIWG meetings and discussions during 2015, as it has done in past years.

UK reported at the HSSC that the DGIWG and NATO Geospatial Maritime Working Group (GMWG) have shown interest in developing several S-100 based Additional Military Layers product specifications by adopting or extending the relevant IHO specifications.

Task 1.1.18 United Nations

United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM)

UN Headquarters, New York

The United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) reports to the UN Assembly via the UN Economic and Social Council (ECOSOC). ECOSOC instructed UN-GGIM to work according to a five-year programme and to provide its first report in 2016. The principal purpose of the UN-GGIM is to play a leading role in setting the agenda for the development of global geospatial information management and to promote the use of geospatial information in addressing key global challenges.

The fifth session of the UN-GGIM took place at the UN Headquarters in New York, USA, from 5 to 7 August. Representatives from the Hydrographic Offices of Cuba, Mexico, Oman and the USA were present in their respective delegations. President Robert Ward represented the IHO.

The Committee noted that the UN General Assembly had adopted its Resolution on a Global Geodetic Reference Frame for Sustainable Development (A/RES/69/266) in February before considering a report on the development of a list of fundamental data themes. Hydrography was reflected in the provisional list of themes using a number of terms, including: *hydrography, depth, elevation and depth, and water*.

The Committee adopted *A Guide to the Role of Standards in Geospatial Information Management* prepared in 2014 by the OGC, ISO/TC211 and the IHO and its companion document as UN-GGIM reference documents. The IHO input to these documents was provided by the IHB and the Marine Spatial Data Infrastructure Working Group (MSDIWG).

States Parties to the Convention on the Law of the Sea (SPLOS)

The 25th Meeting of States Parties to the Convention on the Law of the Sea (SPLOS) took place at United Nations (UN) Headquarters in New York, USA from 8 to 12 June. The IHO, as a recognized Observer Organization, was represented at the meeting by the President of the Directing Committee.

The President informed the meeting of the publication of the 5th edition of IHO Publication C-51, the Manual on Technical Aspects of the United Nations Convention on the Law of the Sea (The TALOS Manual). He drew attention to the new features in the 5th edition and encouraged all States that are preparing submissions to the CLCS, the ISA and ITLOS, to consider referring to the TALOS Manual from the outset.

The TALOS Manual - edition 5.0.0

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President Ward took the opportunity while at UN Headquarters to call on a number of Heads of the Permanent Missions to discuss matters of current interest to those States, including Egypt, Guatemala, Jamaica, Mozambique, Panama, The Philippines, The Syrian Arab Republic, Trinidad and Tobago, and Uruguay. He also met the Executive Secretary of the International Civil Service Commission to learn more about UN conditions of service and remuneration packages as part of the Directing Committee's work in revising the IHO Staff Regulations for further consideration by the Staff Regulations Working Group.

Task 1.1.19 World Meteorological Organization (WMO)

Mr Michel Jarraud, Secretary General of the World Meteorological Organization visited the IHB on 7 October. In addition to receiving a brief on the role of the IHO and an update on current issues, Secretary-General Jarraud signed with President Ward a Memorandum of Understanding between the two Organizations.

President Ward, Mr Michel Jarraud,
Director Bessero and Mr Edgard Cabrera,
Chief, WMO Marine Meteorology and Ocean Affairs Division

Participation at ETMSS, ETSI and other JCOMM meetings

No meetings of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) Expert Teams on Sea Ice (ETSI) and Maritime Safety Services (ETMSS) were held this year, therefore the principal interaction between IHO and WMO remained via the WWNWS Sub-Committee (WWNWS-SC). The progress of the WWNWS-SC is described under element 3.7.

The JCOMM Expert Teams on Sea Ice and Maritime Safety Services made significant progress in the development of S-100 based product specifications, respectively S-411 – *Ice Information* and S-412 – *Weather overlay*, which was reported to the 7th meeting of the HSSC (see Task 2.1.1).

Task 1.1.20 Other Organizations when their agendas have relevance to the programme of the IHO

International Mobile Satellite Organization (IMSO)

The International Mobile Satellite Organization (IMSO) is the inter-governmental organization whose primary purpose is the oversight of certain public satellite safety and security communication services provided by mobile satellite communication systems, including the satellite component of the World Wide Navigational Warning Service (WWNWS). IMSO is recognized as an observer organization to the IHO. The new Director General of IMSO, Captain Moin Ahmed visited the IHB on the occasion of the 7th meeting of the WWNWS Sub-Committee (see Task 3.7.1). The Directing Committee encouraged IMSO to continue participating in the work of the Sub-Committee and invited IMSO to consider participating in the IHO Capacity Building Courses on Maritime Safety Information (MSI).

Group on Earth Observations (GEO)

GEO, the "Group on Earth Observations", is a voluntary partnership of governments and international organizations. It was launched in 2003 in response to calls for action by the 2002 World Summit on Sustainable Development and by the G8 (Group of Eight) leading industrialized countries. GEO is coordinating efforts to build a Global Earth Observation System of Systems (GEOSS) in order to exploit the growing potential of Earth observations to support decision-making in an increasingly complex and environmentally stressed world. GEO's Members include 101 Governments and the European Commission. In addition, 92 intergovernmental, international, and regional organizations with a mandate in Earth observation or related issues have been recognized as Participating Organizations.

The IHO was recognized as a Participating Organization in 2006. GEO meets annually in plenary session. The strategic guidance is provided by a Ministerial Summit which takes place about every three years.

From 11 to 13 November, GEO held its XIIth Plenary and a Ministerial Meeting in Mexico City, Mexico. The meetings were attended by about 400 delegates from 41 GEO governments and 39 partner organizations. Commander Ricardo López (Mexico) represented the IHO and delivered a statement urging GEO Member States to consider the lack of knowledge in their own sea areas and to put in place or reinforce their national and regional hydrographic programmes, assisted where necessary by the IHO, in order to contribute effectively to the maritime dimension of GEOSS.

The meetings adopted a ten year Strategic Plan (2016 - 2025) and a Ministerial Declaration that focused on harnessing critical environmental observations to enable leaders to make better-informed decisions for the benefit of humanity at a time of rapid global change.

International Steering Committee for Global Mapping (ISCGM)

The 22nd meeting of the International Steering Committee for Global Mapping (ISCGM) was held in New York immediately before the fifth session of the UN-GGIM (see Task 1.1.18). The meeting focused on mapping activity to support disaster risk reduction, security and civil management, and briefings in support of the UN-GGIM meeting itself including a briefing on the benefits of implementing international geospatial data standards, in which the IHO was represented. President Ward represented the IHO.

Organisation of Eastern Caribbean States (OECS)

A Memorandum of Understanding (MoU) was concluded between the IHO and the Organisation of Eastern Caribbean States (OECS). The OECS is an intergovernmental organization established by the Treaty of Basseterre 1981, whose mission is to contribute to the sustainable development of its Member States, by contributing to policy and programme formulation and execution in respect of regional and international issues, and by facilitation of bilateral and multilateral co-operation.

The OECS is composed of Antigua and Barbuda, Commonwealth of Dominica, Grenada, Montserrat, Saint Kitts and Nevis, Saint Lucia and Saint Vincent and the Grenadines. Anguilla and the British Virgin Islands are associate members. Most of these States are associate members of the Meso American - Caribbean Sea Hydrographic Commission (MACHC).

The MoU will enable closer ties with the OECS to consolidate and strengthen the process of regional cooperation and integration and ensure the efficient and effective development and coordination of hydrographic and nautical charting programmes in accordance with the obligations of international treaties (see IHO CLs 15 and 36 of 2015).

Maritime Organization of West and Central Africa (MOWCA)

The Maritime Organisation of West and Central Africa (MOWCA) is an intergovernmental regional organization established by the Maritime Charter of Abidjan - as amended, whose mission is to promote the development of cost-effective maritime transport services with the highest safety and security standards, and to protect the marine environment.

The MOWCA is composed of Angola, Benin, Burkina Faso, Cameroon, Cabo Verde, Central African Republic, Chad, Republic of the Congo, Democratic Republic of the Congo, Côte d'Ivoire, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Equatorial Guinea, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome & Principe, Senegal, Sierra Leone, and Togo. All the coastal States involved participate, or are invited to participate, in the activities of the Eastern Atlantic Hydrographic Commission (EAtHC).

Further to a joint IHO-MOWCA workshop held in Pointe-Noire (Republic of the Congo) in 2013, the EAtHC developed a draft MoU on cooperation between MOWCA and the IHO. The draft MoU aimed at consolidating and strengthening the process of regional cooperation and ensuring the efficient and effective development and coordination of hydrographic and nautical charting programmes in accordance with the obligations of international treaties. Following the endorsement of the draft MoU by the IHO Member States (see IHO CL 38/2015), the intention was to sign the MoU on the occasion of the Extraordinary Summit of the African Union on Maritime Security and Safety and Development in Africa initially planned in November. Unfortunately, the Summit was postponed to 2016.

International Cable Protection Committee (ICPC)

The International Cable Protection Committee (ICPC) is a non-profit corporation that was established in 1958 to represent the international submarine cable industry and promote the security and safeguarding of submarine cables against man-made and natural hazards. Membership of ICPC is open to submarine cable owners, submarine cable maintenance authorities, submarine cable system manufacturers, cable ship operators, submarine cable route survey companies and to governments. The ICPC is currently composed of 162 members from 65 countries who represent more than 98% of installed submarine cables.

Through routine contacts related to the provision of cable data for charting purposes, the Directing Committee and the ICPC Executive Committee identified the need to foster cooperation between both organizations on matters related to submarine cable operations. Following further discussions at the ICPC Plenary Meeting held in Hong Kong in April, where the IHO was represented by Mr NG Kwok-Chu, Hydrographer of Hong Kong China, the ICPC Executive Committee agreed to participate in the 7th meeting of the HSSC. The HSSC acknowledged the areas of common interest between the IHO and the ICPC and supported the ICPC's proposal to develop a MoU between the IHO and the ICPC. A draft MoU was agreed between the Directing Committee and the ICPC Executive Committee. Its objective was primarily to assist in facilitating and harmonizing the timely depiction of submarine cables on nautical charts and products through appropriate standards and procedures and

therefore to contribute to the protection of submarine cable infrastructure. The draft MoU also addressed the development of procedures to encourage and facilitate the provision of survey data, or metadata, collected as part of cable laying or maintenance activities, to the IHO DCDB. Subject to any comments received from the Member States (see IHO CL 85/2015), the MoU should be signed in 2016.

Open Geospatial Consortium (OGC)

The Open Geospatial Consortium (OGC) is a not-for-profit organization founded in 1994 comprising more than 500 industry, government and academic members dedicated to advancing interoperability among information technology systems that process geo-referenced information. The OGC is recognized as an observer organization to the IHO. Further to the joint work between the IHO, ISO/TC211 and the OGC to propose a "Guide to the Role of Standards in Geospatial Information Management" to the UN-GGIM (see Task 1.1.18), the IHO and the OGC considered developing further their cooperation through cross-participation in their relevant organs and the development of a draft MoU between both organizations. Assistant Director Anthony Pharaoh represented the IHO at the 97th OGC Technical Committee meeting in Sydney, Australia, from 30 November to 4 December. There were discussions on the use of the Hierarchical Data Format (HDF5) and on testing the inclusion of ISO-19115 metadata in HDF5. HDF is currently used in the Bathymetric Attributed Grid (BAG) specification and the IHO S-102 product specification. It will also be included as an encoding format in the next edition of the S-100 Standard.

Professional Yachting Association (PYA)

UK Chamber of Shipping presentation at the PYA Seminar

The Professional Yachting Association (PYA) was founded in 1991 in response to the creation of the Large Commercial Yacht and Passenger Yacht Codes. The PYA is the professional body for yacht crews and the luxury yacht industry. It has 15 regional offices worldwide and its headquarters are in Antibes, France. The PYA is a recognised observer organization to the IHO. As part of the IHO outreach activities, the Directing Committee opened the IHB as the venue for the annual PYA Sea Changes Seminar on 24 September, on the occasion of the annual Monaco Yacht Show. The Seminar was attended by a total of 100 delegates representing yacht crews, shore-based support companies, training organizations and administrative authorities.

Assistant Director David Wyatt addressed the Seminar and provided a presentation on the IHO and its relevance to the yachting industry, particularly highlighting the way that members of the PYA can contribute their views and expertise to the relevant IHO subordinate bodies. He also provided an up-date on the IHO Crowd-Sourced Bathymetry (CSB) initiative, encouraging those who are not participating to consider joining the CSB community. He explained the work being undertaken to enhance the capabilities of the IHO Data Centre for Digital Bathymetry (DCDB) over the next three years.

The Hydrographic Society of America (THSOA)

The Hydrographic Society of America (THSOA) was recognized as an observer organization to the IHO in September (see IHO CL 68/2015).

Task 1.1.21 Shallow Survey 2015

Shallow Survey 2015 Conference – Common Data Set presentation

Shallow Survey 2015 Conference was the 7th International Conference on High Resolution Surveys in Shallow Water. The Conference, held in Plymouth, UK, from 14 to 18 September, attracted the top international experts in high resolution surveys in shallow water (less than 200 metres in depth). The unique attraction of the Conference was the Common Data Set, which was a series of different surveys obtained by a range of equipment types and models over the same area of seabed close to the Conference site. This enabled delegates to observe and compare how different equipment and techniques work in a common location. In this instance, the Common Data Set had been collected within the natural harbour of Plymouth Sound during the summer of 2014.

Over 300 representatives from a number of IHO Member States, Non-Governmental Organizations (NGOs) and Industry heard presentations given by experts from Canada, Denmark, France, Germany, Ireland, New Zealand, UK and USA as well as various industry and NGOs. Assistant Director David Wyatt represented the IHB.

Assistant Director Wyatt gave a presentation on CSB and Open-access Bathymetric Data, in which he described the progress of the IHO CSB initiative, the formation of the CSB Working Group and progress on up-dating the IHO DCDB to accept CSB data and to act as a data discovery portal for the world's bathymetry.

Assistant Director Wyatt also chaired an open forum that considered "Is IHO publication S-44 - *Standards for Hydrographic Surveys* fit for purpose?" He introduced the topic with a brief presentation on the background and history of S-44 and drew upon feedback received from a survey of IHO Member States (see Element 2.10). In general the participants agreed that S-44 was appropriate for surveys for nautical charting, although it was felt there was scope to consider some improvements including a higher specification than the current Special Order and the format of the publication in general.

The Shallow Survey 2015 Conference was followed by a meeting of the Resurvey Working Group of the North Sea Hydrographic Commission (NSHC). The meeting was chaired by Dr Leendert Dorst (Netherlands) with representatives from seven NSHC Member States (Belgium, Denmark, France, Germany, Netherlands, Sweden and UK) with Finland representing the Baltic Sea Hydrographic Commission. Assistant Director David Wyatt represented the IHB. The meeting discussed some of the outcomes from the Shallow Survey Conference, including the S-44 Open Forum with additional observations and comments provided for submission to HSSC-7.

Element 1.2 Information Management

This element is particularly important since it underpins the communications, documentation, record keeping and coordination activities of the secretariat of the IHO.

Task 1.2.1 Compile and publish documents that are not allocated to a specific IHO body

The IHB maintained and published various documents during the year including P-5 - *IHO Yearbook*, P-7 - *IHO Annual Report*, S-11 Part B – *Catalogue of INT Charts*, and M-3 - *IHO Resolutions.*

In the case of P-5, P-7 and S-11 Part B, significant progress was made towards maintaining and deriving these documents from a database rather than by time-consuming manual compilation methods.

Task 1.2.2 Maintain and extend IHB Admin IT infrastructure

The maintenance and development of the IT infrastructure is achieved through a combination of contract support arrangements, one dedicated member of staff and approximately a third of the time of an Assistant Director. Even so, resources are stretched to meet all the requirements.

The principal components of the IHB IT infrastructure comprises a standard office desktop computer environment; in addition, 17 physical and virtual internal servers used for the IHB Microsoft SharePoint-based document library, proxy services, network storage, mail services, accounting services, anti-virus services, backups, the Wi-Fi infrastructure, the IHB intranet and a Virtual Private Network (VPN) to enable Directors and Assistant Directors to access the IHB network while travelling. The IHB also maintains external internet servers to host the IHO website, the IHO S-100 Registry Server, Web Mapping Services and various test-bed web servers.

Subsequent to the audit and evaluation of the IHB IT infrastructure which was conducted in late 2014 and early 2015, an action plan was developed and implemented to streamline the maintenance contracts, improve the reliability of the infrastructure, rationalize and improve the server architecture, harmonize the configuration of the work stations and strengthen the proxy and firewall infrastructure. A new dedicated backup environment for internal workstations and servers was established; including the installation of additional gigabit network cables, new switches and “Network Attached Storage” (NAS) devices. New WiFi access points were added to improve the coverage within the IHB premises. The capacity to stream content that is projected during meetings in the IHB conference room was added in order to allow remote viewing. A contract was awarded to a local IT company to upgrade the SharePoint system used for processing, managing and storing IHB documentation and correspondence.

Task 1.2.3 Communication between the IHB and Member States through Circular Letters

During the year, the IHB published 93 Circular Letters (CLs) in English, French and Spanish and three Finance Circular Letters were published in English and French. A small number of CLs were distributed directly to accredited NGIOs and certain industry stakeholder organizations because of the nature of their content; for example, those related to ECDIS.

Task 1.2.4 IHB Technical Library

The IHB technical library comprises bound manuscript copies of all significant IHO records, such as Conference Proceedings and Circular Letters, together with an extensive ad hoc collection of reference books and periodicals on various topics related to hydrography and nautical charting.

Element 1.3 Public Relations

This element covers activities concerned with raising the profile of hydrography and of the work of the IHO.

Task 1.3.1 Maintain relationships with the Government of Monaco and the diplomatic corps accredited in Monaco

The relationship with the Government of Monaco remained excellent throughout the year. Upon taking up his appointment, Mr Gilles Tonelli, Minister of External Relations and Cooperation of Monaco, visited the IHB in April and received a briefing on the IHO and a progress report on matters of mutual interest. Members of the Directing Committee also met various diplomatic and government officers at functions and events hosted in Monaco by the Government or diplomatic missions in the Principality.

Diplomatic Missions

Several representatives of States visited the IHB during the year and were hosted by the Directing Committee.

HE Patrick Medecin, Ambassador for Monaco in Japan and India, paid a visit to the Directing Committee on 16 January.

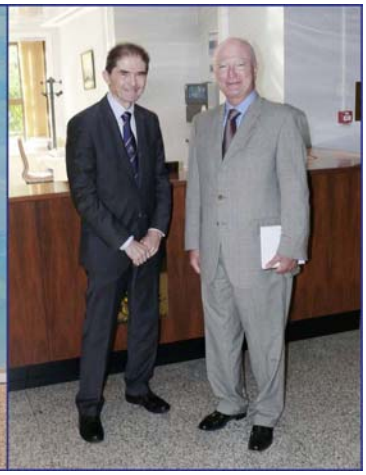
Mr Ghady G El-Khoury, Chargé d'affaires of the Embassy of Lebanon in Paris, paid a visit to the Directing Committee on 3 February.

HE Stephen Brady, Ambassador for Australia in France, paid a visit to the Directing Committee on 4 February.

HE Hadelin de la Tour du Pin, Ambassador of France in Monaco, visited the IHB on 22 September.

Director Iptes, Mr El-Khoury, President Ward and Assistant Director Guillam

President Ward and HE Stephen Brady



Director Bessero and HE de la Tour du Pin

IHO Member States

Italy Captain Luigi Sinapi, who was appointed Director of the Italian Hydrographic Institute, paid a visit to the IHB on 5 November.

United Kingdom Rear Admiral Ian Moncrieff, outgoing Chief Executive of the UKHO, and Mr John Humphrey, Chief Executive designate, visited the IHB on 21 January. Another delegation of the UKHO led by Rear Admiral Tim Lowe, new National Hydrographer, visited the IHB on 9 September.

Viet Nam A delegation from Viet Nam led by Rear Admiral Pham Xuan Diep, Vice Commander-In-Chief and Chief of Staff of the Viet Nam People's Navy, Vice President and Chief Executive Officer of the Hydrographic Office of Viet Nam, visited the IHB on 2 September. This was the first visit of a delegation from Viet Nam to the IHB since Viet Nam became a Member of the IHO in March.

Rear Admiral Pham Xuan Diep and President Robert Ward exchange the crests of Viet Nam and of the IHO

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Monacology 2015

Monacology is an annual event held in Monaco that aims to raise children's awareness about the environment and sustainable development. Monacology 2015 took place on Quai Antoine 1er, from 15 to 19 June, directly in front of the IHB.

clockwise from top left:
HSH Prince Albert II of Monaco welcomed by Director Bessero, a "Junior Hydrographer" displays his "treasure map" with President Ward, and a GEBCO globe awarded to the school "François d'Assise Nicolas Barré" de Monaco

Hydrography was presented at Monacology for the third year running with an interactive display and stand. More than 330 pupils from local schools in Monaco and neighbouring France visited the IHO display and took part in activities guided by the IHB staff. Each visitor was able to discover how marine protected areas in the region are shown on the charts that were provided for the event by the French Hydrographic Office (SHOM). All the children enjoyed trying their hands at completing a magnetic puzzle chart of the Mediterranean Sea and reproducing the limits of environmentally sensitive areas on their own tracings that they could take home or display at school. Each aspiring hydrographer received an IHO badge indicating they were a "Junior Hydrographer" in recognition of their efforts.

The IHO was honoured by a visit to its exhibition by HSH Prince Albert II of Monaco on Thursday 18 June. President Robert Ward and Director Gilles Bessero explained the exhibit and the activities related to hydrography that were intended to raise public awareness of hydrography, and to explain the role of the IHO and its Secretariat to the local community and particularly to the younger generation.

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Task 1.3.2 Compile and publish P-1 – International Hydrographic Review in collaboration with IHR editor

The International Hydrographic Review (IHR), published by the IHO, is the principal peer-reviewed journal that records significant developments in hydrography and associated subjects. Two editions of the Review were published this year with the assistance of Mr Ian Halls, who carried out the role of editor under an ongoing contract arrangement. The IHB worked with the University of New Brunswick (UNB) in a project led by Dr David Wells to develop a digital repository of the complete library of the IHR. As a result, the first phase of the project has provided volumes from 1963 to 2015. They can be found at: https://journals.lib.unb.ca/index.php/ihr

Task 1.3.3 World Hydrography Day

Japan Coast Guard Training Vessel Kojima in Port Hercule, Monaco

The IHB provided briefing material for World Hydrography Day 2015 and published reports on the IHO website of the celebrations that were conducted by Member States around the world.

World Hydrography Day was celebrated in Monaco with a reception on board the Japan Coast Guard training vessel *Kojima* on 30 June. *Kojima* was berthed in Monaco's main harbour, *Port Hercule,* during a special visit as part of her extensive global training cruise for more than 40 cadets.

HSH Prince Albert of Monaco presents a crest to Captain Mitsuya

Local dignitaries, government and diplomatic representatives, together with other invited guests, boarded *Kojima,* where they were greeted by the Commanding Officer, Captain Tetsushi Mitsuya, and President Robert Ward. The reception was honoured by the presence of HSH Prince Albert II of Monaco.

The theme for the celebration of World Hydrography Day was - *Our seas and waterways - yet to be fully charted and explored* - which highlighted the fact that much of the world's seas, oceans and navigable waters remain unsurveyed. The President delivered a speech which highlighted the theme. He laid particular emphasis on the initiatives that the IHO is undertaking to improve the situation.

During the port call of *Kojima*, the cadets and their Captain visited the IHB where they were briefed on the roles and activities of the IHO.

World Hydrography Day - UK

President Ward attended a one-day seminar in London on 11 November organised by The Institute of Marine Engineering, Science and Technology (IMarEST), one of the accredited observer organizations to the IHO. In line with the theme for WHD-2016, the one-day event explored the economic, safety and environmental benefits of improved observation and prediction of our oceans and seas. The seminar was followed by a celebration of World Hydrography Day, organised by the UKHO, where Rear Admiral Patricio JC Carrasco Hellwig, Hydrographer of Chile, was presented with the UKHO's annual Alexander Dalrymple award.

Task 1.3.4 General public relations support

Compile and publish International Hydrographic Bulletin

The IHB published the on-line version of the IHO Bulletin monthly. The Bulletin contained short articles on the IHO activities and representational events that involved the staff of the secretariat of the IHO.

