

INTERNATIONAL SEMINAR ON UNITED NATIONS GLOBAL GEOSPATIAL INFORMATION MANAGEMENT

Effective and Integrated Marine Geospatial Information Management

10 – 12 MAY 2022

PROGRAMME AT A GLANCE

	TIME (SGT)	PROGRAMME
DAY 01 TUESDAY 10 MAY 2022	09:00 – 10:30	Joint official opening ceremony for the International Seminar and the meetings of the three working groups
	11:15 – 13:00	Plenary Session 01 – Effective and integrated marine geospatial information management
	14:30 – 16:00	Plenary Session 02 – Availability and accessibility of marine geospatial information for sustainable societies, economies and environment
	16:30 – 18:00	Plenary Session 03 – Integration of terrestrial, maritime and cadastral domains
DAY 02 WEDNESDAY 11 MAY 2022	09:00 – 10:45	Plenary Session 04 – Effective governance, policy and legal frameworks and financing for integrated marine geospatial information management
	11:15 – 13:00	Plenary Session 05 – Data, innovation and standards for integrated marine geospatial information management
DAY 03 THURSDAY 12 MAY 2022	09:00 – 10:45	Plenary Session 06 – Partnerships, capacity development and advocacy for integrated marine geospatial information
	11:15 – 13:00	Plenary Session 07 – An operational framework for integrated marine geospatial information
	14:30 – 16:00	Plenary Session 08 – Coordinated and coherent integrated marine geospatial information management
	16:30 – 17:30	Closing Session <i>Outcome statement of the International Seminar - 'Singapore Statement on Effective and Integrated Marine Geospatial Information'</i>
	17:30 – 18:00	Official Closing Ceremony

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TIME (SGT)	PROGRAMME
08:15 – 08:45	Onsite Registration for Physical Attendees
08:30 – 08:55	Admission for Virtual Attendees
09:00 – 09:15	Welcome by Emcee Arrival of Guest-of-Honour Mr Chee Hong Tat Senior Minister of State, Ministry of Transport Deputy Secretary-General, NTUC
09:15 – 09:20	Welcome Remarks Dr John Nyberg Deputy National Hydrographer, Co-Chair UN-GGIM Marine Geospatial Information Working Group, UN-GGIM Americas Vice President, IHO IRCC Vice-Chair, IHO WEND WG Chair, National Oceanic and Atmospheric Administration (NOAA)
09:20 – 09:25	Welcome Remarks Mr Colin Low Chief Executive Officer, Singapore Land Authority
09:25 – 09:30	Welcome Remarks Dr Mathias Jonas Secretary General, International Hydrographic Organization
09:30 – 09:50	Official Opening Statement by Guest-of-Honour Mr Chee Hong Tat Senior Minister of State, Ministry of Transport Deputy Secretary-General, NTUC
09:50 – 10:00	Opening Address Ms Quah Ley Hoon Chief Executive, Maritime and Port Authority of Singapore
10:00 – 10:15	Joint Official Opening Ceremony for the International Seminar
10:15 – 10:30	Emcee Briefing for Refreshment Break
10:30 – 11:15	Refreshment Break

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DAY 01: TUESDAY, 10 MAY 2022

TIME (SGT)	PROGRAMME
11:15 – 13:00	<p>Plenary Session 01</p> <p>Effective and integrated marine geospatial information management</p> <p><i>Effective and integrated marine geospatial information management must be fit-for-purpose, appropriate and adequate, interoperable and sustainable, accessible and inclusive, and able to accelerate efforts to increase the availability and accessibility of marine geospatial information. This session discusses the integrative capabilities, potential and opportunities of marine geospatial information, products and services for the benefit of society, economy and environment.</i></p> <p>Moderator:</p> <ul style="list-style-type: none">• Mr Zhongwen Huang Director, Smart Nation and Digital Government Office, Singapore <p>Presentations:</p> <ul style="list-style-type: none">• Prof Koh Lian Pin Director, Centre for Nature-based Climate Solutions Director, Tropical Marine Science Institute• Rear Admiral Massimiliano Nannini Director, Italian Hydrographic Institute• Mr Jens Peter Weiss Hartman Senior Adviser, IHO MSDI Chair and Baltic Sea and North Sea MSDIWG Chair, Danish Geodata Agency – Danish Hydrographic Office• Dr Mathias Jonas Secretary General, International Hydrographic Organization <p>Moderated Discussion</p>
13:00 – 14:30	Refreshment Break

Note: Accurate as of 11 May 2022. Flow of speaker presentations may vary.

