

19TH CONFERENCE OF THE NORTH INDIAN OCEAN HYDROGRAPHIC COMMISSION

Muscat, Oman, 25-28 March

Contribution to the IHO Work Programme 2019

Task 3.2.1.9

Attendance of the North Indian Ocean Hydrographic
Commission Conference

The 19th Conference of the North Indian Ocean Hydrographic Commission (NIOHC) was held in Muscat, Oman, from 26 to 28 March, under the chairmanship of Rear Admiral Tim Lowe, National Hydrographer of the United Kingdom. Participants were welcomed at the opening ceremony by Rear Admiral Abdullah bin Khamis bin Abdullah Al Raisi, Commander of the Royal Navy of Oman.

NIOHC Member State representatives from Bangladesh, Egypt, India, Indonesia, Myanmar, Pakistan, Saudi Arabia, Sri Lanka, Thailand and the United Kingdom (UK) attended the meeting together with representatives of Associate Members from Australia, France, Mauritius, Oman, Seychelles and USA. The Russian Federation, Somalia and Yemen were represented as Observer States. Representatives of the Intergovernmental Maritime Organization (IMO), International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) and several industry stakeholders also attended as invited observers. Director Mustafa Iptes and Assistant Director David Wyatt represented the IHO Secretariat. Following the opening ceremony, Director Iptes called on Rear Admiral bin Abdullah Al Raisi, Commander of the Royal Navy of Oman and was informed that Oman will actively continue to support the IHO activities in the region.



Director Iptes exchanges gifts with Commander of the Royal Navy of Oman.



The NIOHC19 meeting was preceded by a half day seminar on National Obligations for the Provision of Safety of Navigation Services, which was attended, in addition to NIOHC members, associates and observers, by Somalia and Yemen. The INT Chart Coordination Working Group (NICCWG) held a meeting in the afternoon of 25 March after which a report was prepared for the NIOHC19 conference.

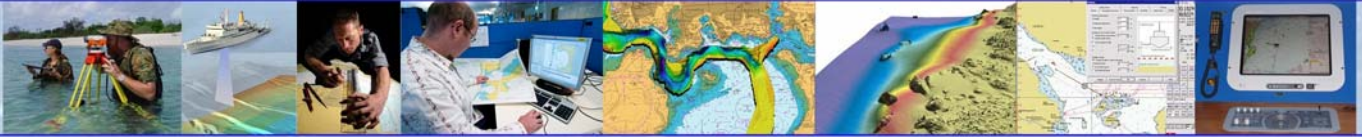
The NIOHC received reports from Member States, Associate Member States and the IHO Secretariat as well as summary reports on the second meeting of the IHO Council and last meetings of the IHO Hydrographic Services and Standards Committee and the Inter Regional Coordination Committee. Director Iptes briefed the Commission on current IHO activities and the preparations for the forthcoming Third Council meeting and second session of the IHO Assembly. The meeting also received reports on progress and issues related to the work of the Marine Spatial Data Infrastructures Working Group, relevant activities that had taken place in the International Maritime Organization, including relevant outcomes of the 6th meeting of the IMO Sub-Committee on Navigation, Communications and Search and Rescue (NCSR 6) and an update from the NAVAREA VIII coordinator.

A Capacity Building (CB) plan was developed for submission to the 17th meeting of the IHO Capacity Building Sub-Committee (CBSC17). The Commission established a CB Working Group to help develop future applications for submission to the CBSC, in addition the Commission also established a Working Group to review the NIOHC Statutes and recommend revisions and amendments to the next NIOHC conference in 2020.

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



Participants of the NIOHC19 Conference.



Sri Lanka, the current Vice-Chair of the NIOHC, will assume the Chair of the NIOHC within the next four months in accordance with the Statutes of the Commission. The NIOHC elected Indonesia to assume the Vice-Chair position for the next period. Sri Lanka indicated they would host the 20th meeting of the Commission in Colombo, Sri Lanka, with proposed dates being in May 2020. It was agreed to hold an INT Chart Coordination Working Group meeting prior to NIOHC20.