Element 1.4 Work Programme & Budget, Strategic Plan and Performance Monitoring

This element concerns the execution of the IHO work programme, future structure and organization of the IHO and its capacity to meet future requirements.

Task 1.4.1 Implement and administer processes for programme management, performance monitoring and risk assessment, including the acquisition and operation of suitable business software tools

Programme management performance monitoring was reinforced through the implementation of Decision No. 3 of the 5th Extraordinary International Hydrographic Conference (EIHC-5) requesting that the Directing Committee collect and compile bi-annual reports from all the IHO and associated bodies. Obtaining the necessary input from the various IHO bodies through the Committee structure was problematic, particularly obtaining reports from the Chairs of Regional Hydrographic Commissions (RHCs). Results for 2015 were reported to Member States by Circular Letter (see IHO CLs 17 and 66 of 2015).

Annex B reports on the status of performance indicators.

Task 1.4.2 Execute the IHO Work Programme and Budget approved by the XVIIIth IHC, monitoring its progress and adopting the necessary adjustment according to the circumstances

The Work Programme and budget for 2015, based on the approved 5-year Work Programme and budget approved at the 18th International Hydrographic Conference in 2012, were drawn up and approved by Member States at the EIHC-5 in October 2014. Progress on the work items contained in the 2015 Work Programme has been reported individually in this report.

The finances of the organization were managed in accordance with the approved budget and work plan for 2015. A positive budget outcome of 338,806.66€ was declared at the end of the year. This included a budget implementation surplus of 264k€. The key reasons for achieving the positive results were the unanticipated payment of arrears by some Member States, the payment of annual financial contributions from newly joined Member States, lower than anticipated operational expenses and a better than anticipated return on investments. The full budget statement for 2015, recommendations and auditor's report are contained in Part 2 of this report.

A significant part of the operational budget is allocated to travel. This supports the travel expenses of Directors and IHB staff engaged on IHO activities. A list of IHB travels in 2015 is shown in ***Annex C***.

Task 1.4.3 Conduct biennial IHO stakeholders' forums

A Stakeholders' session was held as part of the 7th meeting of the HSSC in November in Busan, Republic of Korea (see Task 2.1.1).

Element 1.5 IHB Management

This element concerns ensuring that the IHB is able to provide the range of secretariat and other services required by Member States and the relevant stakeholder organizations.

Task 1.5.1 IHB Administration

IHB Staff

Ms Pascale Bouzanquet retired at the end of August, having joined the IHB in 1989. She had previously worked for five years in the Department of Conference Services at the United Nations Headquarters, in New York, where she was in charge of correspondence in the Office of the Secretary-General, Mr Javier Perez de Cuellar. In 2009, she was awarded a long service bronze medal by the Government of Monaco in recognition of 20 years' service at the IHB. Ms Perrine Brieda has now succeeded Ms Bouzanquet as French translator at the IHB.

Ms Bouzanquet with the Directing Committee

Secondment of Personnel to IHB

Three officers were seconded to the IHB Staff during 2015 under the terms of IHO Resolution 3/1987 as amended. Mr Woong-Kyo Song from the Korea Hydrographic and Oceanographic Agency replaced Mr Jong-Yeon Park in January. Mr Satoshi Yamao from the Hydrographic and Oceanographic Department of the Japan Coast Guard, who had joined the IHB in 2011, continued to work at the IHB until March. He was replaced by Dr Kentaro Kaneda. Commander Luis Hernandez Rubin also joined the IHB in March from Peru.

Mr Park, and then Mr Song, were employed on a number of important areas that included improvements to the maintenance of the GEBCO Gazetteer of Undersea Feature Names and the IHO INT chart catalogue through the INToGIS software solution developed by the Republic of Korea (see Task 3.6.4), processing and analysing incoming results from the IHO ECDIS Data Presentation and Performance Checks in ships, liaison for capacity building activities sponsored by the ROK, and assisting with the maintenance of various IHO publications.

Mr Yamao, and then Dr Kaneda, continued to work on the geo-information databases that will assist both the IHB and the RHCs in fulfilling their roles and a database that will simplify the production and maintenance of IHO Publication P-5 -*IHO Yearbook* (see Task 1.2.2).

Cdr Hernandez worked primarily on bringing the Spanish version of S-32 - *Hydrographic Dictionary* to the same status of revision as the English and French versions (see Task 2.11.2).

Staff training

The seconded officer from Japan undertook bespoke training in Geographic Information Systems in the USA in June.

Task 1.5.2 Translation service

The IHB continued to translate key documents from English into French and Spanish through the use of its translation staff, who were employed primarily on the translation of Circular Letters and IHB correspondence. Translations from French into English, when required, were provided by the Personal Assistant. All incoming Spanish correspondence was translated into English, for internal use, by the Spanish Translator.

The volume of this work was similar to previous years; however the departure of Ms Pascale Bouzanquet and the arrival of Miss Perrine Brieda and the continued rise in the technical complexity of some of the translations meant there was little opportunity to make any significant progress in the backlog of active IHO publications that await translation into the French and Spanish languages other than the maintenance of those publications that have already been translated.

Task 1.5.3 Engage contract support to provide one-off development or maintenance support beyond the resources or competence of the IHB

Contract support in 2015 was used mainly to upgrade the SharePoint office management installation, after one year of experience and use. The improvements included the creation of an intranet and improvements to the user interface (see Task 1.2.2).

Task 1.5.4 Monitor and maintain the Staff Regulations and the Job Descriptions of the IHB Staff in step with the evolution of the IHO work programme and IHO requirements.

The Directing Committee continued to develop a proposed draft text of a new edition of the IHO Staff Regulations, in accordance with the instructions of EIHC-5. The text was forwarded to the Staff Regulations Working group in December for its consideration and feedback to the Directing Committee.

Task 1.5.5 Maintain the IHB premises as required as the occupant.

No significant modification or renovation was carried out this year.

Element 1.6 International Hydrographic Conference

Task 1.6.1 Organize IHC-19 / Assembly-1 in 2017

The EIHC-5 had decided to convene the XIXth International Hydrographic Conference (or 1st Assembly) either from 27 to 31 March or from 3 to 7 April 2017, exact dates to be confirmed (see Decision No. 15). Due to unforeseen constraints relating to the availability of appropriate venues in Monaco, the authorities in Monaco invited the Directing Committee to reconsider the dates. After consultation with the Government of Monaco, the dates for the Conference / Assembly were moved to 24 to 28 April 2017 (see IHO CL 45/2015).

In preparation for the implementation of the Council in the new IHO structure defined by the Protocol of Amendments to the IHO Convention, the Directing Committee provided to the Chairs of the RHCs additional guidance on establishing the processes by which the RHCs will select, and possibly instruct, their representatives in the Council.

Task 1.6.1.1 P-6 - Compile and publish Report on EIHC-5

The Report of Proceedings of the EIHC-5 was published in both official languages in March (see IHO CL 27/2015).

WORK PROGRAMME 2
Hydrographic Services and Standards

Introduction

The IHO Work Programme 2 "Hydrographic Services and Standards" seeks to develop, maintain and extend technical standards, specifications and guidelines to enable the provision of standardised products and services that meet the requirements of mariners and other users of hydrographic information. This Work Programme is under the principal responsibility of the Hydrographic Services and Standards Committee (HSSC).

Element 2.1 Technical Programme Coordination

This element monitors technical developments and oversees the development of IHO technical standards, specifications and publications through the coordination and interaction of the relevant IHO working groups reporting to the HSSC. In 2015, 44 Member States, one IHB Director and all four Assistant Directors played an active role in this activity. The re-organized structure of the working groups of the HSSC was implemented at the beginning of the year (see IHO CL 11/2015). The terms of reference of the HSCC were amended to allow the chairs of the subordinate bodies to designate a representative to report to HSSC meetings (see IHO CL 41/2015).

Task 2.1.1 Conduct annual meeting of HSSC

The 7th HSSC meeting took place from 10 to 13 November in Busan, Republic of Korea, hosted by the Hydrographic Office of the Republic of Korea (KHOA). The meeting was attended by 48 representatives from 20 Member States, the IHB, and six international organizations accredited as observers. A half-day IHO Stakeholders' Open Session was included in the agenda of the meeting and attracted eight additional participants who attended all or part of the HSSC sessions as invited observers.

HSSC-7 participants

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The minutes of HSSC-7, together with all documents referred to at the meeting, were posted on the IHO website (see IHO CL 02/2016).

The Committee reviewed the activities, proposals, and work plans of its subordinate bodies and the decisions of other organs and organizations affecting its work and decided on a number of outcomes. The Committee endorsed the continuation of its current working groups and approved the revised Terms of Reference (TOR) of the Nautical Cartography Working Group (NCWG) and the Tides, Water Level and Currents Working Group (TWCWG).

The Open Session focused on new survey techniques and crowd-sourced bathymetry and on issues related to the development and implementation of the S-100 framework.

Task 2.1.2 Support the IHB to implement the planning mechanism annually and at the end of each 5-year cycle

The HSSC had decided in 2014 to retain its current five Working-level Performance Indicators (WPIs) until the next Conference/Assembly of the IHO in 2017 when they will be reconsidered as part of the revision of the IHO Strategic Plan. Table 2 in Annex B summarizes the status of the WPIs at the end of the year.

The entities under the governance of the HSSC provided their biannual reports as requested by the IHB in accordance with Decision No 3 of the EIHC-5 (see IHO CLs 17 and 66 of 2015).

The Committee discussed and adopted at HSSC-7 its Work Plan for 2015-2016. In view of the next Conference/Assembly, the Committee tasked its Chair Group, composed of the Chair and Vice-Chair of the Committee and the Chairs of its subordinate organs, to prepare the contribution of the Committee to the revision of the IHO Strategic Plan and the preparation of the next pluriannual IHO Work Programme.

Task 2.1.3 Provide technical advice and guidance on IHO technical standards, specifications and publications

The main activities under this task dealt with the promotion of S-100 - *IHO Universal Hydrographic Data Model* and the implementation of the revised set of standards related to Electronic Navigational Charts (ENC) and ECDIS. They are reported under the tasks associated with the relevant forum. The IHB responded also to a number of routine enquiries on other IHO technical publications, in particular S-63 - *IHO Data Protection Scheme*.

Element 2.2 Hydrographic Data Transfer Standards

This element addresses the developments related to transfer standards for digital hydrographic data, the maintenance of the relevant IHO standards, specifications and publications, and the provision of technical advice as appropriate. In 2015, 30 Member States and 14 Expert Contributors participated in this activity.

Task 2.2.1 Conduct meetings of S-100 and ENC Standards Maintenance Working Groups

The Transfer Standard Maintenance and Application Development Working Group (TSMAD) held its 29th and last meeting in Ottawa, Canada, in conjunction with the 7th and last meeting of the Digital Information Portrayal Working Group (DIPWG). Their on-going activities were allocated to the new S-100 Working Group (S-100WG) and ENC Standards Maintenance Working Group (ENCWG) which were formally established at the end of the joint TSMAD-DIPWG meeting. Ms Julia Powell (USA) and Mr Yong Baek (ROK) were elected respectively as Chair and Vice-Chair of the S-100WG. Mr Thomas Mellor (UK) was elected as Chair of the ENCWG. There was no candidate for the post of Vice-Chair of the ENCWG.

Task 2.2.2 Maintain and extend the relevant IHO standards, specifications and publications, using contract support assistance as appropriate

Work continued on the development of S-100 and S-101 - *ENC Product Specification*. Edition 2.0.0 of S-100 which had been endorsed by HSSC in 2014 was approved by the Member States and

published in June (see IHO CL 39/2015). The S-100WG started the preparation of Edition 3.0.0 to include extensions addressing in particular additional encoding formats and portrayal elements and the use of *alerts* and *indications*. The initial scoping of an S-100 interoperability specification for ECDIS was completed. The revised Edition 1.1 of the S-100 master plan was prepared and endorsed by HSSC-7. Further development of the S-100/S-101 test bed is required before the main components of S-101 which have reached baseline status can be tested in accordance with the S-100/S-101 test strategy. Two simple S-100 viewers were reported as under development in the Republic of Korea and in the USA. A new edition of the S-57 to S-101 convertor updated to the latest draft version of S-101 was released and there were several on-going initiatives to develop S-101 test datasets to support functional testing.

A survey of TSMAD members was conducted to refine the scope of an update to S-102 - *Bathymetric Surface Product Specification* and an S-102 project team was established to prepare a draft revised edition.

In 2013 Australia, later joined by Canada, had undertaken the development of S-121 - *Maritime Limits and Boundaries Product Specification* on behalf of the IHO. Although significant progress was reported at HSSC-7, the Committee noted that further work was required and invited Australia and Canada to submit a work plan to the next meeting of the S-100WG and instructed the S-100WG to establish a formal project team to implement the work plan (see IHO CL 84/2015).

The effective implementation of Edition 6.1.0 of S-52 - *Specifications for Chart Content and Display Aspects of ECDIS*, Edition 4.0.0 of S-52 Annex A - *IHO Presentation Library for ECDIS* and Edition 3.0.0 of S-64 - *IHO Test Data Sets for ECDIS* which had been published in December 2014 revealed a number of imperfections requiring corrections or clarifications which were considered by the ENCWG. This led to the publication in June of Edition 4.0(.1) of S-52 Annex A and Edition 3.0(.1) of S-64. Following the publication in August by the International Electrotechnical Commission (IEC) of the 4th Edition of 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 6.1 of S-52, Edition 4.0 of S-52 Annex A and Edition 3.0 of IHO Publication S-64 became the normative IHO references for the type approval of new ECDIS (see IHO CL 65/2015 - rev 1).

A number of inconsistencies, grammatical omissions and some logic errors were identified in Edition 5.0.0 of S-58 - *ENC Validation Checks* which had been published in 2014. As a consequence, a draft revised Edition was begun by the ENCWG. It is expected that the minimum validation requirements defined as “critical” in Edition 5.0.0 will become mandatory when the revised Edition enters into force (see IHO CLs 8 and 18/2015).

The revision of IHO Publication S-66 - *Facts about Electronic Charts and Carriage Requirements* initiated in 2014 was delayed due to other higher priorities. The draft new edition, reflecting the changes that have occurred since the first edition (January 2010), is now expected to be available by April 2016 for review by the HSSC and subsequent consideration by the Member States.

IHO Member States were reminded to update the information on their requirements for ECDIS back-up arrangements using paper charts which have been posted on the IHO website since 2008 (see IHO CL 61/2015). Five updates were received in 2015. 24 of the 33 Member States which have expressed specific requirements have not provided any update of their information since 2008.

Task 2.2.3 Develop and maintain as-yet undefined S-100-based Product Specifications

HSSC-7 considered a submission by Australia reporting that under keel clearance (UKC) systems were increasingly being used around the world in ports and by vessels themselves when sailing in depth critical waterways. Australia recommended that a project team be established under the S-100WG to coordinate the development of a draft product specification for the display of UKC management information. The Committee endorsed the recommendation and established an Under Keel Clearance Management Information Project Team that will report to the S-100WG (see IHO CL 84/2015).

Task 2.2.4 Maintain and extend S-100 Registry

The contract awarded in 2013 to the geospatial software company Caris to develop the S-100 portrayal catalogue builder was completed in August. Additional tasks carried out during the year included the development of the portrayal register database and updates of the portrayal catalogue builder to reflect the changes introduced in Edition 2.0.0 of S-100.

The S-100 GI Registry has been managed, since its inception, by Mr Barrie Greenslade (UK), Chair of TSMAD, on a part-time basis, through the generous and continuing support of UK. Mr Greenslade played a major role in developing and maintaining the Registry. He also acted as the manager of two component Registers in the Registry, both of which fall under the responsibility of the IHO, namely the Feature Concept Dictionary Register and the Product Specification Register. On his retirement in February, a temporary solution based on in-kind support from three Member States (ROK, UK, and USA) was implemented in liaison with the HSSC Chair Group and the S-100WG. Ms Su Marks was kindly made available by the United Kingdom Hydrographic Office (UKHO) to be appointed as interim Registry Manager. The Hydrographic Offices of the USA and of the Republic of Korea undertook further development to address shortcomings in the operation of the Feature Concept Dictionary, to implement changes required by Edition 2.0.0 of S-100 and to support the future connexion with the Feature Catalogue Builder being developed by the Korea Hydrographic and Oceanographic Agency (KHOA).

In accordance with the recommendation of the HSSC, the establishment of a permanent position at the IHB to support the S-100 Registry and more generally the development of S-100 based standards and services was approved by the Member States towards the end of the year and the recruitment of a "Technical Standards Support Officer" was initiated (see IHO CL 88/2015).

Task 2.2.5 Provide outreach and technical assistance regarding transfer standards

In July, the IHB issued a media release on "*New normative references for the type approval of ECDIS*" to assist Original Equipment Manufacturers (OEMs), ship operators, and mariners in the implementation of the new editions of S-52 and S-64.

Element 2.3 Nautical Cartography

This element addresses the developments related to nautical cartography for paper nautical charts and the colours, symbols and display rules used to show System ENC (SENC) information on ECDIS, the maintenance of the relevant IHO standards, specifications and publications, and the provision of technical advice as appropriate. In 2015, 29 Member States and three Expert Contributors participated in this activity.

Task 2.3.1 Conduct meetings of Nautical Cartography Working Group

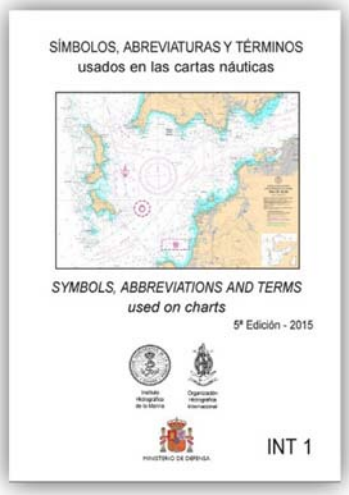
The first meeting of the Nautical Cartography Working Group (NCWG), successor to the former Chart Standardization and Paper Chart Working Group (CSPCWG) took place in Rostock, Germany, hosted by the Hydrographic Office of Germany, from 27 to 30 April. A short meeting of the sub-working group responsible for INT 1 - *Symbols, Abbreviations and Terms used on Charts* was held on this occasion. The NCWG meeting agreed that the former CSPCWG officers should continue as officers of NCWG, with Mr Jeff Wootton (Australia) as Chair and Mr Nick Webb (UK) as Vice-Chair.

Task 2.3.2 Maintain and extend the relevant IHO standards, specifications and publications, using contract support assistance as appropriate

Following the major revision of IHO Publication S-4 - *Regulations for International (INT) Charts and Chart Specifications of the IHO* concluded with the publication of Edition 4.5.0 in 2014, the NCWG continued to maintain this publication, as directed by its programme of work and in accordance with section B-160 of S-4. A revised Edition 4.6.0 including all the changes endorsed by the HSSC and a number of clarifications was drafted and Member States were invited to consider its adoption (see IHO CL 92/2015).

The Hydrographic Offices of Germany and Spain published new editions of the official English and Spanish language versions of INT 1 on behalf of the IHO as follows:

- INT 1 (English): 8th Edition, 2015,
- INT 1 (Spanish): 5th Edition, 2015.



The Hydrographic Office of France started the preparation of the new corresponding edition of the official French language version of INT 1 which is expected to be published in 2016 (see IHO CL 91/2015).

The NCWG prepared a draft revision of IHO Publication S-11 Part A - *Guidance for the Preparation and Maintenance of International Chart Schemes*, in collaboration with the North Sea ENC Harmonization Working Group and the WEND Working Group, to develop and incorporate guidance on the preparation and maintenance of ENC schemes. The draft, which combined INT chart scheming guidance and ENC scheming guidance in the same document, and the outcome of the consultation of the Regional INT Chart Coordinators/INT Charting Coordination Working Groups were considered by HSSC-7. The Committee instructed the NCWG to separate the guidance on INT schemes and ENC schemes.

Ten out of the existing 15 regional chapters of S-11 Part B - *Catalogue of International (INT) Charts* were the subject of revisions by the IHB during the year, as a result of input from the relevant regional INT coordinators:

- Region A - NW Atlantic and NE Pacific,
- Region B - Meso America and Caribbean Sea,
- Region C1- SW Atlantic,
- Region C2 - SE Pacific,
- Region E - Baltic Sea,
- Region H - SE Atlantic and SW Indian Ocean,
- Region I - NW Indian Ocean,
- Region L - SE Indian Ocean and SW Pacific,
- Region M - Southern Ocean,
- Region N - Arctic Ocean.

The development of an on-line web-based interactive version of S-11 Part B is reported under Programme 3 (see Task 3.6.4).

Element 2.4 Digital Data Protection and Authentication

This element addresses the developments related to data protection and data authentication, the maintenance of the relevant IHO standards, specifications and publications, and the provision of

technical advice as appropriate. In 2015, six Member States and 13 Expert Contributors participated in this activity.

Task 2.4.1 Conduct meetings of Data Protection Scheme Working Group

The Data Protection Scheme Working Group (DPSWG) conducted its work by correspondence and through a web-based collaboration group.

Task 2.4.2 Maintain and extend the relevant IHO standards, specifications and publications

Following its approval by the Member States, Edition 1.2.0 of IHO Publication S-63 - *IHO Data Protection Scheme* was published in February (see IHO CL14/2015). Edition 1.2.0 contained a new Annex C describing the functionality required to provide an ENC Update Status Report. This new functionality applies only to those ECDIS systems that are type-approved in accordance with the 4th Edition of IEC 61174 (see Task 1.1.11).

An initial draft of Edition 2.0.0 of S-63, for use with S-100-based product specifications was developed for further review in 2016. The new edition considers the extension of the data protection scheme to non-navigational products.

The IHB continued to monitor, in liaison with the two data servers concerned, the migration of legacy ECDIS systems that were still using edition 1.0 of S-63 after its withdrawal on 31 December 2013. The percentage of legacy systems continued to decrease in 2015, from 6% on 1 January to 4% on 30 September. Considering that there was no major drawback to letting the few remaining legacy users continue using S-63 Ed. 1.0 until their legacy systems were removed or replaced, the HSSC decided to discontinue the monitoring of the transition.

The IHB continued to carry out the role of administrator of the S-63 scheme. This function involves processing applications and providing technical support and the individual and unique digital certificates and codes that are required to allow ENC data servers, OEMs and software developers to encrypt and de-encrypt ENCs as part of the services or equipment that they provide. Four new Data Servers and 22 new OEMs were accepted in 2015. At the end of the year there were 49 Data Servers and 281 OEMs licenced to use the S-63 scheme.

Element 2.5 Data Quality

This element addresses the developments related to methods of classifying and depicting the quality of hydrographic information, the maintenance of the relevant IHO standards, specifications and publications, and the provision of technical advice as appropriate. In 2015, 10 Member States and two Expert Contributors participated in this activity.

Task 2.5.1 Conduct meetings of Data Quality Working Group

The 10th meeting of the Data Quality Working Group (DQWG) was hosted from 7 to 9 July, in Brest, France, by the Hydrographic Office of France. Mr Sean Legeer (USA) was elected as the new Vice-Chair of the working group.

Task 2.5.2 Maintain and extend the relevant IHO standards, specifications and publications

The DQWG concentrated mainly on the data quality topics relating to S-101, especially issues relating to the quality of bathymetric data. A revised draft data quality Unified Modelling Language (UML) model for S-101 was developed for further review by the relevant stakeholders.

Data quality of time and velocity attributes in S-111 - *Surface Current Product Specification*, was also addressed.

Element 2.6 Nautical Publications

This element addresses the developments related to the preparation of nautical publications, the maintenance of the relevant IHO standards, specifications and publications, and the provision of technical advice as appropriate. In 2015, twenty Member States and 10 Expert Contributors participated in this activity.

Task 2.6.1 Conduct meetings of Nautical Information Provision Working Group

The first meeting of the Nautical Information Provision Working Group (NIPWG) was hosted by the IHB in Monaco, from 29 June to 3 July. Mr Jens Schröder-Fürstenberg (Germany) was elected Chair and Dr Edward Hosken (UK) was elected Vice-Chair.

Task 2.6.2 Develop, maintain and extend S-10n - Nautical Information Product Specifications

The NIPWG completed an extensive modelling work for product specifications with the creation of a comprehensive catalogue of features and attributes covering the information elements of sailing directions, lists of radio signals, lists of lights, lists of buoys and beacon, mariners' handbooks, routeing guides and notices to mariners (correction to nautical publications).