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TIME (SGT)	PROGRAMME
14:30 – 16:00	<p>Plenary Session 02</p> <p>Availability and accessibility of marine geospatial information for sustainable societies, economies and environment</p> <p><i>Increasing the availability and accessibility of marine geospatial information benefits many sectors including sustainable access to inland waters and water bodies, coastal zones, seas and oceans as well as in sectors such as commercial shipping and safe navigation, marine spatial planning, management of marine resources, emergency management and response. This session discusses the availability and accessibility of marine geospatial information, which is crucial for sustainable socio-economic development, energy and food production, healthy habitat, and human wellbeing and survival overall.</i></p> <p>Moderator:</p> <ul style="list-style-type: none">• Dr John Nyberg Deputy National Hydrographer, Co-Chair UN-GGIM Marine Geospatial Information Working Group, UN-GGIM Americas Vice President, IHO IRCC Vice-Chair, IHO WEND WG Chair, National Oceanic and Atmospheric Administration (NOAA) <p>Presentations:</p> <ul style="list-style-type: none">• Dr Jani Tanzil Deputy Facility Director (SJINML), Senior Research Fellow (TMSI), St. John's Island National Marine Laboratory, Tropical Marine Science Institute, National University of Singapore• Ms Caitlin Johnson Lead GEOINT Analyst, National Geospatial-Intelligence Agency• Dr Paul Elsner Lecturer in Geographic Data Science, Birkbeck, University of London• Mr Jace Ebben Lead analyst, National Geospatial-Intelligence Agency, United States of America <p>Moderated Discussion</p>
16:00 – 16:30	Refreshment Break

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TIME (SGT)	PROGRAMME
16:30 – 18:00	<p>Plenary Session 03</p> <p>Integration of terrestrial, maritime and cadastral domains</p> <p><i>Evidence-based policy development and decision making leading to effective governance of a country's 'total' space, inclusive of natural and built environment, require the integration of data and information from the terrestrial, maritime and cadastral domains. This session considers the importance of integrating data and information from these domains with any other meaningful data to address socio-economic and environmental challenges. Presenters will discuss not just the value and benefits of but also the issues and challenges of data integration for effective administration and governance of a country's 'total' space.</i></p> <p>Moderator:</p> <ul style="list-style-type: none">• Dr Victor Khoo Director, Singapore Land Authority <p>Presentations:</p> <ul style="list-style-type: none">• Dr Victor Khoo Director, Singapore Land Authority• Mr Saud Hamoud Al-Ruways Director General of Hydrography, General Authority for Survey and Geospatial Information• Mrs Johanna Fröjdenlund and Mrs Magdalena Andersson Business Developer, Lantmäteriet <p>Moderated Discussion</p>
18:00 – 18:05	Closing by Emcee

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TIME (SGT)	PROGRAMME
08:15 – 08:45	Onsite Registration for Physical Attendees
08:30 – 08:55	Admission for Virtual Attendees
08:55 – 09:00	Welcome by Emcee
09:00 – 10:45	Plenary Session 04 Effective governance, policy and legal frameworks and financing for integrated marine geospatial information management <i>Enabling legislations and policies and effective governance and financing sustain and impacts the acquisition and application of marine geospatial information and its integration. The operating landscape is increasingly challenged as the production and consumption of marine geospatial information and services becomes increasingly innovative and creative arising from new and emerging technologies and devices. This session discusses effective governance, policy and legal frameworks and sustainable financing necessary for integrated marine geospatial information management, recognizing the need to avoid duplication and avail geospatial information for a multiplicity of purposes; ‘mapping once, using many times’</i> Moderator: <ul style="list-style-type: none">• Mr Jens Peter Weiss Hartman Senior Adviser, IHO MSDI Chair and Baltic Sea and North Sea MSDIWG Chair, Danish Geodata Agency – Danish Hydrographic Office Presentations: <ul style="list-style-type: none">• Prof Dan Friess Associate Professor, National University of Singapore• Ms Yidda Karim Handal UN-GGIM: Américas Focal Point, PAIGH- National Section of Honduras• Dr John Nyberg Deputy National Hydrographer, Co-Chair UN-GGIM Marine Geospatial Information Working Group, UN-GGIM Americas Vice President, IHO IRCC Vice-Chair, IHO WEND WG Chair, National Oceanic and Atmospheric Administration (NOAA)• Dr Myeonghun Jeong Associate Professor, Chosun University Moderated Discussion
10:45 – 11:15	Refreshment Break