42ND MEETING OF THE UNITED STATES – CANADA HYDROGRAPHIC COMMISSION (USCHC)

Biloxi, Mississippi USA, 18 March

Contribution to the IHO Work Programme 2019

Task 3.2.1.15	Prepare for and report meetings of the Regional Hydrographic Commissions (RHC) / USCHC
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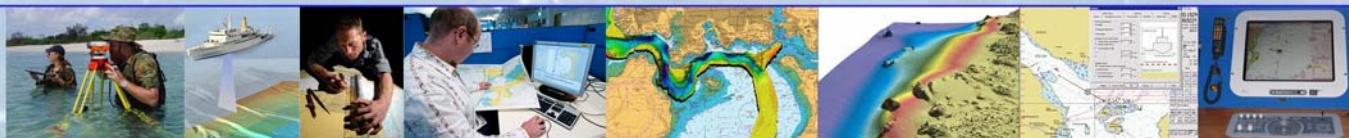
The 42nd meeting of the United States – Canada Hydrographic Commission (USCHC) was held on 18 March in Biloxi, Mississippi, United States of America. USCHC42 took place in conjunction with the US Hydro Conference 2019. The meeting was co-chaired by Director, Office of Coast Survey of the USA, Rear Admiral Shepard Smith and the Hydrographer General of Canada, Ms Geneviève Bechard respectively. Twenty five participants attended the meeting, including representatives from the Canadian Hydrographic Service (CHS) and the Departments of National Defense (DND) and Fisheries and Oceans (DFO), the National Oceanographic and Atmospheric Administration (NOAA), National Geospatial-Intelligence Agency (NGA), US Navy and US Army Corps of Engineers (USACE) and the United Kingdom Hydrographic Office (UKHO) as an observer. Secretary-General Dr Mathias Jonas represented the IHO Secretariat.

The USCHC42 agenda covered a wide range of topics of mutual interest with the Member States' reports and the additional briefs on the activities of the International Hydrographic Organization (IHO), WEND Working Group, Maritime Spatial Data Infrastructure Working Group, Crowdsourced Bathymetry Working Group and IHO/IOC GEBCO Project. Dr Mathias Jonas reported on the IHO Work Programme and the Organization's activities since the second IHO Council held in October 2018.

Some of the topics provoking in-depth discussions included:

- Management of survey and charting activities in border areas and the arctic region;
- Marine Spatial Data Infrastructures (MSDI);
- Crowdsourced bathymetry and the operation of DCDB on behalf of the IHO through NOAA;
- The future of the paper chart; and
- New concepts for the provision of S-100 based data products.

Several technical presentations were also made that were complementary to the discussions, including: joint gridded ENC plans and implications; bathymetric data in the cloud; update of local vertical and horizontal reference datum as well as updates of the global geoid and magnetism models.



The IHO Secretary-General gave a key note address during the opening ceremony of the US Hydro Conference. Under the title “Challenging the norm in Hydrography” he presented his vision of the future developments in all relevant fields of contemporary hydrography such as survey, production of hydrographic products and their future provision. He placed special emphasis on the uptake of unmanned operation of maritime craft and identified hydrographic measurement campaigns as the frontrunner in many aspects of autonomous shipping.

The 43rd USCHC meeting will be held in Québec, Canada in March 2020.



The participants of the USCHC42 meeting.



**9TH MEETING OF THE IHO/ROK
PROGRAMME MANAGEMENT BOARD (PMB9)
Busan, Republic of Korea, 12-13 March**

Contribution to the IHO Work Programme 2019

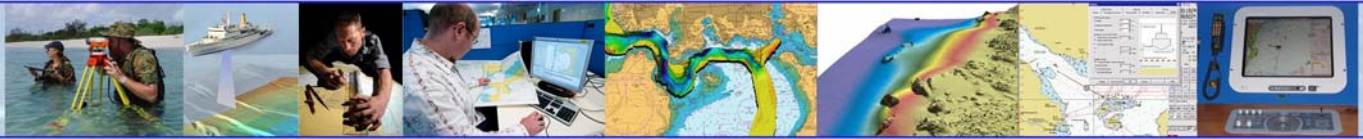
Task 3.3.6	Organize, prepare and report on meetings with other organizations, funding agencies, private sector and academia. Coordinate delivery of Capacity Building activities and investigate new opportunities for CB activities.
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The 9th meeting of the IHO/Republic of Korea (ROK) Programme Management Board (PMB9) was held at the Korea Hydrographic and Oceanographic Agency (KHOA), Busan, Republic of Korea on 12 to 13 March 2019. The meeting comprised of delegates from ROK, the Chair of the CBSC, representatives from the IHO Secretariat and the Hydrographic Sciences Programme Manager of the University of Southern Mississippi (USM). Participants were welcomed by KHOA Director General Mr Yong-seok KANG. Director Mustafa Iptes and Assistant Director Alberto Costa Neves (Secretary) represented the IHO Secretariat.