The status of the development of S-100-based product specifications related to nautical information is summarized in the following table:

Product specification	Test data sample	Data model	Mapping	Application scheme
S-122 - *Marine Protected Areas*	stable	drafted	drafted	drafted
S-123 - *Radio Services*	stable	drafted	drafted	drafted
S-125 - *Navigational Services*	in progress	drafted		
S-126 - *Physical Environment*	stable	drafted		
S-127 - *Traffic Management*	stable	drafted		

The HSSC endorsed the NIPWG proposal to develop a product specification for catalogues of nautical products and allocated the identifier S-128. This product specification is intended to enable the exchange of lists of products between Member States and users in support of the Maritime Services Portfolios for e-navigation.

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Task 2.6.3 Maintain and extend the relevant IHO standards, specifications and publications

The current version of the existing documents did not require any update.

Element 2.7 Tides and Water Levels

This element addresses developments related to tidal and water level observation, analysis and prediction and other related information including vertical and horizontal datums, the maintenance of the relevant IHO standards, specifications and publications, and the provision of technical advice as appropriate. In 2015, 33 Member States and four Expert Contributors participated in this activity.

Task 2.7.1 Conduct meetings of the Tides, Water Level and Currents Working Group

The Tidal and Water Level Working Group (TWLWG) held its 7th and last meeting in Silver Spring, Maryland, USA from 21 to 24 April, hosted by the Hydrographic Office of the USA. At the end of the meeting, the participants reformed as the new Tides, Water Level and Currents Working Group (TWCWG) and elected Ms Gwenaële Jan (France) as Chair and Mr Louis Maltais (Canada) as Vice-Chair.

Rear Admiral Gerd Glang, Hydrographer of the USA, welcoming TWLWG7 participants

Task 2.7.2 Maintain and extend the relevant IHO standards, specifications and publications

Further work was devoted to the revision of IHO Resolution 3/1919 as amended - *Datums and Bench Marks*. A revised draft was endorsed by the HSSC, subject to some additional adjustments before submitting the text to the Member States.

The inventory of tide gauges operated by Member States was extended to include current meters. The inventory available from the TWCWG page of the IHO web site was updated in October. A list of on-line links to real-time tides and currents was compiled and posted on the IHO web site as an additional resource. A process for updating the list was agreed.

Task 2.7.3 Develop, maintain and extend a Product Specification for digital tide tables

Progress was made on a standard for digital tide tables with the development of a list of fundamental attributes.

Task 2.7.4 Develop, maintain and extend a Product Specification for the transmission of real-time tidal data

Further work was undertaken in liaison with the S-100WG to refine the first draft of S-112 - *Meteorological and Hydrographic Data AIS Application-Specific Message Dynamic Water Level Data Product Specification*, focusing on implementation issues.

Task 2.7.5 Develop, maintain and extend a Product Specification for dynamic tides in ECDIS

A draft tidal height product specification was produced and work was started on developing the attributes of a tidal zone feature. The HSSC allocated the identifier S-104 to the product specification for *Tidal Information for Surface Navigation*.

Element 2.8 Digital Data Updating

This element addresses developments in standardized processes for the updating of digital hydrographic data products, the maintenance of the relevant IHO standards, specifications and publications, and the provision of technical advice as appropriate.

Task 2.8.1 Maintain and extend the relevant IHO standards, specifications and publications

The changes in the proposed revised Edition 4.6.0 of S-4 (see Task 2.3.2) includes new guidance in section B-100 defining what is meant by "consistency" of information content between corresponding paper charts and ENCs. The proposed revised wording in section B-600 strengthens the requirement to apply to ENCs the equivalent of paper chart Temporary (T) and Preliminary (P) Notices to Mariners.

Element 2.10 Hydrographic Data Acquisition and Processing

This element addresses the developments related to hydrographic data acquisition and processing, the maintenance of the relevant IHO publications, and the provision of technical advice as appropriate.

As requested by the HSSC at its 6th meeting, Member States were invited to indicate their views on the adequacy of IHO Publication S-44 - *IHO Standards for Hydrographic Surveys*, on related work items which might be relevant, if any, and on the possible establishment of a dedicated Hydrographic Surveys Working Group (HSWG - see IHO CL 25/2015). The replies showed that only a minority of Member States would support the establishment of a new HSWG and even less would support a review of S-44. Although the majority of identified topics could be allocated to existing subordinate bodies of HSSC and IRCC, some topics, which most directly relate to S-44, did not lie within the scope of any of the currently established subordinate bodies or active work programme tasks.

The HSSC considered the outcome at its 7th meeting and in the absence of a consensus on the scope of work to justify establishing a new working group, the Committee decided to create a Hydrographic Surveys Scoping Project Team (H2SPT) that would be tasked, for one year, to clarify the scope and the deliverables expected from any possible HSWG. IHO Member States and stakeholders were invited to participate in the project team (see IHO CL 83/2015).

Element 2.11 Hydrographic Dictionary

This element addresses the development, maintenance and extension of IHO Publication S 32 - *Hydrographic Dictionary* in English, French and Spanish, and the provision of technical advice as appropriate. In 2015, seven Member States, and one Expert Contributor were registered as participants in this activity. However, the active participation of the declared representatives of the Member States, except the Chair, was minimal.

Task 2.11.1 Maintain and extend the IHO Hydrographic Dictionary in English, French and Spanish.

The Hydrographic Dictionary Working Group (HDWG) did not met in 2015. The drafting of new business rules did not progress. The HSSC considered the situation at its 7th meeting and requested the HDWG to investigate options and associated resource requirements and timeline to produce and maintain a reference edition of S-32 - *Hydrographic Dictionary*. The S-100WG was tasked to specify its requirements regarding definitions included in the S-100 Registry.

Task 2.11.2 Develop the Spanish language Wiki version of S-32 with commercial contract support

The project officer seconded at the IHB by Peru updated the Spanish version of S-32. The English and Spanish Word files were reformatted into tables with a common identifier that can be used to create a digital cross-reference between the two language versions. Some investigations were undertaken to identify existing options for on-line multilingual glossaries.

Element 2.12 ABLOS

This element addresses the developments related to the hydrographic aspects of the United Nations Convention on the Law of the Sea (UNCLOS), the maintenance of the relevant IHO publications, and the provision of technical advice as appropriate. The Advisory Board on the Law of the Sea (ABLOS) is a joint body of the IHO and the International Association of Geodesy (IAG). It comprises four representatives from IHO Member States and four representatives from the IAG. Four observers from IHO Member States and two Expert Contributors were also involved in the activities of the Board during the year.

Task 2.12.1 Organize and prepare ABLOS annual business meeting

The 22nd Business Meeting of ABLOS was held at the IHB in Monaco on 19 and 22 October. On completion of the ABLOS Conference, Mr John Brown (UK - IHO) assumed the role of Chair and Dr Niels Andersen (Denmark - IAG) was elected as Vice-Chair.

Task 2.12.2 Organize and prepare the biennial ABLOS Conference

The 8th ABLOS Conference, titled "UNCLOS: Advances in Managing the Blue World" took place from 20 to 22 October in Monaco. It was attended by 70 delegates representing 28 Member States. The Conference included 28 presentations covering a wide variety of topics and issues in relation to the Conference theme. The presentations generated numerous questions and comments in plenary and much discussion in the margins during the breaks. The presentation of the UN Division for Ocean Affairs and the Law of the Sea (DOALOS) highlighted the effectiveness of S-121 - *Maritime Limits*

8th ABLOS Conference

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and Boundaries as a medium for maritime limits and boundaries data and the intention to recommend that States Parties consider using this format for reporting the relevant information to the UN Secretary-General.

Task 2.12.3 Contribute to the revision of IHO publication C-51- TALOS Manual

The work on the sections of IHO Publication C-51 - *A Manual on Technical Aspects of the United Nations Convention on the Law of the Sea* (TALOS Manual) that were identified as requiring revision during the final stages of review of Edition 5.0.0 was undertaken.

Element 2.13 Surface Currents

This element addresses the development of standards for the delivery and presentation of navigationally significant surface current information. In 2015, seven Member States and five Expert Contributors participated in this activity.

Task 2.13.2 Maintain and extend the relevant IHO standards, specifications and publications

SCWG meet in Tokyo

The Surface Current Working Group (SCWG) held its 3rd and last meeting in Tokyo, Japan from 13 to 15 May, hosted by the Hydrographic Office of Japan, before being subsumed in the new TWCWG. Work continued on the revision and further development of the draft edition of S-111 - *Surface Current Product Specification* with a focus on the revision of the metadata, the harmonization with ISO and S-100 standards and the production of test datasets.

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WORK PROGRAMME 3
Inter-Regional Coordination and Support

Introduction

The IHO Work Programme 3 "Inter-Regional Coordination and Support" seeks to establish, coordinate and enhance cooperation in hydrographic activities on a regional basis, and between regions, especially on matters associated with the coordination of global surveying, nautical charting and ocean mapping, dissemination of maritime safety information, capacity building, and education and training. IHO Work Programme 3 is implemented under the principal responsibility of the Inter-Regional Coordination Committee (IRCC).

Element 3.0 Inter-Regional Coordination Committee (IRCC)

The IRCC promotes and coordinates those activities that might benefit from a regional approach. The principal objective of the IRCC is to establish, coordinate and enhance cooperation in hydrographic activities amongst States on a regional basis, and between regions; establish cooperation to enhance the delivery of capacity building (CB) programmes; monitor the work of specified IHO Inter-Organizational Bodies engaged in activities that require inter-regional cooperation and coordination; promote cooperation between pertinent regional organizations; and review and implement the IHO Capacity Building Strategy, promoting Capacity Building initiatives.

Task 3.0.1 Conduct annual meeting of IRCC

The seventh meeting of the IRCC took place in Mexico City, Mexico, from 1 to 3 June, hosted by the Mexican *Secretaría de Marina* in the premises of the *Centro de Estudios Superiores Navales*. The meeting was attended by the Chairs, or their representatives, of the 15 RHCs and the IRCC subordinate bodies, three observing organizations and 29 observers. A total of 55 participants from 23 countries were present. The meeting was chaired by Rear Admiral Tom Karsten (UK). The IHB was represented by President Robert Ward, Director Mustafa Iptes (Secretary) and Assistant Director Alberto Costa Neves.

7th IRCC Meeting

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The IRCC reviewed the reports and activities of the RHCs and its subordinate bodies, considered the outcomes of EIHC-5, acknowledged the accomplishments and challenges of the Capacity Building programme and IBSC activities, examined the developments on crowd-sourced bathymetry and maximizing the use of hydrographic data, and considered issues related to the Worldwide ENC Database (WEND).

As directed by EIHC-5, the IRCC established a Crowd-Sourced Bathymetry Working Group (CSBWG) and approved its proposed ToR. The Committee also appointed the Director of the IHO Data Centre for Digital Bathymetry (DCDB), Ms Lisa Taylor (USA), as the first Chair of the CSBWG.

The Committee considered a revision of its ToR and RoP to include the Chairs of the Maritime Spatial Data Infrastructure Working Group (MSDIWG) and the newly established CSBWG as members of the Committee. The revised ToR and RoP were subsequently approved by Member States (see IHO CLs 73 and 86 of 2015).

The Committee examined the management and monitoring of INT chart production and agreed on an experimental procedure for monitoring and validating the production of new INT Charts. This procedure would be coordinated and implemented by Regional INT Chart Coordinators or INT Chart Coordination Working Groups (ICCWGs) and would run for two years before further evaluation.

The Committee decided to add the topic of satellite-derived bathymetry as a standing agenda item at all future IRCC meetings. The Committee also took note of the IHO GIS and INToGIS projects reported by the IHB and the benefits that are anticipated for RHCs and the Member States in the conduct of their IHO-related activities.

The IRCC acknowledged the accomplishments and challenges, including the resource limitations of the IHO secretariat, in supporting the administration of the Capacity Building programme and IBSC activities. The Committee approved the CB work programme, the IBSC work plan and the new IHO Publication S-5B - *Standards of Competence for Hydrographic Surveyors*. The Committee also endorsed the proposal of the World-Wide Navigational Warning Service Sub-Committee (WWNWS-SC) to submit proposed revised texts related to Maritime Safety Information documentation directly to the IMO through the IHB in the future.

Taking into account Decision 12 of EIHC-5 concerning the long term consequences of not achieving full implementation of the WEND Principles, the IRCC reviewed the WEND Principles and the Guidelines in relation to their implementation, ENC Coverage including gaps and overlaps, information overlay issues and proposals arising from the WEND Working Group report. The Committee agreed that no further action would be taken for the moment on amending the WEND Principles and Guidelines and approved the WENDWG Work Programme for 2015-2016.

The Committee considered papers on data gathering, the management and maximization of the use of hydrographic data, and guidance on access to bathymetric data collected for commercial or scientific purposes. As a result, the IRCC agreed on the need to update IHO publication C-16 - *National Hydrographic Regulations* and also decided that an appropriate supplement or additional chapter, as appropriate, on maximizing access to bathymetric data collected for commercial or scientific purposes was required in IHO Publication C-17 -*Spatial Data Infrastructures: "The Marine Dimension" - Guidance for Hydrographic Offices*.

The IRCC acknowledged an IHB paper on "Considerations on the development of the General Bathymetric Chart of the Oceans (GEBCO)" and tasked the GEBCO Guiding Committee (GGC) to take the recommendations included in the paper into consideration in implementing the GEBCO work plan and to report progress on those recommendations to the next meeting of the IRCC. The Committee also took note of an IHB paper regarding concerns over the governance and administration of the GEBCO Project.

It was announced prior to the meeting that the current Chair would step-down shortly after the meeting as a consequence of his retirement from UK service. The current Vice-Chair would then assume the position of Chair, leaving a vacant position of Vice-Chair to be filled. The Committee therefore elected

Rear Admiral Gerd Glang, the Hydrographer of the USA, as the next Vice-Chair to succeed Dr Parry Oei when he took over the Chair on 11 August.

Element 3.1 Co-operation with Member States and attendance at relevant meetings

The objective of this element is to facilitate coordination, cooperation and collaboration among IHO Member States in order to improve the provision of hydrographic and charting services and products through the structure of the 15 RHCs and the IHO Hydrographic Commission on Antarctica.

This element of the Work Programme is largely accomplished through the meetings of the RHCs. The frequency of meetings of the RHCs varies from annually to triennially, depending on the region. RHC meetings continued to increase in importance as they exercise an increasingly active role in the overall planning, execution and assessment of the IHO Work Programme as it relates to their regions. A Director, sometimes accompanied by an Assistant Director, represented the IHB at the RHC meetings, providing guidance and assistance on IHO matters.

Task 3.1.1 Arctic Regional Hydrographic Commission

The fifth meeting of the Arctic Regional Hydrographic Commission (ARHC) was held in Saint Petersburg, Russian Federation from 28 to 30 October and chaired by Captain Leonid Shalnov on behalf of the Hydrographer of the Russian Federation, Captain Sergey Travin. Four of the five Member States, Denmark, Norway, Russian Federation and the USA, were represented, together with representatives of Finland and Iceland attending as observers. President Robert Ward represented the IHB.

The meeting agenda covered the further development of a strategic directions document for the ARHC as well as initiatives to raise awareness of the shortcomings of hydrography and charting in the region so as to gain greater levels of national and regional support. Discussion also centred on providing relevant input to the Arctic Council working group on the Protection of the Arctic Marine Environment (PAME).

The representatives discussed how the Member States of the Commission might contribute to improving the evolving Marine Spatial Data Infrastructure (MSDI) for the Arctic region.

The Members at the meeting agreed to invite Finland to apply for associate membership of the Commission. In accordance with the established policy of rotation, Canada was elevated from the position of Vice-Chair to take over the Chair while Denmark was elected to occupy the resultant vacant Vice-Chair position.

Task 3.1.2 Baltic Sea Hydrographic Commission

The 20th conference of the Baltic Sea Hydrographic Commission (BSHC20) was held in St. Petersburg, Russian Federation, from 16 to 18 September, under the chairmanship of Mr Janis Krastins (Latvia). All full members of the Commission (Denmark, Estonia, Finland, Germany, Latvia, Poland, Sweden and the Russian Federation) attended the meeting. The IHB was represented by Director Mustafa Iptes.

BSHC20 covered a wide range of regional topics including developments in each of the Member States, the latest status of hydrographic surveying and nautical charting including INT Charts, ENC production and BSHC cooperative projects. The members of the BSHC reported on their national hydrographic, cartographic and Maritime Safety Information activities since the 19th meeting. Director Iptes briefed the Commission on current IHO issues, IHB activities and the outcome of the EIHC-5.

20th BSHC Conference in Saint Petersburg

The Commission reviewed on-going regional initiatives in particular the activities of the Re-survey Monitoring Working Group (MWG), Baltic Sea Bathymetric Database Working Group (BSBDWG), Baltic Sea Marine Spatial Data Information Working Group (BSMSDIWG) and the Chart Datum Working Group (CDWG). The Commission also considered the outcome of the seventh meeting of the IRCC and the fifth meeting of the WENDWG.

Considering that an IHO Council would be established once the Protocol of Amendments to the Convention on the IHO was ratified and following the first Assembly of the IHO, the members of the BSHC discussed the possible options for selecting which Members would take the seat or seats on the Council allocated to the BSHC.

Task 3.1.3 East Asia Hydrographic Commission

The 12th Conference of the East Asia Hydrographic Commission (EAHC) was held in Manila, Philippines, from 13 to 15 October, hosted by the Hydrography Branch of the National Mapping and Resource Information Authority (NAMRIA) of the Philippines and chaired by Commodore Jacinto M. Cablayan, its Director and Chairman of the EAHC. The EAHC meets in Conference every three years and holds annual meetings of its Steering Committee in the intervening years.

Representatives from all but one EAHC Member State attended the Conference: China, Indonesia, Japan, Republic of Korea (RoK), Malaysia, Philippines, Singapore and Thailand. The Democratic People's Republic of Korea was unable to attend. Associate Members Brunei Darussalam and Viet Nam attended the meeting together with invited national representatives from Australia, UK and USA and the Chair of the GEBCO Guiding Committee (GC). President Robert Ward attended as an invited observer from the Secretariat of the IHO.

Each Member State of the Commission provided progress reports. In addition, the meeting received a report on the EAHC Training and Research Development Center (TRDC) (see: http://trdc.eahc.asia/), hosted by the Korea Hydrographic and Oceanographic Agency (KHOA), in Busan, RoK, and established by the Commission to deliver its regional Capacity Building Programme.

The participants discussed proposals to establish a regional ENC Coordination Centre (RECC) that would validate and harmonise ENC coverage in the region. They also agreed the establishment of a Working Group and a Task Group to report to the Commission at the meetings of its Steering Committee. The Working Group was tasked to identify practical measures that the Commission and its members might take to provide information as part of the establishment of a regional Marine Spatial Data Infrastructure (MSDI). Meanwhile, the Task Group was instructed to develop and propose a strategic plan and associated objectives for the Commission covering the next ten years.

President Ward provided a report of IHO activities of relevance to the Commission. He also delivered a report and presentation of the work of the IHO MSDI Working Group and highlighted its relevance to the Commission. He provided a briefing and guidance on the need for the Commission to establish procedures for the selection of the Members of the Commission that would take the seat(s) on the IHO Council allocated to the EAHC.

The full members of the Commission congratulated Brunei Darussalam and Viet Nam on their recent acceptance as Member States of the IHO and anticipated their acceptance as full members of the Commission at the next meeting of the EAHC Steering Committee, subject to the unanimous agreement of the existing members.

At the end of the meeting, the chairmanship of the Commission was transferred to Rear Admiral Zaaim bin Hasan, the Hydrographer of Malaysia. Mr Shigeru Kasuga, the Hydrographer of Japan was elected as the Vice-Chair.

Task 3.1.4 Eastern Atlantic Hydrographic Commission

The Eastern Atlantic Hydrographic Commission (EAtHC) did not meet during the year.

Task 3.1.5 Meso American - Caribbean Sea Hydrographic Commission

The 16th meeting of the Meso American - Caribbean Sea Hydrographic Commission (MACHC) was held in St. John's, Antigua and Barbuda from 9 to 12 December with 70 participants from 11 Member States, six Associate Members, three observer countries, nine observer organizations, and eleven companies. President Robert Ward and Assistant Director Alberto Costa Neves represented the IHB.

The meeting was hosted by the Antigua Department of Maritime Services (ADOMS) and chaired by Captain Marc van der Donck, Hydrographer of the Netherlands and Chair of the Commission.

As a lead-up to the meeting, an IHO capacity building seminar on raising awareness of hydrography was held. Speakers from several IHO Member States, IMO and IALA took part.

This was followed by meetings of the MACHC Integrated Chart Coordination Committee (MICC), Capacity Building Committee, Marine Economic Infrastructure Program (MEIP) Working Group and discussions on the latest developments in risk assessment.

President Ward and the Chair of the MACHC, accompanied by the Hydrographer of Mexico and the National Hydrographer of UK and the former Hydrographer of Brazil called on His Excellency Gaston Browne, Prime Minister of Antigua and Barbuda.

HNLMS *Friesland*, the Netherlands Navy regional guard ship made a port call during the period of the meeting. MACHC attendees were invited to lunch and a tour aboard the vessel.

The 16th meeting of the MACHC was opened on behalf of the government of Antigua and Barbuda by His Excellency Dwight Gardiner, Ambassador Extraordinary and Plenipotentiary, with special responsibility for the IMO, the International Seabed Authority, the International Maritime Satellite Organization, Antigua and Barbuda Representative on Transportation (Port and Maritime) to the Caribbean Community and the Association of Caribbean States.

The agenda was arranged according to themes: reports from countries and organizations, surveying and risk assessment, spatial data infrastructures, nautical charts and publications, and capacity building. In additional to the delivery of national reports from each of the countries represented at the meeting, presentations were provided to complement relevant agenda topics by the industry stakeholders and other organizations invited to the meeting.

The meeting was told of significant progress in ENC coverage in the region with 58 new ENCs and the development of a regional IC-ENC Centre in Brazil. The meeting was also informed of the development of a practical gap analysis process under development by the USA that would help coastal States to identify those ports where there is a need to produce larger scale ENCs. This, and other collaborative activities, reflected the growing levels of technical cooperation between all MACHC States in the region.

The meeting welcomed the representative of the Organization of Eastern Caribbean States (OECS) and acknowledged the recent Memorandum of Understanding concluded between the IHO and the OECS. As a result, the OECS was recognised as a permanent observer organization in the MACHC. The meeting was informed of significant progress on a proposal, led by Antigua and Barbuda, to develop sub-regional hydrographic services in the waters of the Member States of the OECS. Once donor funding has been obtained, the project would enable the development of a regional Hydrographic Service in the Eastern Caribbean.

The Commission reviewed the progress made with its MEIP, which aims to be part of a regional MSDI that supports the blue economy in the region.

A number of changes to the Statutes of the MACHC were agreed in anticipation of the entry into force of amendments to the IHO Convention. In particular, a process was included to determine the selection of the Members of the Commission that would take the seat(s) on the IHO Council allocated to the MACHC. The Statutes were also amended to recognize the need to support the Spanish language during meetings of the Commission.

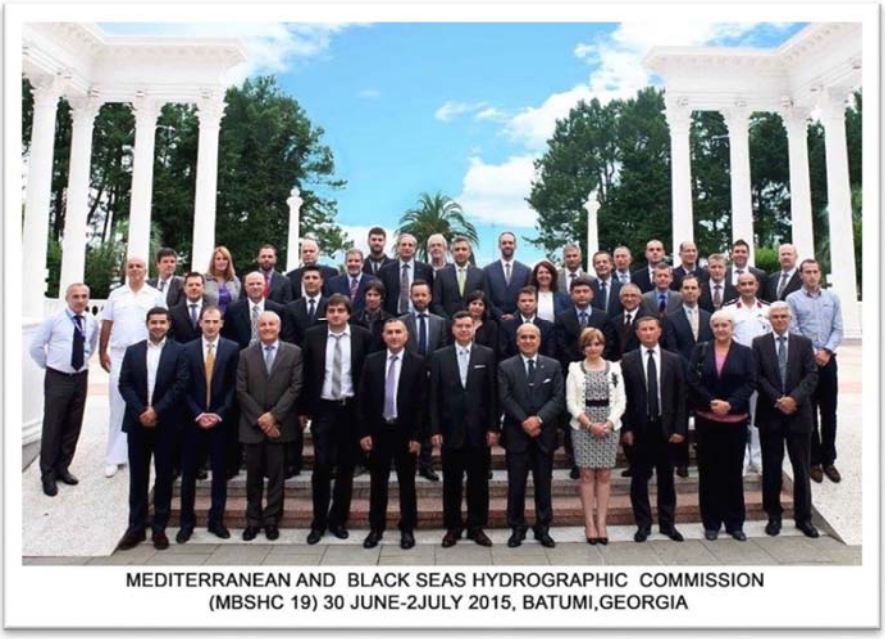
The Dominican Republic informed the meeting of the recent creation of the national hydrographic service as part of the Navy. The Dominican Republic was also recognised as an Associate Member of the Commission.