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11:15 – 13:00	<p>Plenary Session 05</p> <p>Data, innovation and standards for integrated marine geospatial information management</p> <p><i>Innovation stimulates, trigger and respond to rapid change and leapfrog outdated technologies and processes. Technology and processes are continually evolving, creating new opportunities and creativity. Compliance mechanisms and standards enable data and technology interoperability to deliver integrated marine geospatial information and location-based knowledge creation. This session discusses reliable, timely and quality data together with innovation and effective global open standards for integrated marine geospatial information management.</i></p> <p>Moderator:</p> <ul style="list-style-type: none">• Mr Rafael Ponce Professional Services, Principal Executive Consultant – Maritime Practice Lead, Esri <p>Presentations:</p> <ul style="list-style-type: none">• Dr Chow Jeng Hei Scientist, Technology Centre for Offshore and Marine, Singapore (TCOMS)• Mr Sheldon Carter Database Manager, International Seabed Authority• Mr Trevor Taylor Senior Director, Member Success, and Development, Global, Open Geospatial Consortium <p>Moderated Discussion</p>
13:00 – 13:05	Closing by Emcee

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08:30 - 08:55
08:55 - 09:00

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08:15 – 08:45	Onsite Registration for Physical Attendees
08:30 – 08:55	Admission for Virtual Attendees
08:55 – 09:00	Welcome by Emcee
09:00 – 10:45	Plenary Session 06 Partnerships, capacity development and advocacy for integrated marine geospatial information <i>Partnerships and capacities create and sustain the value of marine geospatial information through a culture based on inclusion, trust and strategic alliances that recognize common needs, aspirations and goals, towards achieving national development priorities and outcomes. Capacity and capability development is integral to sustain the value and deliver the benefits of integrated marine geospatial information, the value and benefits that must be continually advocated and communicated. This session discusses the essentials of partnerships, collaboration, avoiding duplication together with capacity development, continuous professional development and training, strategic message and advocacy for integrated marine geospatial information management.</i> Moderator: <ul style="list-style-type: none">• Mr Jonathan Pritchard Senior Technical Manager, IIC Technologies Presentations: <ul style="list-style-type: none">• Dr Parry Oei General Manager of the Joint IHO-Singapore Innovation and Technology Laboratory, Adviser (Hydrography), Maritime and Port Authority of Singapore• Mr Andrick Lal Senior Geodetic Surveyor, Pacific Community (SPC)• Mr Leonel Manteigas Assistant Director, International Hydrographic Organization• Commander Nicola Marco Pizzeghello Head of production department, Italian Hydrographic Institute Moderated Discussion
10:45 – 11:15	Refreshment Break

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PROGRAMME

11:15 – 13:00

Plenary Session 07

An operational framework for integrated marine geospatial information

The Operational Framework to provide practical guidance that governments can use to enhance the availability and accessibility of marine geospatial information to realize the greatest benefit from their integrated geospatial information management arrangements for the sustainable society, economy and environment. This session discusses case for and the importance and value proposition of the operational framework towards strengthening and integrating national marine geospatial information management towards implementation of national development priorities and the 2030 Agenda for Sustainable Development.