The PMB was established under the IHO - ROK Memorandum of Understanding (MoU) to identify directions for improving hydrography and nautical cartography worldwide through the capacity building activities funded by the ROK and to manage the IHO-ROK programme of technical cooperation. The meeting agreed on the need to revise the current MoU in order to update and adjust some of its provisions.

The meeting reviewed the progress and achievements of the various training and education activities sponsored by the ROK. The annual financial contribution from the ROK forms a significant part of the Capacity Building (CB) Fund used to support the annual IHO CB Work Programme (CBWP). Since its inception the ROK contribution has supported education programmes in hydrography and cartography, training for trainers' (TFT) courses, seminars and short courses on hydrographic surveys, ENC quality assurance, marine spatial data infrastructures, law of the sea, and tides and water levels, amongst others.

The PMB considered the management aspects of supporting trainees on the Category "A" Hydrography Programme at the USM and the Category "B" Nautical Cartography Programme at the KHOA in order to effectively deliver high level education and training to participants from developing countries. During the meeting the selection board for the 2019-2020 edition of the Category "A" Programme was convened and the candidates from Mexico and Tunisia was selected, subject to final acceptance by the USM. The meeting was informed that the next TFT training on basic hydrography to be delivered in mid-2019, originally limited to the East Asia Hydrographic Commission (EAHC), will be open to all IHO Member States. Circular letters will be issued calling for applications to the Category "B" Cartography Programme and for the TFT.



Participants at PMB9

The meeting was briefed on CB activities being conducted by the EAHC Technical, Research and Development Center (TRDC) and its developments of e-learning to better assist the international hydrographic community. The meeting agreed to boost the development of Maritime Safety Information (MSI) e-learning material in English and French and the implementation of the online training material for Marine Spatial Data Infrastructures (MSDI), developed by Denmark.

The meeting reviewed the status of development of the Capacity Building Management System (CBMS) jointly addressed by KHOA and the IHO Secretariat. The meeting concluded that the CBMS is mature enough to be used operationally for receiving submissions to the CBSC in 2019. The PMB agreed to investigate the possibility of organizing a KHOA Alumni Seminar in 2021, together with the PMB11 meeting.

The 10th meeting of the PMB will take place in Monaco on 3 to 4 March 2020.



10TH MEETING OF THE MARINE SPATIAL DATA INFRASTRUCTURES WORKING GROUP (MSDIWG)

4-5 March, Busan, Republic of Korea

OGC MARINE DOMAIN WORKING GROUP MEETING

6 March, Busan, Republic of Korea

UN-GGIM WORKING GROUP ON MARINE GEOSPATIAL INFORMATION

7-9 March, Busan, Republic of Korea

Contribution to the IHO Work Programme 2019	
Task 3.7.1	Organize, prepare and report annual meetings of the Marine Spatial Data Infrastructures Working Group (MSDIWG).
Task 3.7.4	Coordinate relevant activities with the Open Geospatial Consortium (OGC) Marine Domain Working Group (Marine DWG)
Task 1.1.12.1	Maintain relationship with the United Nations (UN) organizations including the Committee of Experts on Global Geospatial Information Management (UN-GGIM) and the WG on Marine Geospatial Information (WGMGI)

The 10th meeting of the Marine Spatial Data Infrastructures Working Group (MSDIWG) took place in Busan, Republic of Korea, hosted by the Korea Hydrographic and Oceanographic Agency (KHOA), on 4 and 5 March, in conjunction with the OGC Marine Domain Working Group (Marine DWG) meeting on 6 March and with the 1st Meeting of the Working Group on Marine Geospatial Information (WGMGI) of the Committee of Experts on Global Geospatial Information Management (UN-GGIM). The meeting was chaired by Mr Jens Peter Weiss Hartmann (Denmark). Nineteen delegates from 12 Member States (Australia, Brazil, Denmark, Germany, Indonesia, Italy, Netherlands, Norway, Republic of Korea, Singapore, United Kingdom and United States of America) and 15 representatives of observer organizations and industry members attended the meeting, a total of 35 participants. Assistant Director Alberto Costa Neves represented the IHO Secretariat.