Task 3.1.6 Mediterranean and Black Seas Hydrographic Commission

The 19th Conference of the Mediterranean and Black Seas Hydrographic Commission (MBSHC) was held in Batumi, Georgia from 30 June to 2 July, hosted by the State Hydrographic Service of Georgia. The Conference was chaired by Captain Erhan Gezgin, Director of the Turkish Navy Office of Navigation Hydrography and Oceanography (TN-ONHO). 40 representatives and observers attended the meeting. 13 IHO Member States of the region and four Associate Member States were represented. Four partners from industry, IC-ENC and PRIMAR, the two Regional ENC Coordinating Centres (RENC), were also represented as observers. The IHB was represented by Director Mustafa Iptes and Assistant Director Yves Guillam.

Director Iptes reported on the IHO work programme in general and on the positive momentum within the region with regard to the IHO and the MBSHC memberships. While the MBSHC is the regional hydrographic commission of the IHO having already the largest number of Members and Associate Members, other Coastal States, such as Lebanon and Israel, expressed their intention to submit their applications to join in due course. Georgia and Montenegro signed the statutes of the MBSHC, becoming full Members of the MBSHC.

The IHB representatives provided informative presentations on cooperation with the IMO, on the main outcomes of the 28th session of the Assembly of the IOC, on the development of standards, and on the evolution of the IHO information management system using GIS layers derived from the IHB country information database.



MEDITERRANEAN AND BLACK SEAS HYDROGRAPHIC COMMISSION
(MBSHC 19) 30 JUNE-2JULY 2015, BATUMI,GEORGIA

The Chair of the MBSHC and Director Iptes presented the most important decisions arising from IRCC-7 that had an impact on MBSHC activities; Decision 3 in particular, which introduced a two-year experimental procedure for the review of INT charts by the Regional Charting Coordinators, was explained as well as the remaining steps before the commissioning of the INToGIS project being developed by the IHB with the assistance of the Republic of Korea. France, as Region F International Charting Coordinator, chaired two side-meeting to progress INT chart and ENC scheming and chart production issues. Italy kindly offered to support France, and to lead an ad hoc sub-working group of the nations concerned to identify the course of action needed to eliminate existing overlaps in the small scale ENC scheme covering the Mediterranean Sea.

The Conference covered a wide range of other important topics: Greece reported on the projects funded by the European Commission that are managed or monitored by the IHO-EU Network Working Group (IENWG) such as EMODnet and Coastal Mapping (see Task 1.1.4). Based on the information provided by some Members, Spain also reported on the status of hydrographic surveying in the region as well as on MSI in its role of NAVAREA III coordinator.

Director Iptes provided a general overview of IHO capacity building activities. The representative of Turkey, as CB Coordinator for the region, reported on the outcomes of the 13th CBSC meeting, held in Mexico, in May.

IC-ENC and PRIMAR gave a joint presentation on the benefits of distributing ENCs through the RENCs and reported individually on the progress made with different ENC Producer nations and on the development of distribution solutions for IHO S-102-compliant bathymetric surface products. Egypt also announced that their ENCs covering the new Suez Canal were being issued beginning in July.

At the end of the Conference, IGA Bruno Frachon, Director General of SHOM (France), was elected as the new Chair of the MBSHC for the next two years.

Task 3.1.7 Nordic Hydrographic Commission

The 59th meeting of the Nordic Hydrographic Commission (NHC) was hosted by Iceland, as Chair of the Commission, from 13 to 15 April in Reykjavik. Fourteen delegates attended the meeting. The

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five Nordic States (Denmark, Finland, Iceland, Norway and Sweden) were represented. The IHB Directing Committee was represented by Director Gilles Bessero.

Following the opening of the meeting by the Chair, Mr Georg K. Lárusson, Director General of the Icelandic Coast Guard, and the review of the status of the list of actions from the previous meeting, Director Bessero briefed the Commission on current IHO issues and IHB activities. The meeting considered reports on national activities since the 58th meeting and reviewed on-going initiatives and projects of common interest related to surveys, nautical charting, nautical publications, the provision of official services to the leisure market, the development of marine spatial data infrastructures and the provision of capacity building. Noting that the Nordic Council had initiated a study on Marine Spatial Planning, the Commission tasked the Chair to liaise with the Marine Group of the Nordic Council.

The Nordic Hydrographic Commission meets in Iceland

The members shared their experiences and projects about chart production systems and reported on the status of nautical publications and future plans. It appeared that most publications, including notices to mariners, were being made available in digital format and no longer printed.

The Commission decided to disband the Nordic Nautical Publication Working Group and refer related issues to the relevant working groups of the Hydrographic Services and Standards Committee (HSSC).

The Commission reviewed the activities of the IENWG and discussed the preparation of IRCC-7.

Task 3.1.8 North Indian Ocean Hydrographic Commission

The 15th meeting of the North Indian Ocean Hydrographic Commission (NIOHC) was held in Muscat, Oman, from 16 to 18 March, under the chairmanship of Rear Admiral Tom Karsten, national Hydrographer of the United Kingdom.

NIOHC Member State representatives from Bangladesh, Egypt, India, Pakistan, Saudi Arabia, Sri Lanka, Thailand and the UK attended the meeting together with representatives of Associate Members from Australia, France, Mauritius, Oman, and the Seychelles. The Russian Federation was represented as an Observer State. Representatives of IALA, the IHO-IOC GEBCO Project and several commercial companies also attended as invited observers. Director Mustafa Iptes and Assistant Director David Wyatt represented the IHB. The 15th meeting of the Commission was preceded by a meeting of the NIOHC International Chart Coordination Working Group (ICCWG) on 15 March.

The NIOHC received national reports from Member States, Associate Member States and the IHB as well as summary reports on HSSC-6 and IRCC-6 held during the previous year and presentations about progress in the GEBCO Project and IALA activities. The meeting also received reports on progress and issues related to the IHO WEND concept and the associated RENCs, an up-date on the work of the IHO MSDIWG and brief reports on the progress being made towards an IHO crowd-sourced bathymetry program, relevant activities that had taken place in the IMO, the outcomes of the seventh meeting of the World-Wide Navigational Warning Service Sub-Committee, and an up-date report from the NAVAREA VIII coordinator.

NIOHC representatives gather in Oman

Director Iptes reported on the IHO Work Programme and the Organization's activities during the previous year. The outcomes of EIHC-5 were also considered. Regional INT Chart and ENC coverage were covered with a brief on the INT Chart concept delivered by the IHB. Considerable time was devoted to capacity building and regional requirements. A comprehensive CB plan was developed for submission to CBSC-13 later in the year. The meeting received a comprehensive briefing on the work of the Combined Maritime Forces countering maritime crime and piracy in the region.

The meeting included a number of presentations from industry representatives. These highlighted technologies and training opportunities available to the region. Industry representatives were keen to emphasise their willingness to engage with the NIOHC and its members to assist in the development of hydrographic and cartographic capability within the region.

The Vice-Chair of the NIOHC, Bangladesh, assumed the Chair of the NIOHC four months after the closure of the Conference in accordance with the Statutes of the Commission. The NIOHC elected Egypt to assume the Vice-Chair position for the next period.

Task 3.1.9 North Sea Hydrographic Commission

No meeting of the North Sea Hydrographic Commission (NSHC) was conducted during the year.

Task 3.1.10 ROPME Sea Area Hydrographic Commission

The sixth meeting of the ROPME Sea Area Hydrographic Commission (RSAHC) was held in Abu Dhabi, United Arab Emirates (UAE), from 9 to 11 February. The meeting was opened by Dr Colonel Adel al Shamsi, the Chairman of RSAHC. Representatives from RSAHC Member States Bahrain, Oman, Pakistan, Qatar, Saudi Arabia and UAE attended the meeting with Associate Members attending from France, Iraq, UK and USA and observers from a number of Emirati organizations and

authorities together with several representatives from industry. Director Mustafa Iptes and Assistant Director David Wyatt represented the IHB.authorities

The meeting received national reports from Member and Associate States and the IHB after which the meeting received reports on the IHO-IOC GEBCO project and on WEND issues. Delegates were encouraged to provide regular updates to the IHO Yearbook and IHO publication C-55 - *Status of Hydrographic Surveying and Nautical Charting Worldwide*. Details of regional INT Chart and ENC coverage were discussed, however in the absence of the Regional Coordinator it was decided to refer the issues to a meeting of the INT Chart Coordination Working Group to be held in Abu Dhabi in April 2015, as well as continuing to progress them through correspondence. The NAVAREA IX Coordinator provided an up-date on issues relating to the World Wide Navigation Warning Service (WWNWS) and outcomes from related IMO meeting were reviewed. Director Iptes briefed the Commission on current IHO issues and IHB activities and provided an update on the outcomes of EIHC-5.

The meeting included presentations from industry representatives. The presentations were incorporated in the agenda to provide introductions to the various topics for discussion and to highlight technologies and training opportunities available to the region. Industry representatives emphasised their willingness to engage with the RSAHC and its members to assist in the development of hydrographic and cartographic capability. These presentations were followed by a presentation from the regional CB Coordinator. The presentations generated considerable debate on CB issues and regional requirements. Presentations were also given on satellite derived bathymetry and crowd-sourced bathymetry, both of which supported the request for Member States to contribute to the IHO-IOC GEBCO programme through the provision of shallow water bathymetric data to the IHO DCDB.

The UAE was re-elected as Chair of the Commission with the Islamic Republic of Iran being re-elected as Vice-Chair. Saudi Arabia offered to investigate hosting the seventh meeting of the RSAHC, with a view to holding it in Jeddah in late January 2017 and to be preceded by a one-day meeting of the INT Chart Coordination Working Group.

Task 3.1.11 Southern Africa and Islands Hydrographic Commission

The 12th Conference of the Southern Africa and Islands Hydrographic Commission (SAIHC) was held from 22 to 23 September in Dar es Salaam, Tanzania. Five out of six Member States: France, Mauritius, Norway, South Africa and the United Kingdom were represented at the meeting. The following Associate Member States: Comoros, Kenya, Malawi, Namibia, and Tanzania were also represented together with delegates from IALA, and the GEBCO project. Industry participants included representatives from Caris, C&C Technologies, Jeppesen, OceanWise Ltd, SevenCs GmbH, and Underwater Surveys (Pty) Ltd. President Robert Ward represented the IHB. The meeting was chaired by Captain Abri Kampfer, Hydrographer of South Africa.

SAIHC – 12 pose with Deputy Minister of Lands Housing and Human Settlement of Tanzania

The 12th Conference was preceded by a meeting of the regional International Charting Coordination Working Group and a workshop on the fundamentals of best practice data management and marine spatial data infrastructure. These events took place on 21 September.

The Honourable Angellah J. Kairuki, the Tanzanian Deputy Minister of Lands, Housing and Human Settlement opened the meeting of the Commission and welcomed all delegates to Tanzania. She thanked the delegates for their commitment to safe and efficient navigation through the coordination of hydrography in the region. She outlined the progress being made in hydrography in Tanzania and looked forward to further assistance from the IHO.

Each Member and Associate Member State presented a briefing on the status of hydrography and charting priorities in their areas of responsibility. There were reports, presentations and discussions on satellite derived bathymetry, GEBCO, the IHO capacity building programme for the region, MSDI, the status of IHO publication C-55, and the inexorable move in government geodata agencies towards providing data-centric services rather than the primary production and maintenance of charts and maps.

South Africa was re-elected as Chair for the next term and UK was elected to hold the position of Vice-Chair. The next conference was agreed to take place in early September 2016, in Cape Town, South Africa.

Task 3.1.12 South East Pacific Regional Hydrographic Commission

The 12th meeting of the South-East Pacific Regional Hydrographic Commission (SEPRHC) was hosted and chaired by the Hydrographic Office of Ecuador (*Instituto Oceanográfico de la Armada - INOCAR*) from 13 to 16 July. Eighteen delegates attended the Conference. The participants included six representatives from three of the four IHO Member States of the Region (Chile, Ecuador and Peru), four observers from Mexico, the United Kingdom, the IHO-IOC GEBCO Project and the IC-ENC coordinating centre, and seven observers from industry. Representatives of Colombia participated in most of the Conference by video-link. The IHB was represented by Director Gilles Bessero who provided a briefing on current IHO issues and the work of the IHB.

The opening ceremony, chaired by the National Director of Marine Spaces of Ecuador, marked the change of chairmanship from Peru to Ecuador. The subsequent sessions were chaired by the Director of INOCAR. The Members of the Commission presented reports on their national activities since the 11th Conference held in 2013. While significant progress in ENC coverage for the region was reported, it was noted that due to limited resources and national priorities, the development of the INT chart scheme was at a standstill. The coordinators of the HSSC, IRCC, CBSC and WENDWG groups reported on their work. The Commission discussed its future activities in connection with the IHO Work Programme and adopted its work plan for 2015-2016.

The UK representative highlighted the development of new products and new printing services. The representative of Mexico invited the Commission to support an initiative aiming at acknowledging Spanish as an official language of the IHO. The IC-ENC representative briefed the Commission on the support provided to assist IC-ENC members in developing their ENC production and on the IC-ENC policy on overlapping ENCs. He reported that all potential overlaps within the region had been resolved prior to the release of the relevant ENCs by IC-ENC. Following the presentation of the GEBCO project by the Secretary of the GEBCO Guiding Committee, the Commission agreed to consider the possibility of re-activating the International Bathymetric Chart of the South East Pacific project.

The representatives from industry updated the Commission on their activities and products relevant to the activities of Hydrographic Offices. The Commission agreed to a number of clarifications to the Statutes of the Commission.

Task 3.1.13 South-West Atlantic Hydrographic Commission

The 9th Conference of the South-West Atlantic Hydrographic Commission (SWAtHC) was hosted by the Hydrographic Office of Uruguay (*Servicio de Oceanografía, Hidrografía y Meteorología de la Armada - SOHMA*) and chaired by Captain Gustavo Musso Solari, Hydrographer of Uruguay, on 19 and 20 March. Nine delegates and one observer from industry attended the Conference. Only two IHO Member States in the Region, Brazil and Uruguay, were represented. The IHB Directing

Committee was represented by Director Gilles Bessero who provided a briefing on current IHO issues and the work of the IHB.

Participants gather in front of Uruguay HO

The Chair acknowledged a note of apology from the representatives of Argentina who could not attend for administrative reasons. The approval of the report of the 8th Conference was confirmed and the status of the list of actions was reviewed.

Brazil and Uruguay reported on their national activities since the 8th Conference. Brazil, as Chair of the SWAtHC Planning Committee (*Comité de Planeamiento*), then reported on the progress of the work of the Committee, addressing notably the maintenance and implementation of the regional INT and ENC schemes. The Commission approved the work plan of the Committee for the next intersessional period. The work plan included progressing the development of a prioritized capacity building plan, and the provision of an annual update of C-55 - *Status of Hydrographic Surveying and Nautical Charting Worldwide*. The Chair of the Commission was tasked to reiterate the invitation to Paraguay to join the Committee. The delegation from Brazil reported on the work of the IRCC, CBSC, WENDWG and HSSC. The Commission agreed consequential actions. A brief on the technical visit to Paraguay conducted in January 2014 was also presented. Brazil, as one of the co-Chairs of the Inland ENC Harmonization Group, reported on the activities of that group. It was noted that interoperability issues might need to be considered in the future for vessels operating in waterways which include a downstream segment covered by ENC and an upstream segment covered by inland ENC.

The Commission discussed and agreed the proposals that would be submitted to the next CBSC meeting. Following a presentation by Uruguay on the status of ENC coverage in the region, the Commission agreed to formalize through technical agreements, the pragmatic arrangements which have been progressively adopted to avoid gaps and overlaps and facilitate the shared maintenance of the scheme. The Commission welcomed the intention of Brazil to consider the establishment of a RENC covering South America and expressed its support.

The industry representative briefed the Conference on new software now available to facilitate the acquisition and processing of data from multiple platforms and to prepare the transition to products based on S-100 - *Universal Hydrographic Data Model*.

It was proposed that the next Conference take place in the first half of April 2016 in Argentina. In accordance with the statutes of the Commission, the chairmanship was transferred to Argentina 45 days after the closure of the Conference.

Task 3.1.14 South West Pacific Hydrographic Commission

The Government of the Cook Islands hosted the 13th Conference of the South West Pacific Hydrographic Commission (SWPHC) from 25 to 27 February in Rarotonga, Cook Islands. Representatives from all eight Member States of the Commission, and all seven Associate Members attended the meeting. Three Observer States, three international organisations and six representatives from industry also participated. The IHO was represented by President Robert Ward.

The meeting was opened by the Deputy Prime Minister of the Cook Islands, the Honourable Teariki Heather, and chaired by Commodore Brett Brace, Hydrographer of Australia.

Cdre Brace (Australia) witnesses the membership of Samoa

Each of the States present provided an update on their activities since the last meeting 18 months previously. Among the Pacific Island States and Territories (PICTs) all indicated that progress had been made, albeit only marginal in some cases. However, Papua New Guinea, The Solomon Islands, Tonga and Vanuatu indicated significant progress. Personnel from Papua New Guinea had received internationally recognised training, Solomon Islands personnel were currently implementing new hydrographic survey equipment, and Tonga had re-organised its internal hydrographic responsibilities by designating the Department of Infrastructure, Marine & Ports Division as the national hydrographic authority while the Navy retained responsibility for the conduct of hydrographic surveying and would shortly refurbish its dedicated hydrographic survey vessel.

Vanuatu reported on the very successful collaborative effort between its government, the Secretariat of the Pacific Community (SPC) Geoscience Division, New Zealand, through the Ministry of Foreign Affairs and Land Information New Zealand and the UK Hydrographic Office. This resulted in urgent surveys being carried out and electronic navigational charts being published in direct support of a rapidly growing cruise ship requirement.

New Zealand reported on its ground-breaking work in developing and using a GIS-based risk assessment and cost benefit methodology to determine surveying and charting priorities. The work in Vanuatu and subsequent work in Tonga and the Cook Islands were used to illustrate how the methodology is being used.

During the meeting the New Zealand government announced a five million dollar, five-year hydrographic assistance programme (Pacific Regional Navigation Initiative (PRNI)) which would focus on navigation-related aspects of maritime safety that would see hydrographic risk assessments and chart remediation programmes take place for the Cook Islands, Niue, Samoa, Tonga and Tokelau, where New Zealand is the Primary Charting Authority.

The activities of the SPC Geoscience Division and its improved capability to conduct hydrographic surveys that can be used to improve charts were presented and discussed. Highlights of these included its work as part of the surveying efforts in Vanuatu and the decision at the second meeting of the Pacific Regional Energy and Transport Ministers in April 2014 to endorse the establishment of a hydrographic unit at SPC to develop and further enhance regional hydrographic services to members.

The Commission members reviewed their requirements for further capacity building and agreed on priorities to be submitted to the forthcoming meeting of the CBSC in May.

The 13th meeting of the Commission was preceded by a workshop on hydrographic governance sponsored by the IHO CB Fund and delivered by representatives from the Primary Charting Authorities in the region and industry. The workshop was intended to provide the representatives of

the PICTs with information on the responsibilities and obligations of coastal States with regard to the provision of hydrographic and nautical charting services and ways in which these obligations can be met. 22 people attended the workshop to hear from seven presenters over two days.

Vanuatu, currently an Associate Member of the SWPHC, submitted its application to become a Member State of the IHO during the period of the meeting. Meanwhile, Samoa became an Associate Member of the SWPHC, through the signing of the Statutes during the closing ceremony. Several other Pacific Island States indicated that they expect to become either Associate Members of the Commission or to apply for membership of the IHO in the near future.

At the end of the meeting, the members agreed that Australia would continue to occupy the Chair and Papua New Guinea would continue to occupy the Vice-Chair position.

Subject to final confirmation, the next meeting was planned to be held in Noumea, New Caledonia in late 2016.

Task 3.1.15 USA-Canada Hydrographic Commission

The USA hosted the 38th Conference of the US-Canada Hydrographic Commission (USCHC) on 16 March in National Harbor, Washington DC, USA immediately prior to the biennial US Hydro Conference organised by the Hydrographic Society of America. In addition to the two Member States of the Commission, Mexico and UK attended as Observer States at the meeting. The IHO was represented by President Robert Ward.

USCHC – 38 participants

As usual, the meeting was co-chaired by the Hydrographers of Canada and the USA. Mr Denis Hains, Hydrographer-General of Canada represented Canada and Rear Admiral Gerd Glang, Hydrographer of the USA, represented the USA.

Each country provided reports and presentations on their organizations and accomplishments in the past year. Specific topics discussed were the status of ENC coverage. The USA described its progress on evaluating the use of satellite-derived bathymetry, the development of the IHO DCDB to become a global crowd-sourced bathymetry database and the potential for collaboration on a web-based tool to better discover ENCs - *ENC Online*. Canada provided information on its world-class tanker safety system, the web-based water levels and currents project, its continuous vertical datums project and the Canadian Federal Geospatial Platform.

The next meeting of the Commission was planned to be held in Halifax, Nova Scotia, Canada on 16 May 2016 immediately preceding the Canadian Hydrographic Conference 2016 that would be held in the same location.

Task 3.1.16 IHO Hydrographic Commission on Antarctica

Due to the low level of registration at the end of January and in the absence of any participating observer organizations, it was decided to postpone the 14th Conference of the IHO Hydrographic Commission on Antarctica (HCA), initially planned in March, until the completion of the Antarctic 2015-16 summer season. The rescheduled 14th Conference was planned to be hosted by the Hydrographic Office of Ecuador (INOCAR), on 28-30 June 2016, in Guayaquil, Ecuador.

Task 3.1.17 WEND Working Group

The fifth meeting of the Worldwide ENC Database Working Group (WENDWG) took place in Singapore, hosted by the Hydrographic Department of the Maritime and Port Authority (MPA) of Singapore, from 3 to 5 March. The meeting was chaired by Captain Jamie McMichael-Phillips, UK. Twenty-six delegates from 14 Member States (Brazil, Canada, China, Finland, France, Germany, Japan, Norway, Poland, Singapore, South Africa, Turkey, UK, USA), representing ten RHCs (ARHC, BSHC, EAHC, EAtHC, MACHC, MBSHC, NHC, NSHC, SAIHC, USCHC), two RENCs (IC-ENC and PRIMAR), and the IHB attended the meeting. Australia (representing the SWPHC), which could not participate, provided written comments. Director Mustafa Iptes and Assistant Director Yves Guillam (Secretary) represented the IHB.

The meeting considered the decisions and actions affecting WENDWG activities arising from IRCC-6 and EIHC-5. Subsequent actions were included in the WENDWG 2015-16 programme of work which was approved at IRCC-7. The meeting considered issues associated with ENC information overlays and prepared a way ahead to address this matter in accordance with existing IHO Resolutions and Standards. The meeting also prepared suggestions for the consideration of IRCC-7 to progress EIHC-5 Decision No 10 concerning ENC coverage, and Decision No 12 on the full implementation of the WEND Principles.

The WENDWG agreed that it would monitor RENC harmonization activities related to ENC technical and distribution issues as a new permanent item of the WENDWG programme of work. As a consequence, it was agreed that the RENC Harmonization Sub-Group could be disbanded.

The continuing re-development of the IHO ENC Catalogue was noted and its principles agreed. The offer made by PRIMAR (on behalf of the RENCs) for the International Charting Regions Co-ordinators and the IHB to use its on-line RENC ENC database catalogue and overlap checker tool was welcomed.

The WENDWG agreed to recommend to IRCC that there was no need to further amend or enhance the existing WEND Principles and the Guidelines for the implementation of these WEND Principles at this stage.

Task 3.1.18 Industry participation in RHC meetings

In addition to being represented at IHO meetings through various Non-Governmental International Organizations (NGIO), an increasing number of representatives from industry participated as invited Expert Contributors in most RHC meetings, where they provided valuable contributions to regional capacity building initiatives.

Task 3.1.19 Contribute to improving the framework of IHO response to marine disasters

The IRCC, at its fifth meeting in 2013, had discussed and endorsed a proposal submitted by France to modify IHO Resolution 1/2005 - *IHO Response to Disasters*, in order to expand its scope.