Moderator:

- **Ms Pearlyn Pang**

Co-Chair, UN-GGIM Working Group on Marine Geospatial Information
Vice-Chair, IHO Marine Spatial Data Infrastructures Working Group
Maritime and Port Authority of Singapore

Presentations:

- **Mr Jonathan Pritchard**

Senior Technical Manager, IIC Technologies

- **Ms Julia Powell**

Chief, Navigation Services Division, National Oceanic and Atmospheric Administration,
United States of America (United States – NOAA)

- **Dr John Nyberg**

Deputy National Hydrographer, Co-Chair UN-GGIM Marine Geospatial Information Working Group,
UN-GGIM Americas Vice President, IHO IRCC Vice-Chair, IHO WEND WG Chair, National Oceanic and
Atmospheric Administration (NOAA)

Moderated Discussion

13:00 – 14:30

Refreshment Break

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14:30 – 16:00	<p>Plenary Session 08</p> <p>Coordinated and coherent integrated marine geospatial information management</p> <p><i>Coordination and coherence are the first priority in efforts to strengthen and modernize marine geospatial information management, its infrastructures and services. Effective and integrated marine geospatial information management is characterized by the application of a mixture of good practices, strategic partnerships, standards and compliance mechanisms enabled by sound and robust policy and legal framework, effective governance, and appropriate technology and process, all necessitating coordination and coherence. This session discusses why coordination and coherence including integrated management practices is needed for evidence based policy development and decision making in the implementation of national development priorities.</i></p> <p>Moderator:</p> <ul style="list-style-type: none">• Commander Nicola Marco Pizzeghello Head of production department, Italian Hydrographic Institute <p>Presentations:</p> <ul style="list-style-type: none">• Prof Vladan Babovic Scientist, National University of Singapore• Prof Adam D. Switzer Associate Professor, Earth Observatory of Singapore/Asian School of the Environment, Nanyang Technological University• Master Mariner Mr Jens Schröder-Fürstenberg Head of Nautical Information Service Division, Federal Maritime and Hydrographic Agency (BSH), Germany• Mr Rafael Ponce Professional Services, Principal Executive Consultant – Maritime Practice Lead, Esri <p>Moderated Discussion</p>
16:00 – 16:30	Refreshment Break
16:30 – 17:30	Closing Session

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17:30 – 17:40	Closing Remarks Dr John Nyberg Deputy National Hydrographer, Co-Chair UN-GGIM Marine Geospatial Information Working Group, UN-GGIM Americas Vice President, IHO IRCC Vice-Chair, IHO WEND WG Chair, National Oceanic and Atmospheric Administration (NOAA)
17:40 – 17:50	Outcome statement of the International Seminar - 'Singapore Statement on Effective and Integrated Marine Geospatial Information' Ms Pearlyn Pang Co-Chair, UN-GGIM Working Group on Marine Geospatial Information Vice-Chair, IHO Marine Spatial Data Infrastructures Working Group Maritime and Port Authority of Singapore
17:50 – 17:55	Official Closing Statement Mr Thai Low Ying Huang Chief Hydrographer, Maritime and Port Authority of Singapore and IHO Council Vice-Chair
17:55 – 18:00	Closing Ceremony by the Joint Organisers: <ul style="list-style-type: none">• Mr Jens Peter Weiss Hartman Senior Adviser, IHO MSDI Chair and Baltic Sea and North Sea MSDIWG Chair, Danish Geodata Agency – Danish Hydrographic Office• Dr John Nyberg Deputy National Hydrographer, Co-Chair UN-GGIM Marine Geospatial Information Working Group, UN-GGIM Americas Vice President, IHO IRCC Vice-Chair, IHO WEND WG Chair, National Oceanic and Atmospheric Administration (NOAA)• Ms Pearlyn Pang Co-Chair, UN-GGIM Working Group on Marine Geospatial Information Vice-Chair, IHO Marine Spatial Data Infrastructures Working Group Maritime and Port Authority of Singapore• Mr Jonathan Pritchard Co-Chair, OGC Marine Domain Working Group• Mr Rafael Ponce Co-Chair, OGC Marine Domain Working Group• Mr Thai Low Ying Huang Chief Hydrographer, Maritime and Port Authority of Singapore and IHO Council Vice-Chair

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PLENARY SESSION 01

Effective and integrated marine geospatial information management



Mr Huang Zhongwen

Director, Smart City
Projects Office

Smart Nation Digital
Government Office (SNDGO)
Singapore

Mr Huang Zhongwen heads a new Smart City Projects Office at the Smart Nation Digital Government Office (SNDGO). In this role, he leads an inter-disciplinary team to partner Built Environment and DigiTech sectors to drive use of data and technology to achieve Smart City outcomes; through uplifting Digital Capabilities of Urban Infrastructure and fostering Urban Solutions and Innovations.