The meeting was opened by Mr Yong-seok KANG, Director General of KHOA, welcoming the participants and highlighting the importance of the international cooperation and the relevance of Marine Spatial Data Infrastructures (MSDI) for the sustainable development and use of the oceans, seas and inland waters. The willingness of Republic of Korea to contribute to the international efforts to increase the knowledge of the oceans and their sustainable use was emphasized.



Amendments to the Terms of Reference were proposed by the Chair and endorsed by the meeting, in accordance with decisions of the IRCC10. It proposes an expansion of the remit of the WG to include marine spatial planning (MSP) and common operating picture (COP). The Chair reviewed the relevant outcomes from the Council, IRCC, HSSC, WENDWG and DQWG meetings that affected the work of the WG. The Chair provided an overview on the work of the Strategic Plan Review WG and how it will affect the work of the WG.

Online training material on MSDI developed by Denmark was presented by the Chair, following an action from IRCC10. The material will be made available from the IHO website to serve the IHO Capacity Building Programme. The meeting also considered ways to promote free online material available from industry members and agreed to create a dedicated page in the IHO website.

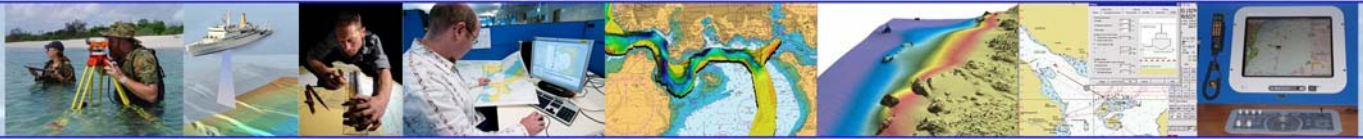
The meeting agreed with the Open Geospatial Consortium (OGC) to review the paper previously submitted to HSSC on the interoperable aspects of a Discrete Global Grid System (DGGS), to develop a white paper on data integrity assurance and to create a template policy statement. OGC will also develop a Guide of Standards for the Common People, to promote and facilitate the adoption of standards worldwide in all aspects of a MSDI.

Participants reviewed the current status of the IHO Concept Development Study (CDS) on MSDI that is being developed by OGC and funded by the USA/NGA, that will be finalized in April 2019 and presented to IRCC11. The CDS will assess the current state of data management and exchange technologies used in the marine domain. The knowledge gained from the CDS will provide interoperability reference architecture for MSDI and foundation for a potential future pilot project that will in turn advance the state of MSDI to support discoverability, accessibility, and interoperability of marine geospatial data across the globe.

Member States and Expert Contributors presented their latest developments and shared lessons learned related to SDI and MSDI. The role of the MSDI Ambassadors was considered and the meeting took note of the Regional Hydrographic Commissions (RHC) that have made progress at national and regional levels. The meeting received feedback on several Use Cases that are being developed and their importance to promote MSDI.

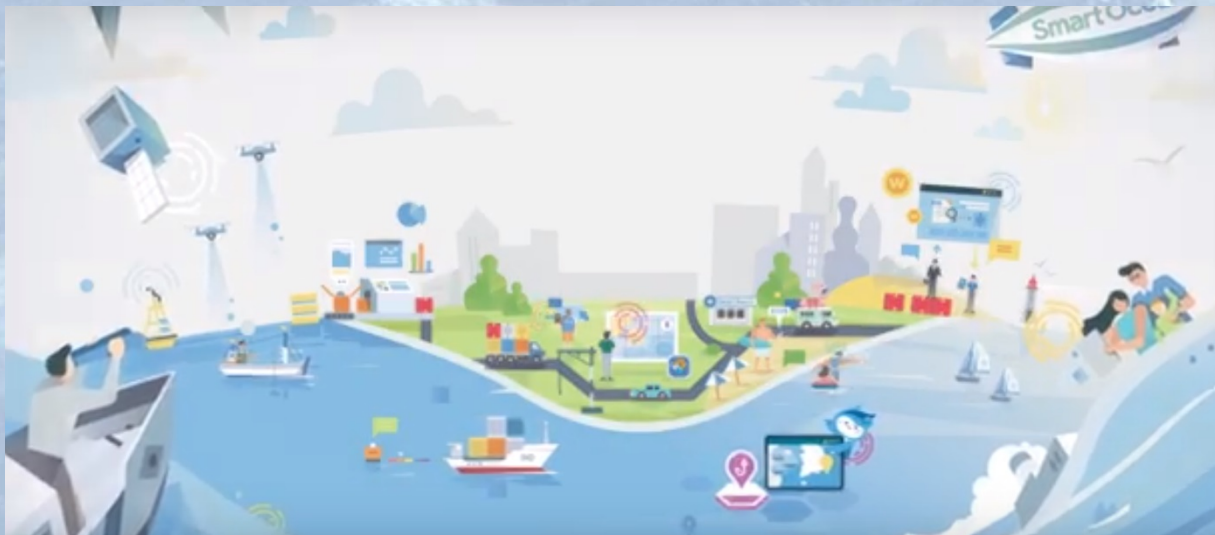
Participants considered how the WG could support the IHO to contribute to the United Nations (UN) Sustainable Development Goals (SDG), in particular those where the impact is more prominent. Attention was also given to the close liaison between the IHO and the UN Committee of Experts on Global Geospatial Information Management (UN-GGIM) and its WG on Marine Geospatial Information (WGMGI). The meeting considered the ongoing work of the IRCC Principles Project Team (PPT) on the UN-GGIM Statement of Shared Guiding Principles for Geospatial Information Management.