The proposed modifications included an expansion of the title of the Resolution and the inclusion of certain preparatory and preventative measures, such as the exchange of near real-time sea-level data and also cooperation and coordination with the IHB, RHCs, other States and international organizations. The proposed amendments to the Resolution were approved by Member States (see IHO CL14/2014 and 29/2015).

During the period of this report, the South West Pacific region, in particular Vanuatu, was impacted by a significant natural disaster, named “Tropical Cyclone PAM” in March. Commodore Brett Brace (Australia), Chair of the SWPHC, in close coordination with the IHB Directing Committee, successfully monitored the impact of the disaster and stood ready to implement the IHO Resolution 1/2005 as amended in order to activate the "IHO Disaster Reaction Organization” for immediate requests regarding the hydrographic and cartographic requirements. Australia, New Zealand, USA, UK and France also provided direct and indirect support to the region for recovering from this disaster.

Element 3.2 Increase participation by non-Member States

One of the important strategic goals of the IHO is to increase the participation of non-Member States in IHO activities. Taking the opportunities of attending regional and other international meetings / events, in particular during the MACHC, SWPHC, NIOHC, MBSHC and IMO meetings held during the year, the IHB Directors visited and briefed high level governmental officials directly and through their diplomatic representatives as part of the IHO awareness-raising campaign. Assistant Director Alberto Costa Neves also visited the relevant maritime authorities in Panama during the IALA-IHO seminar in March and provided encouragements and information to assist Panama in becoming an IHO Member. Non-Member States of the IHO were also encouraged and invited to participate in the RHC meetings, CB initiatives and relevant IHO meetings.

Status of Applications for Membership of the IHO

The following States, whose application for membership was approved in preceding years, have yet to deposit their Instruments of Accession to the IHO Convention:

- Mauritania (application approved in April 1991),
- Bulgaria (application approved in April 1992),
- Sierra Leone (application approved in September 2010),
- Haiti (application approved in November 2012).

The Directing Committee continued to be in communication with the authorities of these States to encourage them to complete this final formality.

At the end of the year four applications for membership were still awaiting approval by IHO Member States. The status of approvals at the end of 2015 was as follows:

- Malta (applied 2015) 25 approvals out of a required 53;
- Vanuatu (applied 2015) 25 approvals out of a required 54;
- Congo (applied 2015) 22 approvals out of a required 55;
- Solomon Islands (applied 2015) 22 approvals out of a required 55.

The Directing Committee encouraged those IHO Member States, whose Governments had not yet indicated to the Government of Monaco their position on the approval of the applications for

membership made by Malta, Vanuatu, Congo and Solomon Islands to actively encourage their government authorities to consider doing so as soon as possible (see IHO CL 67/2015).

Accession of New Member States

The accession earlier in the year of Georgia, Viet Nam and Brunei Darussalam to the IHO Convention (as announced in IHO CLs 30 and 33 of 2015) as full IHO Members brought the IHO Membership to 85 Member States.

Element 3.3 Capacity Building Management

The IHO Capacity Building programme is a strategic objective of the organization that considers the maturity of coastal States and provides targeted training, technical assistance and hydrographic awareness seminars aimed at improving nautical charting and the delivery of maritime safety information in regions, particularly for developing countries.

The IHO Capacity Building programme is funded from the IHO budget and is supplemented by additional support from Member States (currently Japan, through the Nippon Foundation, and the Republic of Korea). However, considering the growing demands for IHO Capacity Building activities, more funds and contributions are required. For this reason, the Directing Committee continued its campaign to find new donor States and funding organizations.

The level of activity of the IHO Capacity Building (CB) Programme continued to increase. Expenditure in the IHO 2015 CB Work Programme (930,907 Euros) was 118% greater than the budget for the previous year. During the period of this report, 86% of the budgeted work program was executed and paid for. Some planned CB activities could not take place because of administrative and other issues in host nations, the unavailability of nominated personnel, or other late changes to the planned events. Most of the activities that could not take place were postponed and transferred to the 2016 CB Work Programme for execution.

The significant increase in the level of activity of the CB programme and the completion of the contract of a part-time Capacity Building Assistant (CBA) at the end of 2014 constrained some aspects of the CB programme during 2015, particularly in relation to the monitoring of activities and the maintenance of reports and statistics.

One IHB Director, one Assistant Director and several other members of the IHB staff were engaged in this work.

Task 3.3.1 Capacity Building Sub-Committee

The 13th meeting of the Capacity Building Sub-Committee (CBSC13) was held in Mexico City, Mexico, from 27 to 29 May, hosted by the Mexican *Secretaría de Marina* at the premises of the *Centro de Estudios Superiores Navales*. The meeting was chaired by Mr Thomas Dehling (Germany) and attended by 18 members and 14 observers from 13 RHCs, 19 Member States and two observing organizations. The IHB was represented by Director Mustafa Iptes and Assistant Director Alberto Costa Neves (CBSC Secretary).

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The Sub-Committee reviewed the impact of the revised IHO Capacity Building (CB) Strategy approved by EIHC-5 on the work of the CBSC, especially in building the Management Plan, the access of non-Member States only to Phase 1 activities, the need to identify larger and comprehensive projects to attract funding from donor agencies and the development of a paper on Public Relations to raise awareness of the importance of the IHO CB Programme and to improve its visibility.

The Sub-Committee considered the increasing number of CB activities, the associated administrative workload, intersessional correspondence and meeting workload. The Sub-Committee acknowledged the challenges of the existing limitations of the IHO secretariat to support the administration of the CB programme. This limitation on the level of support that could be provided by the IHO secretariat was subsequently acknowledged by IRCC-7 that decided to monitor its impact.

The increasing interaction with the WWNWS-SC, the MSDIWG and the TWCWG was considered in relation to the feedback on CB activities, the assessment of the need for further support and the development of course material.

The CBSC considered the development of the current IHO Publication C-55 - *Status of Hydrographic Surveying and Nautical Charting Worldwide* and its planned transition to a GIS database environment, the development of supporting databases (the Country Information System and the regional database), the progress made in the IHO GIS infrastructure and the possibilities for creating an improved C-55 function by using Category of Zones of Confidence (CATZOC) values extracted from ENCs as an indicator of the quality or status of the underlying survey data.. This work would enable country profiles to be created to support the decision-making process when considering and allocating CB priorities.

The Sub-Committee reviewed the draft CB Procedure 9 - *Technical Visits* and agreed to use this draft procedure for one year and to obtain feedback before considering formal approval at the next CBSC meeting. The CBSC acknowledged the continuing significant contributions to the IHO CB Programme made by the Republic of Korea and by Japan, through the Nippon Foundation (NF). The Sub-Committee also acknowledged the significant contributions from the IMO and IALA in supporting hydrographic training as part of the development of maritime services in developing States through the delivery of joint capacity building programmes.

The meeting commended the work by New Zealand in developing an evidence-based risk assessment methodology and its implementation in the SWPHC to establish priorities for surveys and charting. Other developments were presented by the UK (on the Organization of the Eastern Caribbean States – OECS Project), the Republic of Korea (on the EAHC Training, Research and Development Center), France (on the EAtHC Definition Study for a Long Term CB Project) and Mexico (on Strengthening the Hydrographic Capabilities in Meso-America and Caribbean Sea).

The CB Management Plan (CBMP) was reviewed and approved by the meeting as the basis for the 2016 CB Work Programme (CBWP). The meeting also approved the closure of the 2014 CBWP and updated the 2015 CBWP. The CBSC expressed some concern that there were currently only limited financial resources available to execute the full 2016 CBWP.

The next meeting of the CBSC is planned to be held in Abu Dhabi (UAE) from 24 to 26 May 2016.

Task 3.3.2 Capacity Building Fund Management

The Republic of Korea and the Nippon Foundation of Japan made significant financial contributions to the CB Fund during the period of this report.

Many other IHO Member States contributed significant in-kind resources to the CBWP, by providing such things as the venue, instructors, local support, or other items to ensure the effective implementation of CB activities. A statement of accounts for the CB Fund is contained in Part 2 of this Annual Report.

Task 3.3.2.1 Develop and maintain a Capacity Building Management System

The IHB continued to develop a more robust Capacity Building Management System based on databases and online services, but at a relatively slow pace due the resource limitations indicated in the introductory paragraph of Element 3.3.

Task 3.3.3 Meeting with other organizations, funding agencies, private sector and academia

Task 3.3.3.1 9th Joint IHO/IMO/WMO/IOC/IALA/IAEA/FIG Capacity Building (CB) Coordination Meeting

The 9th Joint IHO/IMO/WMO/IOC/IALA/IAEA/FIG Capacity Building (CB) Coordination Meeting was held on 30 November and 1 December, at the Headquarters of the World Meteorological Organization (WMO) in Geneva, Switzerland. The annual meeting brought together seven representatives from the IHO, WMO and IALA. The IMO, IOC, IAEA and FIG were not represented at the meeting. The IHO was represented by Mr Thomas Dehling (Germany), Chair of the CBSC, Director Mustafa Iptes and Assistant Director Alberto Costa Neves (CBSC Secretary).

9th Joint Meeting at WMO Headquarters

Participants presented the strategies and the management of their CB programmes, reported on their CB activities since the last meeting and shared lessons learned, best practices, standardization procedures and experience in dealing with funding agencies. The IHO representatives reported on developments including the impact of the recently approved IHO CB Strategy, the status of joint projects and the overall CB achievements.

Participants reviewed the impact of the joint paper on “Partnership arrangements, Delivering as One in action” submitted to the last session of the IMO Technical Co-operation Committee (TC 65) in June and discussed the need to follow up the joint approach under the United Nations policy of "*Deliver as one*". The IHO representatives informed the meeting of the presentation of a proposal to the IMO TC 65 for the identification of the components of the IMO Country Maritime Profile that could be shared amongst the seven organizations. The meeting considered the synergies for the execution of the CB programmes for 2016 and agreed on the implementation of a joint CB Calendar that would be put in place by the WMO and the IOC.

The meeting agreed to focus its efforts on the identification of a suitable region (such as the Caribbean, South-West Pacific or West Africa) for the development of a joint regional project that might attract funding from other donor agencies. The objectives would be to increase cooperation

and efficiency between existing services in a region, to invest in CB and thereby to provide integrated maritime and marine services in order to improve the safety of navigation, the protection of the marine environment, the protection of the population and support to sustainable economic growth. The meeting agreed to work intersessionally to select a region, to outline the scope of work and to define how to progress the project.

The next Joint CB Coordination Meeting is planned to take place in the second half of October 2016 in London, UK, and to be hosted by the IMO.

Task 3.3.3.2 Capacity Building Stakeholders Forum

No activity was conducted in 2015 for the organization of a Capacity Building Stakeholders Forum.

Other meetings

The 5th meeting of the IHO/ROK Programme Management Board (PMB5)

The PMB – 5 participants

The 5th meeting of the IHO/ROK Programme Management Board (PMB5) was held in Busan, Republic of Korea (ROK), from 25 to 26 February, hosted by the Korea Hydrographic and Oceanographic Administration (KHOA). The meeting was co-chaired by Mr. Joon Ho Jin (KHOA) and Mr. Thomas Dehling (IHO) and attended by the participants representing the contributing partners. The IHO was represented by Mr. Dehling (Germany, Chair of the IHO Capacity Building Sub-Committee), Director Mustafa Iptes and Assistant Director Alberto Costa Neves (Secretary).

The PMB reviewed the significant achievements and the various training and education activities sponsored by the ROK. The meeting also considered the management aspects of supporting trainees on the Category "A" Programme at the University of Southern Mississippi (USM)/USA and the Category "B" Nautical Cartography Programme at KHOA in order to effectively deliver high level education to participants from developing countries. During the meeting the selection board for the 2015-2016 edition of the Category "A" Programme was established and selected four candidates from Bahrain, Nigeria, Oman (subsequently replaced by a reserve candidate from Mauritius) and Romania, subject to final acceptance by the USM. ROK confirmed its intention to continue supporting CB activities at the same level of contribution as previous year.

Meeting with Nippon Foundation and new fund for the CHART Project

In accordance with the Memorandum of Understanding (MoU) between the IHO and the Nippon Foundation which was signed in December 2013, the programme known as The IHO-Nippon Foundation CHART (Cartography, Hydrography and Related Training) Project began in 2014 and was funded by the Nippon Foundation. A coordination meeting between the IHB and Nippon Foundation was held in London, UK on 28 April to review and discuss the details of the next courses to be conducted under the CHART Project. Director Mustafa Iptes represented the IHB.

Graduation Recognition Ceremony for Master of Science Degree in Hydrographic Science, University of Southern Mississippi, USA

Three students (from Bangladesh, Nigeria and Philippines), sponsored by the Republic of Korea through the IHO CB Programme, successfully completed a Master Degree in hydrographic science at the University of Southern Mississippi, USA, in July. This programme is recognized by the FIG/IHO/ICA IBSC as meeting its Category A level. Mr Thomas Dehling (Germany), Chair of the

CBSC, attended the Graduation Recognition Ceremony as IHO representative on 30 July and delivered a keynote address.

Task 3.3.4 IHO Capacity Building Strategy

Following the approval of the IHO CB Strategy by the EIHC-5, the CBSC considered at its 13th meeting in Mexico City that the Strategy was fit for purpose.

Task 3.3.5 Capacity Building Work Programme

The Capacity Building Work Programme is developed by the CBSC and subsequently endorsed by the IRCC. More details about the activities in the CBWP are described under Elements 3.4 and 3.5.

Task 3.3.6 Follow-up of CB activities and initiatives

The IHB, on behalf of the CBSC, continuously monitored CB activities and initiatives. One IHB Director and one Assistant Director were engaged in this work. Additionally, the President, both Directors and the Assistant Directors continuously monitored CB activities undertaken in the RHC areas for which they provide an overview and advisory function.

Task 3.3.7 FIG/IHO/ICA International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers (IBSC)

The 38th meeting of the IBSC was held in Niteroi/Rio de Janeiro (Brazil) at the Directorate of Hydrography and Navigation from 23 March to 2 April. The meeting was attended by the ten members of the Board. Assistant Director Alberto Costa Neves (IBSC Secretary) represented the IHB.

The Board assessed ten programmes for hydrographic surveyors and nautical cartographers at its annual meeting: five Category B (S-5) submissions, including two new programmes, four Category A (S-5) submissions and one new Category B (S-8) submission.

In addition to its annual meeting, the IBSC had been working on the development of revisions to the standards, as reported under Task 3.3.9 and 3.3.9.1.

The IBSC considered its increasing workload brought about by the number of submissions for recognition, the need for intersessional work and the meetings' requirements. The Board acknowledged the challenges on the existing limitations of the IHO secretariat to support the administration of the IBSC programme. This limitation on the level of support that can be provided by the IHO secretariat was acknowledged by IRCC-7 that decided to monitor its impact.

The number of programmes in hydrographic surveying and nautical cartography continued to increase. In 2015, there were 51 programmes in hydrography, eight in cartography and one regional scheme for individual recognition in hydrography that had been recognized by the Board.

In 2015, two new Members from Brazil (Capt. Nickolas de Andrade Roscher) and Indonesia (Mr Sobri Syawie) joined the Board, representing the IHO and the FIG respectively. Regrettably, one of the Board members, Prof. Dr Delf Egge (IHO Representative) from Germany, passed away in August.

Task 3.3.8 Provide guidance to training institutions

The IHB provided training institutions and other inquirers with guidance regarding the recognition and provision of training and education, when requested. This most often occurred as a result of the recognition evaluation processes for the IBSC, and during the preparation of CB projects, as well as during seminars and RHC meetings.

Task 3.3.9 Maintain IBSC Publications (C-6, C-47, S-5 and S-8)

The IHB and the IBSC worked on a plan for the revision of IHO Publication C-6 - *Reference Texts for Training in Hydrography* and on the new structure and update of C-47 - *Training Courses in Hydrography and Nautical Cartography* that are expected to be concluded in 2016.

Task 3.3.9.1 IBSC to develop a new Standards framework to separate competency requirements for Cat A and Cat B

The IBSC had been working on the development of revisions to the standards, specifically the significant revision of S-5 - *Standards of Competence for Hydrographic Surveyors* and S-8 - *Standards of Competence for Nautical Cartographers* into a new framework of separate Standards (S-5A, S-5B, S-8A and S-8B - see IHO CL 31/2015). The revision process continued during the year by correspondence and by four working group meetings (Antigua and Barbuda, Australia, Brazil and Canada). In 2015 Member States approved the new Edition of S-5B which was scheduled to enter into force in January 2016 (see IHO CLs 53 and 90 of 2015).

Element 3.4 Capacity Building Assessment

Task 3.4.1 Technical and Advisory Visits

Execution of the technical and advisory visits planned for 2015 are summarized in the following table:

Nº	Events	RHC	Implementation
1	Vanuatu technical implementation visit	SWPHC	Led by UKHO 09-13 November
2	Kiribati technical implementation visit	SWPHC	Led by UKHO 02-05 November
3	Technical Visit to Montenegro combined with Albania	MBSHC	POSTPONED TO 2016
4	Technical Visit to Cambodia	EAHC	POSTPONED TO 2016
5	Haiti follow up visit	MACHC	POSTPONED TO 2016
6	Technical Visit to Liberia (former 2014 CBWP A-11)	EAtHC	POSTPONED TO 2016
7	Technical Assessment & Advice - Samoa (former 2014 CBWP A-08)	SWPHC	POSTPONED TO 2016
8	MOWCA (all western Africa coastal and island States from Mauritania to Angola) high level visit (former 2014 CBWP A-09)	EAtHC	POSTPONED TO 2016

Task 3.4.2 Enhance publication C-55. IHB with the support of the RHCs, CBSC and GGC to develop a new framework for C-55

The IHB continued to update publication C-55 - *Status of Hydrographic Surveying and Nautical Charting Worldwide* based on the submissions received from Member States. The current edition of C-55 is generated from a database that is continuously updated as an online service accessed in the download section of the IHO website. The IHB continued to investigate ways to display the current database in a GIS environment and to seek new ways to use geo-information to represent the status of surveys and charting around the world. See also Task 3.6.1.

Element 3.5 Capacity Building Provision

Task 3.5.1 Raise awareness on the importance of hydrography

The IHB Directing Committee continued to work on a schedule of visits to improve global awareness, engage external stakeholders such as the United Nations, IMO, IALA, the European Commission, funding agencies, academia and industry in general. This included visits to high level authorities in several countries, participation in RHC meetings, participation in various seminars and conferences, and the active promotion of IHO activities in specialized magazines and journals.

Task 3.5.1.1 Revise M-2 – The Need for National Hydrographic Services

The IHO Publication M-2 was updated (as Edition 3.0.4) to reflect new Member States and to harmonize country names (in English, French and Spanish) with those used by the United Nations Organization (see IHO CL 55/2015).

Task 3.5.2 Technical workshops, seminars, short courses

Execution of the following seminars, workshops and short courses planned in 2015 are summarized in the following table:

No.	Events	RHC	Implementation
1	Definition Study for Long Term CB Project	EAtHC	Led by SHOM, West Africa During 2015
2	Technical Workshop on Hydrography and Hydrographic Governance	SWPHC	Led by LINZ, Cook Is. 23-24 February
3	Phase 1 Skills Course for Spanish Speakers	MACHC	Led by DIGAOHM, Veracruz, Mexico 25 November-01 December
4	Phase 1 Skills Training Course	SAIHC	POSTPONED TO 2016
5	Seminar on Raising Awareness of Hydrography	MACHC	Led by UKHO, St. John's, Antigua & Barbuda 07-08 December
6	Tides & Water Levels Technical Workshop	SWPHC	Led by AHS, Wollongong, Australia 26-30 October
7	Workshop on MSI	MBSHC	Led by ONHO, Istanbul, Turkey 20-22 October
8	Introduction to MBES - India	NIOHC	Led by UKHO, Visakhapatnam, India 9-13 February
9	MBES Processing for Bangladesh	NIOHC	Led by UKHO, Chittagong, Bangladesh 12-16 April
10	MBES Processing - Abu Dhabi	RSAHC	Led by UKHO, Abu Dhabi, UAE 07-11 June
11	MSDI Workshop with MACHC and SEPRHC	SWAtHC	Led by DHN, Niteroi, Brazil 23-27 November
12	MBES Processing for Sri Lanka	NIOHC	Led by UKHO, Colombo, Sri Lanka 06-10 April
13	ENC QA	NIOHC	POSTPONED TO 2016
14	Workshop on Multi-beam Echosounder and SSS Systems	MBSHC	POSTPONED TO 2016
15	Technical aspects of Maritime boundaries, baselines	SAIHC	Led by UKHO, Fish Hoek, South Africa 30 November-04 December

No.	Events	RHC	Implementation
16	Seabed Classification and Multi-beam Survey	EAHC	Led by DISHIDROS, Jakarta, Indonesia 05-09 October
17	Tsunami Inundation Mapping Workshop	EAHC	Led by JHOD, Tokyo, Japan 25-27 November
18	Project will be a technical visit (Activity A-05)	-	Moved to the CB Assessment part
19	Seminar on S-100	SWAtHC	Led by SOHMA, Montevideo, Uruguay 18-20 November
20	MSDI and Database Management	EAHC	POSTPONED TO 2016
21	Technical Aspects of Maritime Boundaries	MACHC	Led by UKHO, Paramaribo, Suriname 10-14 August
22	Cat A hydrography Programme (USM)	IHB	Led by USM, Hattiesburg, USA August 2015-August 2016
23	7th Course on Hydrographic Data Processing and Marine Cartography (UKHO)	IHB	Led by UKHO, Taunton, UK 07 September-18 December
24	GEBCO Training Project (UNH)	UNH	Led by UNH, Durham, USA August 2015-August 2016
25	Regional Training Course in Africa	IMO	Cancelled
26	Regional Training Course in the Pacific Islands	IMO	Cancelled
27	Category B Marine Geospatial Information Program (Phase 1) (former 2014 CBWP P-30)	IHB	Led by KHOA, Busan, RoK 2 March-10 April
28	MSI course (3 days) for EAHC Members (former 2014 CBWP P-04)	EAHC	Led by JHOD, Tokyo, Japan 03-05 March
29	Tidal and Water Levels Workshop, for RSAHC Members (former 2014 CBWP P-08)	RSAHC	Led by UKHO, Abu Dhabi, UAE 06-10 September
30	Tidal and Water Levels Workshop, for SAIHC Members (former 2014 CBWP P-10)	SAIHC	Led by UKHO, Fish Hoek, South Africa 23-27 February
31	Multi-beam Training Course on Port Operations for Safety of Navigation (New)	IMO	Led by IHB, Kuala Lumpur, Malaysia 7-11 December

Task 3.5.3 IHB, in conjunction with IBSC and CBSC, to encourage the development and delivery of new Hydrographic and Nautical Cartography Programs, including the establishment of new Hydrographic Schools where that regional capacity does not exist. Report to the IHO on the results

Through the work of the IBSC, CBSC and IHB, new programmes continued to be developed as indicated by the responses to CL 47/2015 for the update of IHO Publication C-47 - *Training Courses in Hydrography and Nautical Cartography* (see Task 3.3.9) and by the new submissions to the IBSC (see Task 3.3.7).

Task 3.5.4 On the Job Training (ashore / on board)

On the job training on multi-beam processing was provided to Bangladesh and Sri Lanka (see Task 3.5.2, activities 9 and 12 respectively) during the period of this report.

Task 3.5.5 IHB, with the support of CBSC and RHCs, to ensure awareness of multilateral or bilateral projects with hydrographic and/or cartographic components, and to provide advice to governments, project managers and funding agencies on the importance of including a hydrographic Capacity Building Component. Report to IHO annually on the results obtained.

The IHB assisted in the development of several regional projects including in the South-West Pacific (liaison with Land Information New Zealand (LINZ)), the Caribbean region (liaison with The Organisation of Eastern Caribbean States (OECS) and with the UKHO) and the West African region.

Task 3.5.6 CBSC to foster bilateral agreements in order to help satisfy SOLAS V/9

Technical visits (see Task 3.4.1) continued to be the principal way of identifying areas where bilateral agreements may help to further develop the provision of hydrographic services.

Element 3.6 Coordination of Global Surveying and Charting

Task 3.6.1 Publication C-55: Status of Hydrographic Surveying and Nautical Charting worldwide

Relatively few countries provided updates or confirmed the current entries shown in C-55. This limits the usefulness of the publication.