The WG considered how to improve communication and to develop an outreach strategy considering the target audience and the means to achieve it. A drafting group was established to develop the first draft of this strategy. The meeting also decided to investigate the possibilities for the development of a new publication on the status of MSDI worldwide from a database



within the IHO Regional and Country Information Systems (RIS/CIS). The Chair was tasked to coordinate, with the UN-GGIM/WGMGI Chair, the preparation of a common questionnaire on the status of MSDI worldwide.

The meeting approved with satisfaction the video on MSDI kindly developed by the Republic of Korea (draft available at www.youtube.com/watch?v=5m15KBhd9v0). The video will be made available on the IHO website in English, French and Spanish). Other topics considered by the meeting were the development of a Training for Trainers Course on MSDI, the use of template for MSDI maturity assessment and the way ahead for improving the IHO Publication C-17 *Spatial Data Infrastructures: "The Marine Dimension" - Guidance for Hydrographic Offices*.

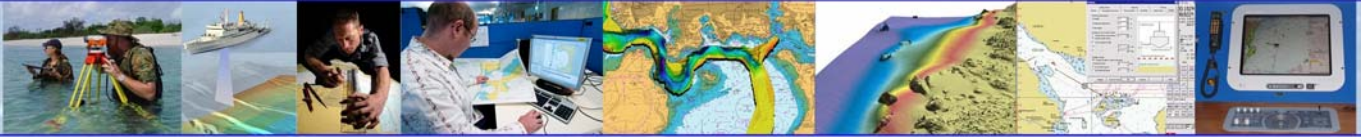


The video to promote MSDI developed by Republic of Korea, available at www.youtube.com/watch?v=5m15KBhd9v0

OGC Marine Domain Working Group

MSDIWG10 was succeeded by a meeting of the OGC Marine Domain Working Group (DWG). The meeting was Co-Chaired by Mr Sebastian Carisio (USA and Vice-Chair of the IHO MSDIWG) and Mr Jonathan Pritchard (UK). The meeting reviewed the outcomes of the OGC Marine Summit, held in Singapore on 27 February and the MSDI Concept Development Study (CDS) and the possible follow on Pilot Project.

The meeting also considered the developments of the S-121 Product Specification on Marine Boundaries and Limits, the advances in the GeoPackage Encoding Standard, the updates of the GEBCO Seabed 2030, matters related to interoperability and discoverability, particularly for scientific data, vertical datum harmonization, management and manipulation of temporal data in the marine domain (bathymetry, point clouds), storage and handling for variable resolution



data, the progress with the DGGs, governance and policy for data sharing, interoperability and implementation of data catalogues, metadata for bathymetry and data security and provenance and authenticity.

UN-GGIM Working Group on Marine Geospatial Information (WGMGI)

MSDIWG10 and OGC Marine DWG were followed by the 1st Meeting of the UN-GGIM WGMGI. The meeting was chaired by Mr John Nyberg (USA), one of the co-chairs of the WG. All Member States participating in the meeting were represented by Hydrographic Offices or by their representatives in an IHO body.