The following table lists the countries for which updates to existing C-55 entries were received in 2015:

IHO Member States	Non IHO Member States
Bangladesh	Barbados
Cameroon	Benin
Denmark	Comoros
Ecuador	Congo
Finland	Côte d'Ivoire
France	Djibouti
Germany	Equatorial Guinea
Greece	Gabon
Monaco	Gambia
Morocco	Guinea
Netherlands	Israel
Norway	Lebanon
Peru	Madagascar
Spain	Mauritania
Sweden	Senegal
Tunisia	Togo
UK	
Ukraine	

Task 3.6.2 WENDWG to foster the implementation of the WEND principles, monitor progress and report to IRCC

The principal objective of the WENDWG is to monitor and advise IRCC on the achievement of adequate ENC coverage that meets the SOLAS V/19 carriage requirements for ECDIS. The WENDWG submitted a number of proposals to IRCC-7 as reported under Task 3.1.17.

Task 3.6.3 RHC to coordinate ENC schemes, consistency and quality

In 2015, the Nautical Cartography Working Group (NCWG), in liaison with the INT Chart / ENC Regional Coordinators, prepared a new draft edition of IHO Publication S-11 Part A, the main purpose of which was to incorporate guidance relating to the preparation and maintenance of ENC schemes. Comments received on this draft from the IHO Member States will be addressed in 2016. Based on this publication, RHC's are expected to coordinate the development and maintenance of small/medium scale ENC schemes and to ensure that uniform parameters are used to ensure consistency and quality. RHCs are also invited to monitor and report on gaps and overlaps in ENC coverage on a regularly basis. This will then be considered at every meeting of the WENDWG. The importance of the WENDWG activities had been acknowledged formally at EIHC-5 by Decision No 10 which states that "*the two continuing priorities of the IRCC will continue to be Capacity Building and ENC coverage together with related WENDWG issues*". EIHC-5 also tasked the IRCC, by Decision No 12, "*to assess the long term consequences of not achieving the full implementation of the WEND Principles*". This task was progressed under the WENDWG and the initial outcomes were expected to be considered at the WENDWG-6 meeting in 2016.

As far as ENC coverage was concerned, reporting from individual RHCs to the IHB or the WENDWG remained inconsistent but was improving with the use of the IHO ENC on-line Catalogue and the RENC Coverage and Overlap Checker tool made available by the RENCs in 2015. The examination of the IHO ENC Catalogue, compiled primarily from data provided by the two established RENC organizations and the UKHO, showed that ENC small/medium scale coverage was generally satisfactory, though there were a number of instances of overlapping or duplicated data in the same usage band, as well as some gaps in coverage. At larger scales, there were still a number of ports, harbours, moorings and approaches for which there was not an ENC to correspond to a published paper chart of the same area.

The statistics reported annually by the IHO to the IMO concerning global ENC coverage are included in Table 1 of Annex B under Strategic Performance Indicator 2. By the end of 2015, the figures had not changed significantly from those reported in the previous annual report.

The relevant RHCs were invited to report on their analysis of any remaining gaps in ENC coverage and to identify possible actions to the next meeting of the WENDWG.

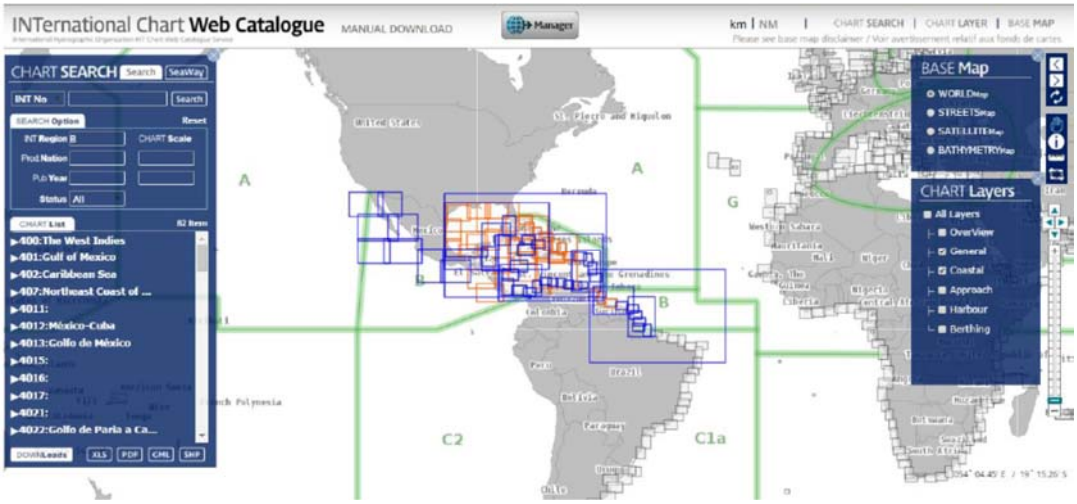
A working group led by Singapore on behalf of the East Asia Hydrographic Commission (EAHC) carried out a pilot project to explore technical solutions to resolve the unpredictable performance of ECDIS caused by overlapping ENC coverage, notably in areas where the limits of waters of national jurisdiction between two neighbouring countries are not established. ECDIS manufacturers were invited to take part in the project.

Task 3.6.4 Maintenance of INT chart schemes and improvements of availability of the INT chart series

The purpose of the IHO INT chart series is to define and produce a set of medium and large-scale charts that are specifically designed for planning, landfall and coastal navigation and access to ports used by ships engaged in international trade. The designation of the limits and scale for each INT chart and the designation of which country will be the primary producer of each INT chart are managed by the relevant RHC.

Kindly supported by the Korea Hydrographic and Oceanographic Agency (KHOA) in 2015, the IHB initiated the development of an on-line web-based interactive version of IHO Publication S-11 Part B - *Catalogue of INT Charts*. This project, called "INToGIS" is a complementary contribution to the development of the IHO Geographic Information System (GIS) by providing the Regional International

Charting Coordination Working Groups (ICCWGs) with the necessary tools to review and maintain INT chart schemes and monitor the production of INT charts and to ensure the wide on-line availability of up to date information on the status of INT charts.



The following table summarizes the status of the INT chart scheme at the end of 2015, according to the new S-11 Part B INTernational Chart Web Catalogue:

Region	Coordinator	Commission	Scheduled	New publications reported in 2015	Published Total
A	USA/NOS	USCHC	15	0	15
B	USA/NOS	MACHC	81	1	47
C1	Brazil	SWAtHC	51	0	33
C2	Chile	SEPRHC	44	0	7
D	UK	NSHC	216	2	215
E	Finland	BSHC	294	1	282
F	France	MBSHC	225	1	161
G	France	EAtHC	172	0	133
H	South Africa	SAIHC	118	1	92
I	Iran (I.R of)	RSAHC	116	0	67
J	India	NIOHC	171	6	131
K	Japan	EAHC	294	0	240
L	Australia	SWPHC	62	0	56
M	UK	HCA	113	3	77
N	Norway	ARHC	12	0	8
1 :10 Million	IHB	--	25	0	24

Total of INT charts scheduled: 2009
Total of INT charts produced in 2015: 15 (0.7% of the total scheduled)
Total of INT charts published by end 2015: 1588 (79.0% of the total scheduled)

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As indicated in IHO CL 89/2015, the compilation of the INToGIS chart database resulted in the identification of several inconsistencies in the details for some charts in the INT schemes, such as missing attributes or incomplete or unclear information related to edition dates, availability of INT charts, formal approval of INT chart schemes by the relevant RHC, and the allocation of Producer or Printer Nations for some INT charts. In these cases, the IHB did not include the affected charts in the database and will not do so until the required clarifying information is provided.

Element 3.7 Maritime Safety Information

Task 3.7.1 Sub-Committee on the World-Wide Navigational Warning Service

The Sub-Committee on the World-Wide Navigational Warning Service (WWNWS-SC) monitors and guides the IHO/IMO World Wide Navigational Warning Service which includes NAVAREA and coastal warnings. The Sub-Committee is responsible for studying and proposing new methods to enhance the provision of navigational warnings to mariners at sea, facilitating the implementation of the major changes in procedures for dissemination of navigational warnings and providing appropriate guidance to concerned IHO Member State representatives to further the evolution of the WWNWS. The Sub-Committee also maintains a close liaison and cooperation with the WMO for its Worldwide Met-Ocean Information and Warning Service (WWMIWS).

The seventh meeting of the WWNWS-SC (WWNWS-7) was held at the IHB in Monaco, from 24 to 27 August under the chairmanship of Mr Peter Doherty (USA). The meeting was attended by 42 delegates from 18 IHO Member States, the Secretariats of IMO, WMO, IOC and IMSO, the Chairs of IMO NAVTEX and IMO SafetyNET Coordinating Panels, Inmarsat, Iridium, CIRM and Furuno Finland Oy. The delegates included representatives of 16 NAVAREA Coordinators, one Sub-Area Coordinator and four National Coordinators. The IHB was represented by Assistant Director David Wyatt.

The IMO Secretariat provided a brief on the modernization of the Global Maritime Distress and Safety System (GMDSS) and the GMDSS Master Plan. The representative of the IMO Secretariat noted that a GMDSS Circular was being considered announcing the inclusion of a module in the Global Integrated Shipping Information System (GISIS) that will allow individual Member States to update relevant information in the GMDSS Master Plan. Noting the desire for ease of updating, it was agreed that the IMO SafetyNET and NAVTEX Coordinating Panels would conduct some quality control and quality assurance to ensure no invalid information was published. It was also noted that a similar process would be required when additional service providers operate in the future; it was also confirmed that a validation check would be undertaken by the IMO Secretariat (see Task 3.7.5).

The Sub-Committee reviewed the WWNWS documentation, including the proposed editorial amendments to the SafetyNET and NAVTEX Manuals prepared at the 13th meeting of the Document Review Working Group (DRWG), received MSI self-assessment reports (see Task 3.7.3) assessed the content and success of the MSI Capacity Building training courses delivered during the year and prepared a report on the outcome of the meeting for submission to the third session of the IMO NCSR in 2016.

The delegates received briefings on AIS Application Specific Messages from the USA, SONSAT (Security of Navigation, Stabilisation, Advice and Training, including the Admiralty Warning and Navigational Information Service (AWNIS)) from the UK and developments in the provision of mobile satellite Global Maritime Distress and Safety System (GMDSS) services from Inmarsat and Iridium. The meeting also received a progress report on the development of the S-124 Product Specification on Navigational Warnings.

The Sub-Committee received presentations on the IOC Tsunami Early Warning System, the impact of e-navigation on hydrographic services from the IHB, NAVTEX encoding from Furuno and the ACCSEAS[2] project of the European Union from Denmark.

[2] ACCSEAS: ACCessibility for Shipping, Efficiency Advantages and Sustainability.

Task 3.7.2 WWNWS Document Review Working Group and Task 3.7.3 Maintain and extend the following IHO standards, specifications and publications

The WWNWS relies on various IMO/IHO documents to provide guidance for the promulgation of internationally coordinated NAVAREA and Coastal warnings. Further, the WWNWS systems used for dissemination of the maritime safety information, SafetyNET and NAVTEX respectively, each have their own guidance document. The WWNWS ensures that there is 100% consistency between these documents.

The Document Review Working Group (DRWG) met in the week after the second session of NCSR and prepared editorial amendments to the IMO SafetyNET and NAVTEX Manuals. The editorial reviews of the IMO SafetyNET and NAVTEX Manuals were completed at WWNWS-7. In accordance with the decision of IRCC-7 and in the absence of any adverse comment from Member States on the procedure for the submission of MSI documents to the IMO which had been approved by the IRCC (see IHO CL 54/2015), the final draft versions of the SafetyNET and NAVTEX Manuals were submitted directly to the third session of the IMO Sub-Committee on Navigation, Communications, and Search and Rescue (NCSR3) for comment and endorsement prior to the consideration and anticipated approval of Member States at the 96th session of the IMO Maritime Safety Committee (MSC96).

It was decided at WWNWS-7 that the 14th meeting of the Document Review WG (DRWG14) would undertake a review of the IMO Resolutions A.664(16) - *Performance standards for enhanced group call equipment*, MSC.305(87) - *Guideline on operational procedures for the broadcast of maritime safety information concerning acts of piracy and piracy countermeasure operations*) and MSC.306(87) - *Revised performance standards for enhanced group call (EGC) equipment* and prepare proposed amendments for consideration at WWNWS8 in 2016 and subsequent submission to NCSR4 in 2017. Additionally it was agreed to include the MSICB course training material in the review cycle to ensure it reflected the recent amendments to the Joint MSI Manual and the proposed revisions to the SafetyNET and NAVTEX Manuals. It was agreed to finalize the work on IMO Resolution A.1051(27) - *IMO/WMO Worldwide Met-Ocean Information and Warning Service – Guidance Document* in preparation for submission to NCSR4 in 2017.

Task 3.7.4 Liaise with IMO and WMO on the delivery of MSI within the GMDSS

The WWNWS-SC, with support from the IHO CB Programme, continued to deliver its comprehensive training course that provides practical guidance to relevant authorities in countries that are drafting navigational warnings or broadcasting MSI for the high seas under the GMDSS. The objective of the course is to increase the flow of MSI to NAVAREA Coordinators for promulgation, and ultimately to emphasize the importance of establishing expertise in the countries within these NAVAREAs, to fulfil their role of National Coordinators.

The Sub-Committee received updated information on the delivery of MSI training courses and the need for the NAVAREA Coordinators to work closely with the Regional CB Coordinators to help developing nations to reach the Phase 1 level (collection and circulation of nautical information, necessary to maintain existing charts and publications up to date) of the IHO CB Strategy. As part of this cooperation, the proposed text of an MSI assessment to be included in national reports to RHC meetings was discussed. The meeting was informed that one MSI course had been conducted in Tokyo, Japan, for participants from the East Asia Hydrographic Commission from 3 to 5 March and a further course was programmed to be held in Istanbul, Turkey for participants from the Mediterranean and Black Seas Hydrographic Commission from 20 to 23 October. It was also noted that a further two courses had been funded for the Meso American and Caribbean Hydrographic Commission and the South West Pacific Hydrographic Commission in 2016.

Task 3.7.5 Contribute to the IMO work items on the modernization of GMDSS

The WWNWS-SC reviewed the relevant matters considered and decisions taken during the 95th session of the IMO Maritime Safety Committee (MSC95) and the second session of IMO NCSR. The WWNWS-SC, through the IHO, again raised its concerns at IMO NCSR that the company Iridium had provided limited details on how it might fulfil the requirements outlined in IMO Resolution A.1001(25)

- *Criteria for the Provision of Mobile Satellite Communication Systems in the GMDSS*. Iridium is the first commercial satellite provider other than Inmarsat, to attempt to gain approval based on the IMO Resolution A.1001(25).

The Secretariat of the IMO provided a brief on the modernization of the GMDSS and the GMDSS Master Plan, noting the next revision would be issued in mid-September after approval by the Chair of the IMO NAVTEX Coordination Panel and consultation with the Chair of the IMO SafetyNET Coordinating Panel. The representative of the IMO Secretariat noted that a GMDSS circular was being considered announcing the inclusion of a module in the Global Integrated Shipping Information System (GISIS) that would allow individual Member States to update relevant information in the GMDSS Master Plan. Noting the desire for ease of updating, it was agreed that the IMO SafetyNET and NAVTEX Coordinating Panels would conduct some quality control and quality assurance to ensure no invalid information was published. It was also noted that a similar process would be required when additional service providers operate in the future; it was also confirmed that a validation check would be undertaken by the IMO Secretariat. The representative of the IMO Secretariat urged that all Area Coordinators provide relevant input to the GMDSS modernization Correspondence Group.

The contents of the relevant Annexes of the GMDSS Master Plan were reviewed. The Chair of the NAVTEX Coordinating Panel noted that there were eight amendments waiting input to Annex 8. Review by the Sub-Committee highlighted and identified a number of incorrect inputs during the meeting.

Task 3.7.6 Improve the delivery and exploitation of MSI to global shipping by taking full advantage of technological developments

WWNWS-7 considered self-assessment reports from all 21 NAVAREAs. The MSI Self-Assessment document requires NAVAREA Coordinators to complete an MSI Quality Management Survey. There was a pleasing high level of consistency of service described in all of the reports. A number of issues were highlighted, which required further investigation and input from the Chair of the WWNWS-SC, as well as the Chairs of the IMO SafetyNET and NAVTEX Coordinating Panels. The Chair of the Sub-Committee agreed to assist NAVAREA Coordinators, through the IHB, to gain the support of National Coordinators in ensuring that all SOLAS MSI responsibilities were being met.

WWNWS – 7 participants in Monaco

The Secretariat of the WMO provided a brief on the activities of the Organization over the past year, including outcome from its Congress. Details of the work programmes of the six regional associations and working groups and their activities, increased cooperation between NAVAREA and METAREA Coordinators, the continuous emergency response capability were all highlighted, as well as the activities of the regional training and global training centres. An update on the multi-hazard early

warning system was provided; the IHO and IMO were invited to participate in the network to develop appropriate world-wide policy and standards.

The Secretariat of IMSO provided a presentation on the activities of IMSO and the process for conducting the technical assessment of potential new GMDSS mobile satellite service providers as directed by the NCSR and the MSC.

The Secretariat of the IOC gave a presentation on the Tsunami Early Warning System and raised a number of issues for comment by the WWNWS-SC. The relationships between NAVAREA and METAREA Coordinators, National Tsunami Warning Centre (NTWCs), national authorities and mariners were highlighted and the process for warnings on tidal surges and storm generated waves, particularly in low lying coastal regions, was explained.

Inmarsat reported on progress on the Inmarsat-C EGC SafetyNET system developments. The Chair of the IHO S-124 Correspondence Group updated the Sub-Committee on the progress in the development of S-124, the S-100 based Product Specification for Navigation Warnings. Denmark provided a briefing on the European Union ACCSEAS (Accessibility for Shipping, Efficiency Advantages and Sustainability) project, and on a new web-based system for displaying MSI and other maritime data on a Maritime Message Information website. The process for creating warnings in the system was also demonstrated. Iridium provided an update on developments of the Iridium Satellite system, as the process towards approval recognition as a mobile satellite GMDSS service provider progresses. Director Gilles Bessero gave a background brief and presentation on the impact of e-Navigation on the provision of hydrographic services. The presentation covered the likely future developments in the IMO e-Navigation initiative, and highlighted in particular the impacts on MSI provision and the work of the NAVAREA Coordinators.

Element 3.8 Ocean Mapping Programme

The GEBCO Project is a joint programme that is executed under the governance of the IHO and the IOC. GEBCO is directed by a Guiding Committee made up of representatives from both IHO and IOC and is supported by a Technical Sub-Committee on Ocean Mapping (TSCOM), a Sub-Committee on Undersea Feature Names (SCUFN), a Sub-Committee on Regional Undersea Mapping (SCRUM), and a Nippon Foundation/GEBCO Training Project Management Committee. Additional ad hoc working groups are convened as necessary. Through the work of its organs, GEBCO produces and makes available a range of bathymetric data sets and products, including gridded bathymetric data sets, the GEBCO Digital Atlas, the GEBCO world map, the GEBCO Gazetteer of Undersea Feature Names and the GEBCO Cook Book. GEBCO maintains a comprehensive website at: http://www.gebco.net. The progress of the GEBCO Project is reported below.

During the year, the Directing Committee noted a continuing and growing interest in the health and status of the oceans by many governments, international and philanthropic organizations and by the public more generally - culminating in the adoption of a UN Sustainable Development Goal (Goal 14) on the oceans in September as part of the UN Post 2015 Development Agenda and subsequent discussions at the 2015 Paris Climate Conference (COP21) under the UN Framework on Climate Change (UNFCCC) in December. However, the long-running GEBCO Project was rarely mentioned or recognised by the participants in any of the related activities.

Task 3.8.1 Conduct meetings of relevant GEBCO bodies

Task 3.8.1.1 GEBCO Guiding Committee

The 32nd meeting of the GEBCO Guiding Committee (GGC) was held in Kuala Lumpur, Malaysia from 8 to 9 October. Director Mustafa Iptes and Assistant Directors David Wyatt and Anthony Pharaoh represented the IHO secretariat.

The GGC received brief reports from its sub-committees and endorsed the work which they had undertaken. The GGC also received reports from key personnel performing functions on behalf of GEBCO as well as reports from its parent bodies - IHO and IOC, on activities since the previous meeting. A detailed report was received covering education and outreach activities, the results of a year-long focused study.

The GGC reviewed its Work Programme and commenced development of its Work Plan for 2015 to 2016. The Committee also acknowledged its new Terms of Reference and Rules of Procedure, which had been approved by the IOC Assembly in June and then by the IHO Member States in September.

The GGC devoted significant time to considering its future direction and associated ten-year plan. It was agreed that the goals and vision should be guided by four main underpinning themes: human capacity, science and technology, outreach and education, and resources (human and financial). There was a clear understanding that data quality and coverage was the underpinning foundation on which the many uses and products would be developed and that the GEBCO Project should be focused on obtaining and making bathymetric data available, and that it was for others to develop products and services from that data. The Guiding Committee was briefed on the plans and preparations for a GEBCO-Nippon Foundation sponsored forum, *Forum for Future Ocean Floor Mapping (F-FOFM)*, a three day international event bringing together ocean experts with the goal of accelerating the ability of GEBCO to accurately portray the shape of the world's ocean floor.

A desire was expressed to seek ways in which the naming process used by the Sub-Committee on Undersea Feature Names (SCUFN) could be made more efficient, one of which was to re-assess the way in which the GGC provided its endorsement of names approved by SCUFN. It was agreed in future this would be done by correspondence.

The GGC discussed outreach and ways to raise the profile of the GEBCO project amongst the different stakeholder and user communities - including IHO and IOC Member States, the maritime and scientific community and the public. It was noted that different strategies would be required for each of these groups. The GGC also reviewed its current financial situation in relation to proposed planned projects; the Committee recognised that the sub-committees would need to present more detailed proposals for consideration at future GGC meetings for the subsequent consideration and endorsement by the IRCC.

The current Secretary advised the Committee that his term of office would finish at the end of 2015. The GGC accepted the offer of the IHB to provide secretarial assistance and Assistant Director David Wyatt was appointed to the position of GEBCO Secretary from 1 January 2016. It was agreed that the 33rd meeting of the Committee would take place, together with meetings of TSCOM, SCRUM and the GEBCO Science Day, in Viña del Mar, Chile, during the week 10 to 14 October 2016.

Task 3.8.1.2 Technical Sub-Committee on Ocean Mapping (TSCOM) and Task 3.8.1.3 Sub-Committee on Regional Undersea Mapping (SCRUM)

The GEBCO Technical Sub-Committee on Ocean Mapping (TSCOM) and the Sub-Committee on Regional Undersea Mapping (SCRUM) held a joint meeting from 6 to 7 October. The meeting was co-chaired by Dr Karen Marks (USA), (Chair of TSCOM), and Professor Martin Jakobsson (Sweden), (Chair of SCRUM).

The TSCOM is responsible for producing and maintaining the GEBCO global digital grids which are used by ocean scientists, academia, map producers and many other communities. The meeting decided that a new (higher resolution) GEBCO grid should be produced in 2016. The current 30 arc-second grid should be upgraded to a 15 arc-second grid.

The meeting agreed that bathymetric data for coastal and shallow water areas should be improved, and proposed that national hydrographic authorities should be invited to provide data from whatever sources they were prepared to make available. It was agreed that Crowd Sourced Bathymetry (CSB) would also be an important source of shallow water data in these areas. The meeting discussed various outreach activities such as outreach for high school and college students, using the IHO-IOC GEBCO Cook Book (B-11) as an educational resource. It was also proposed to make scanned versions of the five GEBCO printed map editions available in digital format for download, and as an online tile map service. It was reported that information about the B-11 publication had been included in the Earth Observing System (EOS) news brief and in an article in the Hydro International periodical. Update reports were provided on the following regional mapping projects: Indian Ocean Bathymetric Compilation (IOBC), North Atlantic Seabed Mapping Project, International Bathymetric Chart of the Arctic Ocean (IBCAO), International Bathymetric Chart of the Southern Ocean (IBCSO) and Baltic compilations.

For the tenth consecutive year, the GEBCO project held a "Bathymetric Science Day" at the Kuala Lumpur Convention Center on 5 October. It was attended by more than 50 delegates from all over the world. There were 13 oral and eight poster presentations and these included contributions from a number of Nippon Foundation Ocean mapping programme alumni. It also featured presentations on a diverse range of topics.

Task 3.8.1.4 Sub-Committee on Undersea Feature Names (SCUFN)

The 28th meeting of the IHO-IOC GEBCO Sub-Committee on Undersea Feature Names (SCUFN) was hosted at the Diretoria de Hidrografia e Navegação (DHN), in Niteroi, Brazil, from 12 to 16 October. SCUFN is tasked with selecting the names of undersea features to appear in the products of the IHO-IOC General Bathymetric Chart of the Oceans (GEBCO) project and on international nautical charts. These names, widely used in scientific publications also, are made available in the GEBCO Gazetteer of Undersea Features Names (www.gebco.net > Data and products > Undersea feature names > view and download). The meeting, chaired by Dr Hans Werner Schenke (IOC representative) from the Alfred Wegener Institute for Polar and Marine Research (AWI – Germany), was attended by 20 participants, including nine of the 12 SCUFN members (four IOC and five IHO representatives), together with 10 observers. Assistant Director Yves Guillam (SCUFN Secretary) represented the IHB.

The meeting was opened by Vice-Admiral Antonio Pontes Lima, Director of DHN, and Admiral (Ret.) Luiz Fernando Palmer, ex-Director of DHN. Admiral Pontes Lima stressed the importance of the role fulfilled by SCUFN in harmonizing undersea feature names and making these names available to a large community of users.

After the election of Dr Yasuhiko Ohara (IHO representative, Japan,) as Vice-Chair, the Sub Committee considered proposals for 72 undersea feature names, submitted by various bodies and supporting organizations: Brazil (12), China (20), Japan (28), Republic of Korea (3), Malaysia (6), Russian Federation (1), Sweden (1) and USA (1). The Sub Committee decided also to trial a fast-track procedure when reviewing the proposals made by New Zealand related to 56 names that already appear on nautical charts.

The success of the meeting was assisted by work done through contracted support managed by the IHB during the inter-sessional period. The contractor addressed a number of issues identified in 2014:

- the improvement of the consistency of the GEBCO Gazetteer database and the effective implementation of SCUFN decisions;
- the monitoring of the number of PENDING names;
- the evaluation of the on-line tools;
- the preparation of an experimental fast-track evaluation procedure to review the proposals made by New Zealand related to 56 names that already appear on nautical charts;

- the preparation of the collection of amendments / clarifications that would need to be included in the IHO-IOC Publication B-6 – *Standardization of Undersea Feature Names* when a new Edition is deemed necessary.

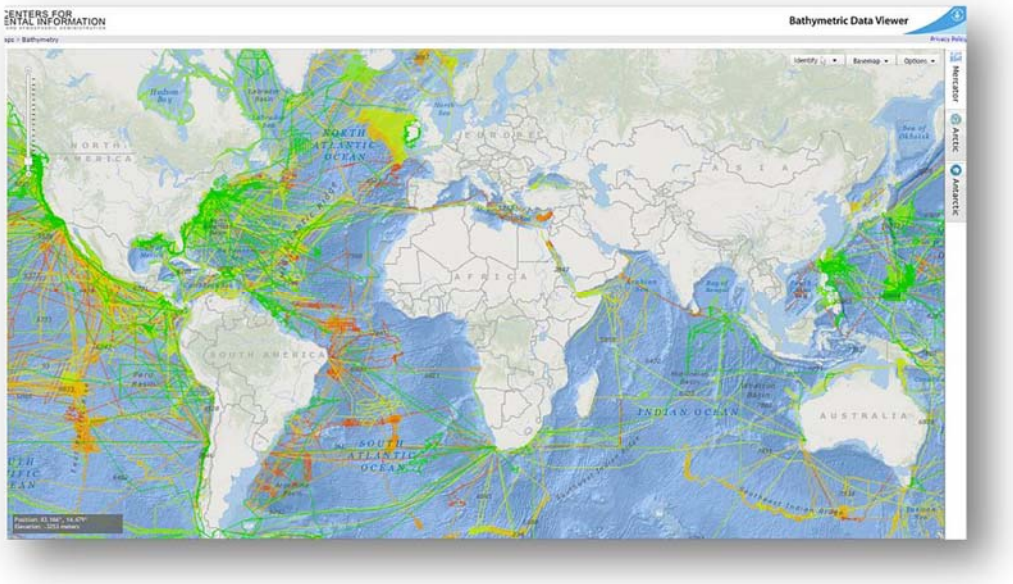
In addition, several other factors were very helpful in making the evaluation process more efficient during the meeting, including:

- most of the proposals were submitted in accordance with the relevant standards and submission procedures;
- the terminology provided in Publication B-6 was applied more consistently;
- associated GIS files were provided in advance, which enabled the IHB to pre-load the data in the GEBCO Gazetteer database and perform some initial quality control and screening;
- the SCUFN members were able to use collaborative on-line reviewing tools developed by the Republic of Korea, prior to the meeting.

The Sub Committee also decided to include in its programme of work liaison with the IHO S-100 Working Group and the Nautical Cartography Working Group to provide expertise on undersea feature names.

Task 3.8.2 Ensure effective operation of IHO Data Centre for Digital Bathymetry

Since its inception, the IHO Data Centre for Digital Bathymetry (DCDB) has become a prominent repository of digital oceanic bathymetry and is used by IHO Member States and other ocean science communities. The IHO DCDB facility is generously hosted by the National Oceanographic and Atmospheric Administration (USA) on behalf of the IHO Member States.



IHO DCDB Web Map Interface

The IHO DCDB data store contains oceanic soundings that have been acquired by hydrographic, oceanographic and other vessels during surveys or while on passage. These data are used for the production of improved and more comprehensive bathymetric maps and grids, particularly in support of the GEBCO Ocean Mapping Programme (see Tasks 3.8.4 and 3.8.5). Bathymetric data located at the IHO DCDB can be viewed/filtered via a web map interface, and freely downloaded. The map interface can be accessed from: http://maps.ngdc.noaa.gov/viewers/bathymetry/

Task 3.8.2.1 Crowd-Sourced Bathymetry

As a result of Decision 8 of the EIHC-5, the IRCC established a Crowd-sourced Bathymetry Working Group (CSBWG) at its seventh meeting (see IHO CL 42/2015).

The CSBWG was tasked to examine how best to incorporate, manage and use bathymetric data acquired by other than conventional means and develop principles and guidelines to enable the appropriate collection and use of crowd-sourced bathymetry for the benefit of all stakeholders interested in knowing the shape and nature of the seafloor and its depths.

The CSBWG was also tasked to draft an IHO publication on policy for trusted crowd-sourced bathymetry including guidelines on the collection and assessment of CSB data, not only for potential use for charting purposes but also for its wider use in non-navigational applications. The publication should take into account the work to enhance the IHO DCDB as a data discovery and upload/download portal for Crowd-Sourced Bathymetry and lessons learned and specifications created during the IHO CSB pilot projects. See Terms of Reference and Work Program for further information.

The CSBWG held its first meeting in Kuala Lumpur, Malaysia on 7 October. The meeting was chaired by Ms Lisa Taylor (USA) with representatives from five Member States (China, France, Malaysia, UK and USA) with observers and expert contributors from the IHO-IOC GEBCO project, the Professional Yachting Association (PYA) and Sea ID, a company developing open technology for the marine industry. Director Mustafa Iptes and Assistant Director David Wyatt represented the IHB.

The CSBWG received a presentation covering the background to the creation of the working group and the tasks which have been set by the IRCC. The participants focused on four key areas -data collection models, appropriate hardware, data formats and the determination of uncertainties - which it was felt needed to be addressed within the guidance document and progressed by the working group.

It was agreed an outline for the guidance document should be prepared for presentation at IRCC8 in May 2016; additionally it was agreed that a further meeting of the working group would be beneficial prior to IRCC8 to progress the outline document. The second meeting was planned for 10-11 February 2016 at the NOAA Offices in Boulder, Colorado, USA.

Task 3.8.3 Encourage the contribution of bathymetric data to the IHO DCDB

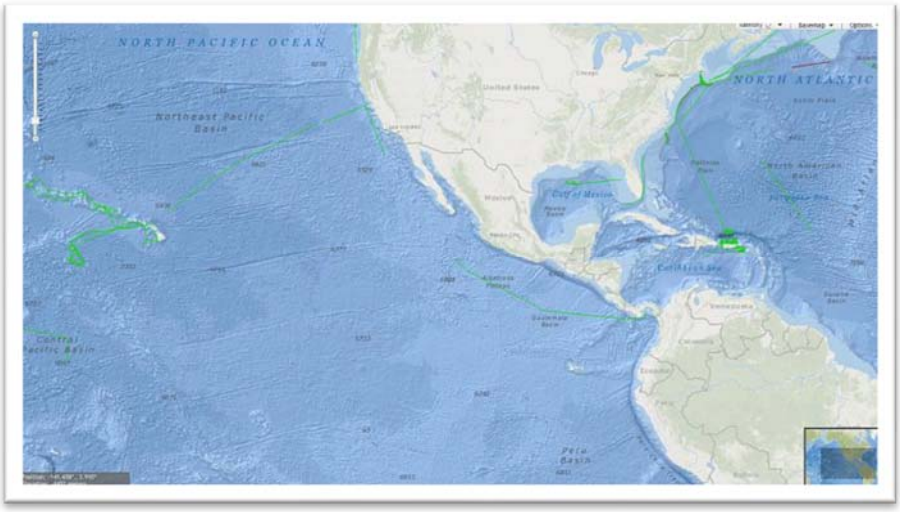
The GEBCO Ocean mapping programme is dependent on the availability of bathymetric data and undersea feature information. In order to achieve its goals, GEBCO proactively collects, stores and disseminates bathymetric data for the world's oceans. GEBCO has worked towards improving its participation in regional mapping activities and has also appointed representatives to participate in selected RHC meetings.

Traditionally GEBCO has focused on areas deeper than 200m, however, it is now actively collecting data in shallow water areas to support activities such as coastal zone management and the mitigation of seaborne disasters such as storm surges and tsunami inundation. IHO Member States are encouraged to contribute bathymetric data in shallower coastal areas to support the production of higher resolution gridded data products.

Task 3.8.4 Maintain IHO bathymetric publications:

- ***B-4 - Information concerning recent bathymetric data***

Bathymetric data from ten multi-beam and single beam surveys were added to the IHO DCDB during 2015. These data can be viewed or downloaded using the web mapping facility provided at: http://maps.ngdc.noaa.gov/viewers/bathymetry/



Recent additional data in the IHO DCDB

- ***B-6 - Standardization of undersea feature names***

Edition 4.1.0 of Publication B-6 on the Standardization of Undersea Feature Names entered into force in September 2013. It provides guidelines for naming features, a naming proposal form and a list of generic terms with definitions. Edition 4.1.0 of B-6 was made available in Spanish/English and Chinese/English versions. Some definitions were reviewed in 2015 in preparation of a future edition. Further harmonization between the procedures and definitions used by SCUFN and by other national and international naming organizations still needs to be addressed as a matter of high priority.

- ***B-8 - GEBCO Gazetteer of Undersea Feature Names***

The on-line GEBCO Gazetteer of Undersea Feature Names, developed by the IHO DCDB (co-located at one of the US National Centers for Environmental Information (NCEI)), was maintained by the IHB and was fully available to the users during the period of this report. The continuing maintenance of this interface, for corrections and possible upgrades, was raised at the SCUFN-28 meeting in October, as matter of concern, especially since the Gazetteer of Undersea Feature Names database is connected to other geospatial portals around the world (Marine Regions for instance).

- ***B-9 - GEBCO Digital Atlas***

IHO publication B-9 - *GEBCO Digital Atlas* (GDA) is a two-volume DVD and CDROM set which contains: the GEBCO global bathymetric grid at 30 arc-second intervals; the GEBCO One Minute Grid global bathymetric grid, a global set of digital bathymetric contours and coastlines, the GEBCO gazetteer of undersea feature names and a software interface for viewing and accessing the data sets. The GEBCO grids are generated by combining quality-controlled ship depth soundings with depth interpolations between sounding points guided by satellite derived gravity data. The grids were updated in March 2015 to correct an error in the procedure used to include the IBCSO data set. The new version of the GEBCO_2014 grid was produced with a revised version number: 20150318. The grid is available for download from the GEBCO website.

- ***B-11 - GEBCO Cook Book***

The GEBCO Cook Book (IHO publication B-11) is a technical reference manual that has been developed to assist and encourage participation in the development of bathymetric grids. It is an important GEBCO reference document that is used by academic institutions and hydrographic organizations. The Cook Book covers a wide range of topics such as data gathering, data cleaning, gridding examples and provides an overview of different software applications used for producing bathymetric grids.

The Cook Book was first released as IHO Publication B-11 in April 2012 and as an IOC guide document in October 2012. The Cook Book has been adopted as an important resource by the University of New Hampshire, the Texas A&M University and various other educational institutions.

B-11 was last updated in December. The updates include a new chapter on mosaics, a new chapter covering "Nautical Chart Adequacy" and updates to the sections on Satellite Derived Bathymetry and some of the internal references.

Task 3.8.5 Contribute to outreach and education about ocean mapping

GEBCO continues to promote the importance of bathymetric data to the international community. A significant GEBCO annual outreach event is the annual Science Day which includes oral presentations and poster displays on topics relating to ocean-floor mapping and its applications.

GEBCO data was highlighted in a feature article (by the Earth Observing System (EOS)) on the search in the Indian Ocean for the missing aircraft on Malaysian Airlines flight MH370.

The IHO-IOC GEBCO Cook Book (B-11) continues to be used as an important educational resource for ocean mapping students.

In February, an application was launched for viewing and accessing GEBCO's grids via the GEBCO website (www.gebco.net/data_and_products/gridded_bathymetry_data/). This is an addition to the previous means of accessing GEBCO's grids via GEBCO web pages hosted at the British Oceanographic Data Centre (BODC) (http://www.bodc.ac.uk/data/online_delivery/gebco/). The grid download application was also extended to allow access to GEBCO's grids in Esri ASCII raster format in addition to the existing GeoTiff and netCDF formats.

A new version of the GEBCO Web Map Service (WMS) was developed in 2015. The new service included the GEBCO_2014 Grid and a Source Identifier (SID) grid, and showed which grid cells were constrained by data, either soundings or from other grids. The SID grid also included metadata indicating the origin of the source data from which grid cells were derived.

A draft global contour dataset was developed in 2015. It included bathymetric contours at depths of 100m, 200m, 500m and at 500m intervals thereafter. The data set was reviewed by the TSCOM and SCRUM groups, and would require additional editing to remove a number of artefacts before it can be released. The dataset is expected to be made available for download from the GEBCO website in Shapefile format.

Task 3.8.6 GEBCO Website kept current and updated regularly

The GEBCO website provides access to information about GEBCO's products, services and activities. The website can be viewed at http://www.gebco.net.

GEBCO bathymetric maps and data sets can be downloaded from the website. These continue to be accessed by a wide user community that includes commercial and academic sectors and the general public. From June 2014 to 31st August 2015 the GEBCO's gridded data sets were downloaded 17,288 times. This included the GEBCO_08 Grid and accompanying SID grid (up to December 2014); the GEBCO_2014 Grid (since its release in December 2014) and the GEBCO One Minute Grid (GEBCO's one-arc minute interval grid, largely based on its 2003 bathymetric contour data set).

The GEBCO website also provides access to the world grid via a Web Map Service (WMS) (See Task 3.8.5).

The GEBCO's website is maintained and updated on behalf of GEBCO by the BODC since July 2008.

Task 3.8.7 Develop short course and course material on compiling digital bathymetric models (DBMs) to be included in GEBCO from a heterogeneous bathymetric source database. Associated deliverables: -a course curriculum

Due to a lack of resources, no activity was conducted in 2015 on the development of short courses or course material related to compiling digital bathymetric models.

Task 3.8.8 Update and enhance the GEBCO Gazetteer (B-8) for internet access

Maintenance of the underlying geospatial database of the on-line gazetteer is carried out by a network of appointed editors (mainly, SCUFN members) under the coordination of an Administrator who is currently the SCUFN Secretary from the IHB. In order to improve the content and the quality of the Gazetteer and to remove some inconsistencies, a comprehensive review and corrections of anomalies were undertaken by contract in 2015 under the IHB supervision. The results, covering about 3,000 feature names, have been used to improve significantly the quality and consistency of the database.

Element 3.9 Marine Spatial Data Infrastructures

This element addresses the developments related to the hydrographic component of Spatial Data Infrastructures (SDI), the maintenance of the relevant IHO publications, and the provision of technical advice as appropriate. The Marine Spatial Data Infrastructures Working Group (MSDIWG) transferred from HSSC to IRCC governance as of 1 January 2015 (see IHO CL 76 / 2014). Twenty-three Member States and eleven Expert Contributors participated in this activity during the period of this report.

Task 3.9.1 Conduct meetings of MSDIWG

The sixth meeting of the Marine Spatial Data Infrastructures Working Group (MSDIWG) took place in London, hosted by the United Kingdom, from 4 to 6 March. The meeting was chaired by Mr Jens Peter Hartmann (Denmark). Ten participants from nine Member States (Canada, Denmark, France, Germany, Japan, Netherlands, Norway, United Kingdom and USA), six Expert Contributors representing the Coastal & Marine Union (EUCC) and industry (Caris, Envitia, Esri, and OceanWise), and the IHB attended the meeting. Assistant Director Alberto Costa Neves represented the IHB.

The MSDIWG outside the JHOD

The meeting considered the impact of the decision to transfer governance of the MSDIWG from the HSSC to the IRCC and prepared revised Terms of Reference that were then submitted to IRCC7.

Participants looked at ways to assist IHO Member States and Regional Hydrographic Commissions in understanding the benefits of, and the means for, establishing MSDIs. The needs to promote cultural changes, to develop an MSDI strategy and to invest in training were all considered.

The MSDIWG also discussed the impact of Crowd-Sourced Bathymetry (CSB) and the use of authoritative versus non-authoritative data. The possibility of establishing the uncertainty of such data was considered while discussing the character of CSB as an extension of Hydrographic Notes (reports

from mariners), the nature of the input to the GEBCO gridded data sets and the parallel with the use of vessels of opportunity by the WMO to collect data. Participants focused on the "data centric" approach rather than on products in order to make data available for re-use.

Presentations on regional and national MSDI developments allowed participants to better understand the progress that has been made in some countries and appreciate that a large gap still exists between the advanced hydrographic services and those that are yet to modernize and embrace a digital geospatial information environment. The meeting considered examples of the use of common datasets to enable greater collaboration across national boundaries, the improvement of data management processes, links to the development of e-navigation and improvements to the public and government acknowledgement of hydrographic services at a national and regional level. The MSDIWG agreed on actions to build use cases and a generic business case framework for MSDI.

Participants also considered the need to establish training syllabi for MSDI at distinct levels - decision-makers, managers, users. The MSDIWG would seek input from academia and the wider hydrographic community to review and extend the IHO Publication C-17 -_ *Spatial Data Infrastructures: "The Marine Dimension" - Guidance for Hydrographic Offices*, to identify national and regional best practices, to identify the challenges that are faced by hydrographic services and to update existing MSDI documentation on the IHO website. The meeting also reviewed the existing standards and how appropriate they are to MSDI.

MSDIWG-6 was preceded by a one day "MSDI Open Forum" attended by 30 participants. The Forum explored the theme: "*Building a Maritime Spatial Data Infrastructure – Are the Principles at Odds with Strategies for Delivery?*". MSDIWG members and external stakeholders discussed the relationship between MSDI and hydrography. Geospatial data developments - mainly in UK and Europe, SDI case studies and open data standards and policies were also on the agenda.

Task 3.9.2 Maintain the relevant IHO standards, specifications and publications

This task was reflected in the work plan of the MSDIWG but no significant progress was reported in 2015.

Task 3.9.3 Develop training syllabi for MSDI and associated learning subjects

The MSDIWG developed and submitted to the IRCC the following syllabi: Syllabus for MSDI orientation, Syllabus for Fundamentals of a Marine Spatial Data Infrastructure (MSDI), Syllabus for Database Design, Data Management and MSDI for Practitioners, and Syllabus for Marine Spatial Data Infrastructure (MSDI) for Managers.

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New and Revised IHO Publications

The following new IHO publications or revised editions were issued during 2015 and made available from the IHO website.

DATE	Announced Via CL	TITLE
18/02	14	S-63 :Adoption of Revised Edition 1.2.0 of IHO Publication S-63 - IHO Data Protection Scheme
23/03	27	P-6: Report of Proceedings of the 5th Extraordinary International Hydrographic Conference, Monaco, 6-10 October 2014
26/03	29	M-3: Approval of Amendments to IHO Resolution 1/2005 as amended - Response to Disasters
05/06	39	S-100: Adoption of the new Edition 2.0.0 of the Publication S-100 Universal Hydrographic Data Model
05/08	55	M-2: IHO Publication M-2: The Need for National Hydrographic Services – Release of Edition 3.0.4
12/10	75	P-7: Annual Report of the IHO for 2014 and Approval of the Recommendations in the Finance Report
17/12	90	S-5B: Adoption of the New Publication S-5B Edition 1.0.0 Standards of Competence for Hydrographic Surveyors, Category B (In force January 2016)
18/12	91	IHO Publication INT 1 - Symbols, Abbreviations and Terms used on Charts. English Version, 8th Edition (2015) and Spanish Version, 5th Edition (2015)

The following publications are continuously updated:

- B-8 - Gazetteer of Geographical Names of Undersea Features
- C-55 - Status of Hydrographic Surveying and Nautical Charting Worldwide
- P-5 - IHO Yearbook
- S-32 - Hydrographic Dictionary
- S-62 - List of Data Producer Codes

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Status Report on Performance Monitoring (2015)

Background

The introduction of IHO performance indicators was decided in 2009 by the 4th Extraordinary International Hydrographic Conference (EIHC-4), together with the adoption of the IHO Strategic Plan.

The implementation of performance indicators is described in the IHO Strategic Plan as follows:

> *The implementation of performance indicators (PIs) is based on a two level approach:*
>
> - *strategic level: a small number of PIs associated with the objectives of the IHO (1 or 2 PIs per objective), to be agreed by the Conference (the Conference to be replaced by the Assembly when the revised IHO Convention enters into force) and managed by the IHB (the IHB to be replaced by the Secretary General and the Council when the revised IHO Convention enters into force);*
> - *working level: PIs associated with the strategic directions and managed by the appropriate subsidiary organs;*
>
> *In this perspective cross-references between the objectives, the strategic directions and the PIs are arranged in the following way:*
>
> *Objectives => strategic PIs => strategic directions => responsible organs => working level PIs*
>
> *Accordingly, the assessment of the working level PIs and the review of progress with the strategic directions are considered in two phases: an initial review by the leading organ and an overall review by the IHB (the IHB to be replaced by the Secretary General and the Council when the revised IHO Convention enters into force).*
>
> *Together with the assessment of the strategic PIs, these results are then submitted for consideration by the Conference (the Conference to be replaced by the Assembly when the revised IHO Convention enters into force). The submission should include a qualitative and, where practicable, a quantitative assessment of progress based on the value of the PIs. It should also include recommendations on management actions to be considered where trends indicate either a lack of progress or a change to an underlying assumption/direction is required. In this way the aim can be maintained and evidence of progress monitored/presented.*

The EIHC-4 adopted nine strategic performance indicators (SPIs) associated to the seven objectives of the IHO and invited the IHB Directing Committee to consider, in liaison with the HSSC and the IRCC, the implementation of working level performance indicators based on list of potential indicators associated with the strategic directions.

In 2012, the XVIIIth IHC welcomed the monitoring system to be put in place by the IHB Directing Committee based on the Strategic Performance Indicators (SPI) of the Strategic Plan (see CONF.18/WP.1/Add.2) and invited them to take action. Moreover, the HSSC and the IRCC were invited to review the working level performance indicators relevant to them.

The Annual Report of the IHO for 2012 included Performance Indicators for the first time.

Strategic Performance Indicators

Table 1 provides values for the Strategic Performance Indicators for 2015.

The values for 2014 are included to enable trends and comparisons to be made.