The Chair reported on the progress made with the online meetings and highlighted the importance of the support received from the IHO, in particular of its Secretary-General. Main points emphasized by the Chair included the strong relationship with the UN SDG 14 (Conserve and sustainably use the oceans, seas and marine resources for sustainable development) and the need to improve Communications, the importance to include inland waters and countries with no coastline and the very importance of funding and capacity building.



Participants of the 1st meeting of the UN-GGIM Working Group on Marine Geospatial Information

The WG aimed to address marine geospatial information, including inland water bodies and waterways, focusing on the 2030 Agenda for Sustainable Development, in particular, SDG 14 and to an extent, SDG 6 (Ensure availability and sustainable management of water and sanitation for all). The meeting was attended by 42 expert representatives from Australia, Brazil, Denmark, Germany, Italy, Jamaica, Netherlands, Norway, Republic of Korea, Singapore, United Kingdom, United States of America, IHO, OGC and UN-GGIM Private Sector Network.



The meeting agreed that marine geospatial information must be made available, accessible and discoverable for a multiplicity of purposes within collaborative information systems nationally to deliver reliable, timely and quality information necessary for citizens, organizations and governments to build accountable actions and make informed and evidenced-based policies and decisions.

The 11th meeting of the MSDIWG will be held in Rostock, Germany, in February 2020. There will be a joint technical session with the OGC Marine DWG and an MSDI Open Forum. The UN-GGIM WGMGI recognized the importance of having the next meeting collocated with the MSDIWG and OGC Marine DWG and will investigate the possibility to have the next meeting in Rostock.



4TH S-100 WORKING GROUP (S-100WG), 5TH S-102 PROJECT TEAM MEETINGS AND 1ST IHO GI REGISTRY WORKSHOP Aalborg, Denmark, 26 February - 1 March

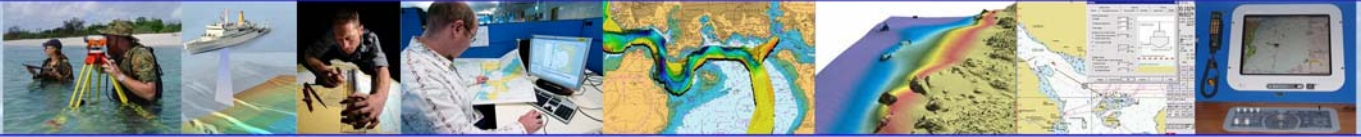
The Danish Geodata Agency hosted the 4th S-100 Working Group, 5th S-102 Project Team meetings and the 1st IHO Registry Workshop in Aalborg, Denmark between 26 February and 1 March 2019. More than 60 participants, representing 22 Member State agencies and 18 expert contributors from industry and academic organizations, attended the meetings. Director Abri Kampfer, Assistant Director Anthony Pharaoh and Technical Standards Support Officer Jeff Wootton represented the IHO Secretariat.

1st IHO Geospatial Information Registry Workshop (25 – 26 February).

The 4th S-100WG meeting was preceded by the 1st IHO Geospatial Information (GI) Registry workshop, which was chaired by the IHO GI Registry Manager, Mr Jeff Wootton (IHO Secretariat). Thirty two delegates from 11 Member States (Canada, China, Denmark, Finland, France, Italy, Norway, Republic of Korea, Romania, Sweden and United States) and eight expert contributors (ESRI, IALA, IC-ENC, IEHG, KRISO, Portolan Sciences, University of New Hampshire and WMO) attended the workshop. Stakeholder participation in the workshop was also provided by representatives of six IHO Working Groups and Project Teams (ENC Working Group, Nautical Information Provision Working Group, S-100 Working Group, S-101 Project Team, S-124 Project Team and S-129 Project Team).

The Chair outlined the main aims of the workshop, which were to provide participants with a common understanding of the IHO GI Registry; and to leverage on the wide range of subject matter expertise of the participants in discussing and improving all aspects of the Registry. An introduction to the structure, roles, interface and content of the IHO GI Registry and its component Registers was provided. This was followed by a briefing on the issues raised and the “lessons learned” in the operation of the IHO GI Registry since it became operational in October 2016, which provided the starting point for discussions for the remainder of the workshop. The structure of a new “Beta” version of the GI Registry, which is under development but partially operational, was demonstrated and discussed.

The standardization of the content of the Registry was discussed in detail, which provided input to an editing session on draft publication S-99 Annex A – Conventions and Guidelines for the Content of the IHO GI Registry. Outcomes from the workshop will also contribute to a review of S-100 Part 2 – Management of Registers and S-99 – Operational Procedures for the Organization and Management of the S-100 Geospatial Information Registry. The workshop concluded with demonstrations of the Feature Catalogue Builder and Portrayal Catalogue Builder tools.



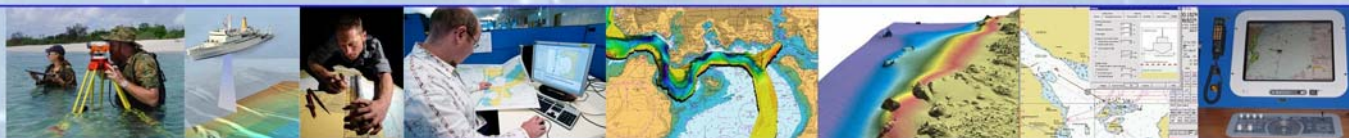
Participants in the 1st IHO Geospatial Information Registry Workshop

5th S-102 Project Team Meeting (25 – 26 February).

Twenty two participants representing Member States, industry organizations and academia participated in the 5th S-102 Bathymetric Surface Project Team meeting which was held at the same venue and time as the Registry Workshop. The meeting was chaired by Mr David BRAZIER (USA – CNMOC).

The primary focus of the meeting was to complete Edition 2.0.0 of the S-102 Bathymetric Surface Product Specification, in time for consideration at the 11th Hydrographic Services and Standards Committee (HSSC11) meeting which will take place in May 2019. Some of the main items that were considered by the meeting included issues relating to horizontal accuracy metadata, revisions to the S-102 grid structure, the suitability of S-102 for navigation and extensions to the HDF5 encoding format. The meeting considered several proposals for corrections, clarifications and extensions to the Product Specification. There were also some informative discussions on data quality constructs (developed by the Data Quality Working Group) and how these could be used to portray uncertainty in navigation systems.

The Chair provided a report on the software application that has been developed to convert grid data from the “Bathymetric Attributed Grid” (BAG) format to the S-102 format. This conversion software will be made available for download from the S-100WG page on the IHO website (<http://www.iho.int>).



Participants in the 5th S-102 (Bathymetric Surface) Project Team Meeting

4th S-100 Work Group Meeting (27 February - 1 March)

The S-100 Working Group meeting, which was chaired by Ms Julia Powell (USA - NOAA), considered reports on the status of the following product specifications currently under development by IHO subordinate bodies; the S-102 (Bathymetric Surface), the S-121 (Maritime Limits and Boundaries), the S-101 (Electronic Nautical Chart), the S-129 (Under Keel Clearance Management) and the S-124 (Navigational Warnings) Product Specifications.

The meeting discussed several proposals for changes and extensions for inclusion in the next edition of the S-100 Universal Hydrographic data Model. These included proposals to change the naming convention used for exchange set catalogues; to implement changes to the catalogue style sheet file structure; and to provide colour pallet support for the display of symbols. There were also proposals to extend the HDF5 encoding format and to modify the way feature associations are used in the ISO 8211 encoding format.

Denmark provided a presentation on the work that it has been carried out to produce generic S-100 based validation checks. The meeting also reviewed the following two important support documents currently under development; S-97 - Product Specification Development Guidebook; and S-98 - Interoperability Specification for S-100.

Presentations were provided on the status of the new GI Registry web application; the S-57 to S-101 conversion software application; the Feature Catalogue and Portrayal Catalogue builder applications; the Data Classification and Encoding Guide (DCEG) document generation application; and the S-100 data viewer applications.

The Korea Hydrographic and Oceanographic Agency (KHOA) and the USA Space and Naval Warfare Systems Command (SPAWAR) organization provided comprehensive presentations on projects to test the use of S-100 data within prototype navigations systems. These test systems load and portray datasets based on the S-101 ENC, S-102 Bathymetric Surface, S-111 Surface Currents, S-122 Marine Protected Areas, S-123 Radio Signals and S-127 Marine Traffic Management Product Specifications.



Participants of the 4th S-100 Working Group Meeting

The next S-100WG meeting is scheduled to take place in February or March 2020. Venue and dates still to be confirmed.