Table 1

Strategic Performance Indicators (SPI)

No PI	Designation	Source	Status 31 Dec 2014	Status 31 Dec 2015	General Trend
SPI 1	Number and percentage of Coastal States providing ENC coverage directly or through an agreement with a third party.	WEND WG through RHCs	No suitable information was provided by RHCs. IHB estimate ~64%	No suitable information provided by RHCs IHB estimate[3]:~66%	⇑
SPI 2	Growth in ENC coverage worldwide, as reported in the IHO on-line catalogue, relative to the existing gap in adequate coverage (as defined by IMO/NAV) from the benchmark 01 Aug. 2008.	WEND WG and IHO on-line catalogue of coverage	Small scale: ~ 100% Medium scale: 91% Large scale: 97%	Small scale: ~ 100% Medium scale: 92% Large scale: 97%	⇔ ⇑ ⇔
SPI 3	Percentage of Coastal States which provide hydrographic services, directly or through an agreement with a third party, categorized by CB phases, as defined by the IHO Capacity Building Strategy.	CBSC through RHCs	No suitable information was available at IHB		

[3] Information is difficult to obtain from Primary Charting authorities acting on behalf of coastal States. Thanks to the information kindly provided by Australia, France, New Zealand, South Africa and UK in 2015, the estimate is likely to be better this year.

No PI	Designation	Source	Status 31 Dec 2014	Status 31 Dec 2015	General Trend
SPI 4	Percentage of "acceptable" CB requests which are planned. (*Percentage of submitted CB requests that were approved*)	CBSC	97%	93%	⇓
SPI 4 bis	Percentage of planned CB requests which are subsequently delivered.	CBSC	82%	79%	⇓
SPI 5	Number of standards issued (including new editions), per category: - hydrographic standards to enhance safety of navigation at sea, - protection of the marine environment, - maritime security, - economic development.	HSSC	5 *Safety of navigation: 4* *Protection of the marine environment: 0* *Maritime security: 0* *Economic development: 1*	4[4] (See Annex A) *Safety of navigation: 4* *Protection of the marine environment: 0* *Maritime security: 0* *Economic development: 0*	⇓ ⇔ ⇔ ⇔ ⇓
SPI 6	Number of potential new IHO MS (indicated by the start of the application process) relative to the number of "non-IHO" IMO MS.	IHB through the Government of Monaco	7 / 88 (2012: 8 / 89) *Number of IMO MS: 170* *Number of IHO MS: 82*	8 / 86 *Number of IMO MS: 171* *Number of IHO MS: 85*	⇑ ⇑ ⇑

[4] Versions of standards developed originally in English, which are issued in other languages later on, are not accounted.

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No PI	Designation	Source	Status 31 Dec 2014	Status 31 Dec 2015	General Trend
SPI 7	Increase in participation / membership in RHCs.	IRCC through RHCs	No suitable information provided by RHCs IHB estimate: MS participation: 75% Non MS participation: 29%	No suitable information provided by RHCs IHB estimate[5]: MS participation: 84% Non MS participation: 60%	⇑ ⇑
SPI 8	Percentage of available / agreed ENC [production] schemes.	WEND WG through RHCs or International Charting Coordination Working Groups (ICCWG)	IHB estimate for UB1, 2 and 3 based on existing coverage: ~80%	IHB estimate for UB1, 2 and 3 based on existing coverage: ~82%	⇑

[5] Based on
- Number of RHC meetings: 13
- Participation of IHO MS: MS represented 86 times out of 99 possible attendances
- Participation of non IHO MS: Non-MS represented 32 times out of 53 possible attendances

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HSSC Working Level Performance Indicators

HSSC4 agreed to implement the WPIs listed in table 2.
Table 2 provides values for the Working Level Performance Indicators for 2015 associated with Work Programme 2.

Values for 2014 are included to enable trends and comparisons to be made.

Table 2

HSSC WPIs

Metric	Source	Rationale	Status 31 Dec 2014	Status 31 Dec. 2015	General Trend
Number of S-100 based product specifications approved	IHB	Relative indicator of uptake of IHO standards including for purposes other than SOLAS navigation	0	0	⇔
Percentage of annual work programme achieved	HSSC WGs (all)	Progress against objectives in the strategic plan	52%	46%	⇓
Total number of participants at meetings (MS and Expert Contributors)	HSSC WGs (all)	Indicates participation of MS and wider community in execution of the plan	171 *MS: 128* *Expert Contributors.: 43*	158 *MS: 130* *Expert Contributors: 28*[6]	⇓ ⇑ ⇓
Number of technical revisions and clarifications approved	IHB	Indicative of ability to provide comprehensive, safe and effective standards	2	7	⇑

[6] When taking into account the IHO Stakeholders's forum held during HSSC-7, the participation of Expert Contributors in 2015 remains equivalent to 2014 (44).

Metric	Source	Rationale	Status 31 Dec 2014	Status 31 Dec. 2015	General Trend
Number of ENCs distributed annually under license (equivalent annual licences)	WEND WG	Relative indicator of ENC usage throughout SOLAS market	2,272,923 [7]	2,678,741[8]	⇑

[7] Total of Primar and IC-ENC distribution only - does not include local distribution or other distribution mechanisms

[8] Total of Primar (1,098,154) and IC-ENC (1,580,587) distribution only - does not include local distribution or other distribution mechanisms

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IRCC Working Level Performance Indicators

Table 3 provides values for the Working Performance Indicators for 2015 associated with Work Programme 3.

Values for 2014 are included to enable trends and comparisons to be made.

Table 3

IRCC WPIs

No PI	Designation	Source	Status 31 Dec. 2014	Status 31 Dec. 2015	General Trend
WPI 15	Growth in ENC coverage worldwide, as reported in the IHO on-line catalogue, relative to the existing gap in adequate coverage (as defined by IMO/NAV) from the benchmark 01 Aug. 2008.	WEND WG through RHCs	See SPI 2	See SPI 2	
WPI 16	Number of additional IHO MS starting to produce & maintain (with/without support) relevant ENCs (contributing to 'adequate coverage') in the reporting period relative to those already producing at 01 Aug. 2008.	WEND WG through RHCs	0	1	⇑
WPI 17	Percentage of Coastal States delivering hydrographic services - categorized by CB phases (MSI services, surveying capabilities, charting capabilities), directly or through an agreement with a third party, at the end of the reporting period.	CBSC through RHCs	No suitable information was provided by most RHCs WPI 17 is the same as SPI 3		

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No PI	Designation	Source	Status 31 Dec. 2014	Status 31 Dec. 2015	General Trend
WPI 18	Percentage of IHO MS updating their C-55 entry data regarding hydrography survey, INT charts, ENC, and MSI in the reporting period.	IRCC through RHCs	24% (20/82)	21% (20/85)	⇓
WPI 19	*Status of hydrographic surveys in each region.*	IRCC through RHCs	Metrics yet to be defined by IRCC	Metrics yet to be defined by IRCC	
WPI 20	Percentage of agreed INT chart schemes, percentage of INT charts available. [9]	IRCC through RHCs or ICCWGs	88% (14 schemes out of 16) 77% (1,558 charts published out of 2,013 planned)	88% (14 schemes out of 16) 79% (1,588 charts published out of 2,009 planned)	⇔ ⇑
WPI 21	Percentage of agreed ENC schemes, percentage of ENC available.	WEND WG through RHCs or ICCWGs	See SPI 8	See SPI 8	
WPI 22	Increase in effective MS participation in RHC activities.	IRCC through RHCs.	No suitable information provided by RHCs	No suitable information provided by RHCs	
WPI 23	Percentage of Coastal States which are IHO Member States.	IHB	54% (81[10] /151)	55% (84 /152)	⇑
WPI 24	Number of new Coastal States joining the IHO during the reporting period.	IHB	0	3[9]	⇑

9 Regions A and N, for which no scheme is available yet, are excluded

10 Serbia is not considered as a Coastal State

9 Georgia, Viet Nam and Brunei Darussalam

No PI	Designation	Source	Status 31 Dec. 2014	Status 31 Dec. 2015	General Trend
WPI 25	Number of potential new IHO MS (indicated by the start of the application process) relative to the number of "non-IHO" IMO MS.	IHB	WPI 26 is the same as SPI 6		
WPI 26	Percentage of Coastal States which have achieved CB phase 1, 2 or 3 and established a National Hydrographic Office.	CBSC through RHCs	No suitable information was available at IHB		
WPI 27	Number of States which have achieved CB phase 1, 2 or 3 and established a National Hydrographic Office in the reporting period.	CBSC through RHCs	No suitable information was available at IHB		
WPI 28	Percentage of Coastal States which provide ENC coverage directly or through an agreement with a third party.	WEND WG through RHCs	WPI 28 is same as SPI 1		
WPI 29	Percentage of Coastal States which have set up a national geospatial infrastructure.	IRCC through RHCs	No information available at the IHB to make an estimate	No information available at the IHB to make an estimate	

No PI	Designation	Source	Status 31 Dec. 2014	Status 31 Dec. 2015	General Trend
WPI 40	Number of agreements signed in the reporting period, including bilateral agreements and RENC membership, etc.	IRCC through RHCs	Limited information available at IHB IHB estimate: 2[11]	Limited information available at IHB IHB estimate: 4[12]	⇑
WPI 41	Percentage of planned CB events that are achieved.	CBSC	WPI 41 is the same as SPI 4bis		
WPI 42	Number of acceptable CB requests received.	CBSC	29	30	⇑
WPI 43	Percentage of "acceptable" CB requests which are planned.	CBSC	WPI 43 is the same as SPI 4		

[11] Comoros with France and Montenegro with Primar

[12] New Members of PRIMAR (Ukraine, not registered in 2014), IC-ENC (Oman, USA/NOAA, Israel).

List of IHB Travel (2015)

DATE	NAME	MEETING	DESTINATION	COUNTRY
JANUARY				
15	IPTES	IHO – NF CHART Project Meeting	Taunton	UNITED KINGDOM
27 29	WARD	e-Nav Underway Conference	Copenhagen	DENMARK
28 29	BESSERO	2nd Meeting of the IHO-EU Network WG	Saint Mandé	FRANCE
FEBRUARY				
02 06	PHARAOH	TSMAD 29 & DIPWG	Ottawa	CANADA
06 13	WYATT	RSAHC 6	Abu Dhabi	UNITED ARAB EMIRATES
08 11	IPTES	RSAHC 6	Abu Dhabi	UNITED ARAB EMIRATES
10 12	WARD	EAHC SC2	Singapore	SINGAPORE
20	WARD	High Level Visit	Wellington	NEW ZEALAND
22 25	WYATT	1st Seabed Mapping	Brussels	BELGIUM
23 27	WARD	SWPHC 13	Cook Islands	COOK ISLANDS
25 27	IPTES	PMB 5	Busan	REPUBLIC OF KOREA
25 27	COSTA NEVES	PMB 5	Busan	REPUBLIC OF KOREA
MARCH				
03 05	GUILLAM	WEND WG 5	Singapore	SINGAPORE
03 05	IPTES	WEND WG 5	Singapore	SINGAPORE
03 06	COSTA NEVES	MSDIWG 6	London	UNITED KINGDOM
08 13	COSTA NEVES	IALA IHO Seminar	Panama	PANAMA
08 14	WYATT	NCSR 2	London	UNITED KINGDOM
09 13	BESSERO	NCSR 2	London	UNITED KINGDOM
14 19	WYATT	NIOHC 15	Muscat	OMAN
15 18	IPTES	NIOHC 15	Muscat	OMAN
16 19	WARD	USCHC	Washington	UNITED STATES OF AMERICA
16 19	WARD	US HYDRO 15	Washington	UNITED STATES OF AMERICA
16 20	PHARAOH	IODE-XXIII	Bruges	BELGIUM
19 20	BESSERO	SWATHC 9	Montevideo	URUGUAY
23 02	COSTA NEVES	IBSC 38	Niteroi	BRAZIL
30 31	WYATT	IHO – IOC Liaison meeting UNESCO	Paris	FRANCE
31	WARD	IHO – IOC Liaison meeting UNESCO	Paris	FRANCE
APRIL				
14 15	BESSERO	NHC 59	Reykjavik	ICELAND
16 17	GUILLAM	EC Conference	Brussels	BELGIUM
20 25	WYATT	TWLWG 7	Silver Spring	UNITED STATES of AMERICA

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27 29	WARD	CIRM Annual Conference	Larnaca	CYPRUS
27 30	GUILLAM	CSPCWG 11 & NCWG 1	Rostock	GERMANY
28	IPTES	Nippon Foundation Coordination Meeting	London	UNITED KINGDOM
28 02	WYATT	RSAHC & ICCWG	Muscat	OMAN
29	IPTES	IMO CB Coordination Meeting	London	UNITED KINGDOM
30	IPTES	IRCC7 Preparation Meeting	London	UNITED KINGDOM
MAY				
06 07	WYATT	MSI Coordination	London	UNITED KINGDOM
08 12	PHARAOH	ISO / TC211	Southampton	UNITED KINGDOM
11 16	WYATT	SCWG 3	Tokyo	JAPAN
27 29	IPTES	CBCS 13	Mexico City	MEXICO
27 29	COSTA NEVES	CBCS 13	Mexico City	MEXICO
JUNE				
01 03	WARD	IRCC7	Mexico City	MEXICO
01 03	IPTES	IRCC7	Mexico City	MEXICO
01 03	COSTA NEVES	IRCC7	Mexico City	MEXICO
02 13	WYATT	MSC 95	London	UNITED KINGDOM
5	WARD	IHO DCDB	Boulder	UNITED STATES OF AMERICA
08 12	WARD	UN SPLOS	New York	UNITED STATES OF AMERICA
08 12	BESSERO	MSC95	London	UNITED KINGDOM
09 10	GUILLAM	IENWG 3 (prep MBSHC 19 Mtg with Chart Coordinator)	Paris	FRANCE
16	IPTES	IALA Meeting	Paris	FRANCE
17 24	WYATT	IOC Assembly 28	Paris	FRANCE
17 25	IPTES	IOC Assembly 28	Paris	FRANCE
22 24	COSTA NEVES	TC 65	London	UNITED KINGDOM
30 02	IPTES	MBSHC 19	Batumi	GEORGIA
30 02	GUILLAM	MBSHC 19	Batumi	GEORGIA
JULY				
07 09	GUILLAM	DQWG 10	Brest	FRANCE
08 10	WYATT	2nd Seabed Mapping	Cork	IRELAND
13 16	BESSERO	SEPRHC 12	Guayaquil	ECUADOR
AUGUST				
03 07	WARD	UN GGIM 5	New York	UNITED STATES OF AMERICA
SEPTEMBER				
08 09	GUILLAM	IC-ENC Steering Committee 16	Munich	GERMANY
10 11	WYATT	MSI Coordination	London	UNITED KINGDOM
12 16	GUILLAM	SCUFN 28	Niteroi	BRAZIL
12 19	WYATT	Shallow Survey	Plymouth	UNITED KINGDOM
16	BESSERO	WORLD ECDIS DAY	Hamburg	GERMANY
16 18	IPTES	BSHC 20	St. Petersburg	RUSSIAN FEDERATION
22 23	WARD	SAIHC 12	Dar es Salaam	TANZANIA

22 24	PHARAOH	S-100 Test Strategy Meeting	Jeju	REPUBLIC OF KOREA
OCTOBER				
03 11	WYATT	GEBCO 32	Kuala Lumpur	MALAYSIA
05 09	PHARAOH	GEBCO SCRUM and TSCOM	Kuala Lumpur	MALAYSIA
07 09	IPTES	GEBCO GC 32	Kuala Lumpur	MALAYSIA
11 12	IPTES	High Level Visit	Bandar Seri Begawan	BRUNEI DARUSSALAM
13 15	WARD	EAHC 12	Manila	PHILIPPINES
26 31	WYATT	3rd Seabed mapping	St John's	CANADA
27 28	GUILLAM	Primar Advisory Committee 22	Paris	FRANCE
28 30	WARD	ARHC 5	St Petersburg	RUSSIAN FEDERATION
29	BESSERO	HSSC-7 Preparation meeting	Saint-Mandé	FRANCE
29	GUILLAM	HSSC-7 Preparation meeting	Saint-Mandé	FRANCE
29	PHARAOH	HSSC-7 Preparation meeting	Saint-Mandé	FRANCE
NOVEMBER				
09 13	BESSERO	HSSC 7	Busan	REPUBLIC OF KOREA
09 13	GUILLAM	HSSC 7	Busan	REPUBLIC OF KOREA
09 13	PHARAOH	HSSC 7	Busan	REPUBLIC OF KOREA
10 11	WARD	Staff Regulations briefing	Taunton	UNITED KINGDOM
11	WARD	World Hydrography Day event	London	UNITED KINGDOM
23 27	IPTES	IMO Assembly 29	London	UNITED KINGDOM
25 26	WYATT	GEBCO – NF Meeting	London	UNITED KINGDOM
30 01	IPTES	Joint CB Coordination Meeting	Geneva	SWITZERLAND
30 01	COSTA NEVES	Joint CB Coordination Meeting	Geneva	SWITZERLAND
30 04	PHARAOH	OGC Technical and Planning Meeting	Sydney	AUSTRALIA
DECEMBER				
4	WARD	UNFCCC COP21	Paris	FRANCE
07 11	PHARAOH	ISO / TC211	Sydney	AUSTRALIA
08 12	COSTA NEVES	MACHC 12	Antigua	ANTIGUA & BARBUDA
08 12	WARD	MACHC 12	Antigua	ANTIGUA & BARBUDA

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IHB Directing Committee Responsibilities

Robert WARD – President

- Relations with EU, the United Nations including IMO and WMO, international bodies concerned with hydrographic matters in polar regions, Non-Member States of the IHO, and other relevant organizations and bodies as appropriate;
- Matters concerning IHO Membership, Host Government Affairs;
- Public Relations;
- Finance and Budget;
- Strategic Plan, Work Plan;
- Programme Performance Reporting;
- Translation services;
- IHO Publications;
- IHB Administration, Information Technology;
- IHB Personnel Administration, Staff Regulations;

and the following Regional Hydrographic Commissions:

- Arctic Regional Hydrographic Commission;
- East Asia Hydrographic Commission;
- Meso American - Caribbean Sea Hydrographic Commission;
- South Africa and Islands Hydrographic Commission;
- South West Pacific Hydrographic Commission;

and the following Commission:

- Hydrographic Commission on Antarctica.

Mustafa IPTES - Director (Regional Coordination Programme)

- IRCC, and subordinate bodies, including IBSC and GEBCO;
- Relations with FIG, IOC, the academic sector (education and training), and other relevant organizations, concerning the IRCC programme;
- Capacity Building, Training, Education and Technical Co-operation, including CB Work Programme, CB Fund and budget;
- International Hydrographic Review;
- IHO Conference;
- Annual Report;

and the following Regional Hydrographic Commissions:

- Baltic Sea Hydrographic Commission;
- Mediterranean and Black Seas Hydrographic Commission;
- North Indian Ocean Hydrographic Commission;
- ROPME Sea Area Hydrographic Commission;
- USA and Canada Hydrographic Commission.

Gilles BESSERO - Director (Technical Programme)

- HSSC and subordinate bodies;
- Relations with ABLOS, IALA, ICA, IEC, ISO, and other relevant organizations, concerning the HSCC programme;
- Technical Support services;
- Stakeholder Liaison;

and the following Regional Hydrographic Commissions:

- Eastern Atlantic Hydrographic Commission;
- Nordic Hydrographic Commission;
- North Sea Hydrographic Commission;
- South East Pacific Regional Hydrographic Commission;
- South West Atlantic Hydrographic Commission.

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Annex E

IHB Staff Responsibilities in 2015

Managerial Staff

Mr A. PEDRASSANI COSTA NEVES	(Brazil)	ADCC	Cooperation and Capacity Building
Mr Y. GUILLAM	(France)	ADCS	Charting and Services
Mr A. PHARAOH	(South Africa)	ADDT	Digital Technology
Mr D. WYATT	(UK)	ADSO	Surveying and Operations
Ms G. FAUCHOIS	(France)	MFA	Manager, Finance and Administration

Translators

Ms M.P. MURO	SpTr	Spanish Translator	
Ms I. ROSSI	HFrTr	Head French Translator	
Ms P. BOUZANQUET	FrTr	French Translator	*[to August]*
Ms P. BRIEDA	FrTr	French Translator	*[from August]*

Technical, Administrative and Service Staff

Ms I. BELMONTE	WPE	Website and Publications Editor
Ms S. BRUNEL	AAA	Administrative and Accounting Assistant
Mr D. COSTIN	ITO	Information Technology Officer
Ms C. FONTANILI	PA	Personal Assistant to the Directing Committee
Mr A. MAACHE	BSA	Bureau Support Assistant
Mr D. MENINI	CGA	Cartography and Graphics Assistant
Ms M. MOLLET	REG	Registrar, Librarian
Ms B. WILLIAMS	HREG	Head of Registry

Seconded Officers

Mr Woongkyo SONG (Republic of Korea)	Website Development Projects
Mr K. KENTARO (Japan)	GIS and IT Projects
Commander Luis Hernandez Rubin (Peru)	Spanish Dictionary revalidation project

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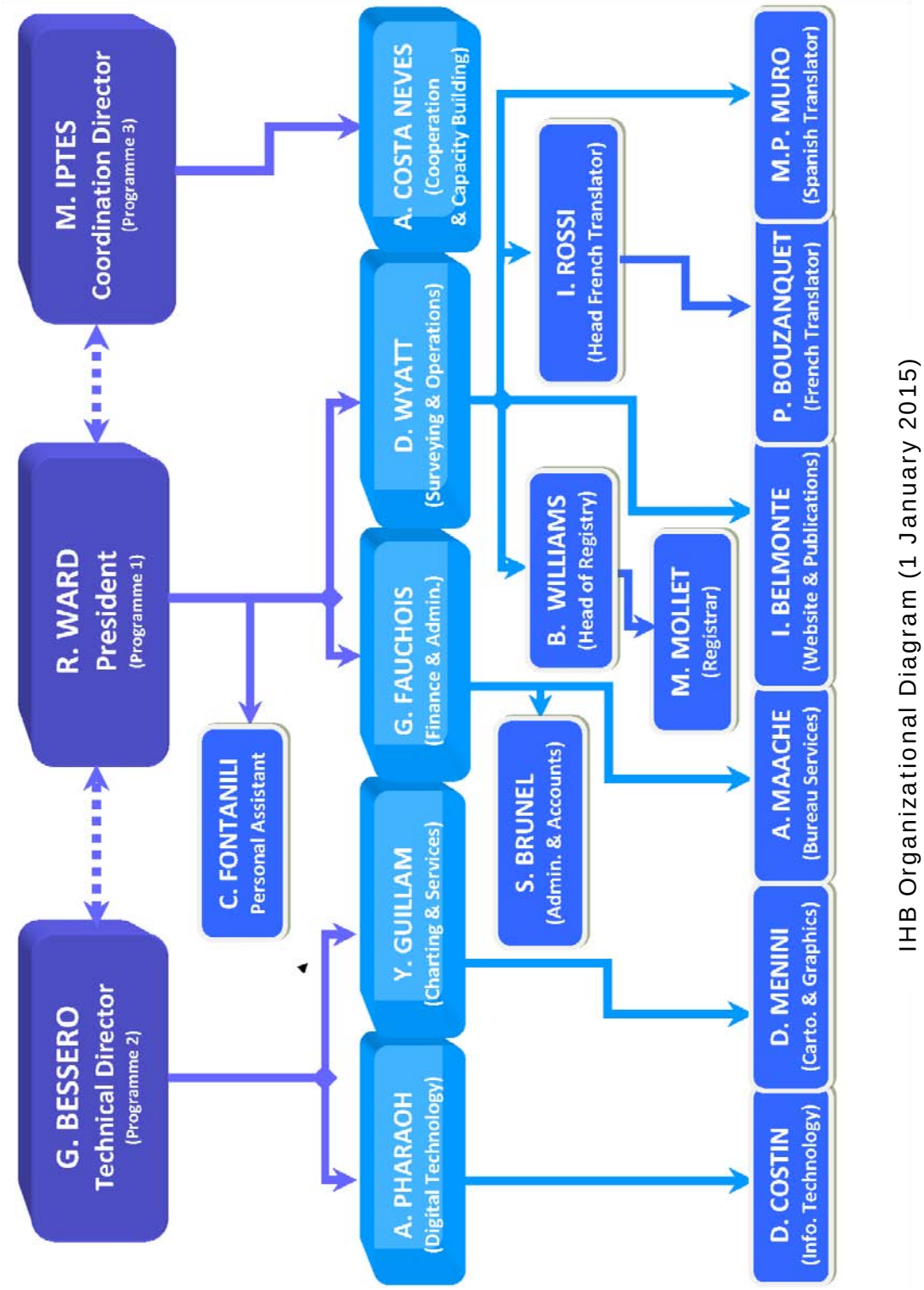

IHB Organizational Diagram (1 January 2015)

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