Prior to this, he was leading efforts to digitalise urban planning and design using spatial analytics, decision support systems, and AI technologies. Here, he partnered MPA in Singapore's Geospace-Sea efforts. In his earlier days as a naval officer, he also worked on acquiring new capabilities to transform navigation and anti-submarine operations with new technologies.

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Prof Koh Lian Pin

Director, Centre for
Nature-based Climate
Solutions

Director, Tropical Marine
Science Institute



www.nus.edu.sg/cncs

Professor Koh brings 16 years of international research experience in the field of sustainability and environmental science, having worked in institutions across Switzerland, Australia and the United States. In 2020, he returned to Singapore under the National Research Foundation's Returning Singaporean Scientists scheme to join the Department of Biological Sciences at the National University of Singapore. He is the Director of the University's Centre for Nature-based Climate Solutions, the Kwan Im Thong Hood Cho Temple Chair Professor of Conservation at NUS, Vice Dean of Research at the Faculty of Science, and Director of NUS' Tropical Marine Science Institute. He also currently serves as a Nominated Member of Parliament.

About the Centre:

The Centre for Nature-based Climate Solutions (CNCS) is a focal point for world-class research, thought leadership and education on nature-based solutions for climate mitigation and adaptation in the Asia-Pacific Region. The Centre brings together an interdisciplinary group of researchers to produce credible, salient, and legitimate science that informs nature-based climate strategies and actions and build capacity and empower leadership in the public, private and people sectors to respond to climate challenges and opportunities.

Time and Talent is of Essence – The Case for Integrated Marine Geospatial Information

In this keynote plenary, Professor Koh Lian Pin shares his views on effective and integrated marine geospatial information. In his speech, he will discuss the pivotal role of integrated marine and geospatial information as well as building the green talent pipeline to enable the effective use of these tools for the benefit of society, economy, and the environment.

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**Mr Jens Peter Weiss
Hartmann**

Senior Adviser, IHO MSDI
Chair and Baltic Sea and
North Sea MSDIWG Chair

Danish Geodata Agency –
Danish Hydrographic Office



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Jens Peter Hartmann is Senior Advisor at the Danish Geodata Agency which contains the Danish Hydrographic Office. He is the agency's international coordinator and was responsible for the implementation of the Danish Marine Spatial Data Infrastructure .

He is Chair of the IHO Marine Spatial Data Infrastructures Working Group (MSDIWG) and Chair of the Baltic Sea and North Sea Marine Spatial Data Infrastructure Working Group (BS-NSMSDIWG) under the Baltic Sea Hydrographic Commission (BSHC). He is also external associate professor at Copenhagen Business School.

Jens Peter has been Head of the Danish Hydrographic Office and served as Head of the Maritime Inspectorate at the Danish Maritime Administration. He also served as chairman for a working group under the BSHC that addresses the harmonisation of ENCs in the Baltic region.

Jens Peter is educated as a naval officer in the Royal Danish Navy and worked as a master mariner in the commercial fleet and as a commercial pilot. He holds degrees in organisation and strategy from the Copenhagen Business School.

The IHO Marine Spatial Data Infrastructures Working Group. (MSDIWG)

The 17th International Hydrographic Conference held in May 2007, directed that CHRIS (now the IHO Hydrographic Services and Standards Committee - HSSC) establish a Marine Spatial

Data Infrastructures Working Group (MSDIWG) to identify the Hydrographic Community inputs to National Spatial Data Infrastructures (NSDI).

The objectives of the IHO MSDIWG is to assess the status of Spatial Data Infrastructures (SDI), Marine Spatial Data Infrastructures (MSDI) and Marine Spatial Planning (MSP) worldwide. Support and promote the activities of the IHO in these fields. The WG develops and maintains the IHO Publication C-17 Spatial Data Infrastructures: "The Marine Dimension" - Guidance for Hydrographic Offices. Members are representatives of Member States, Expert Contributors and Accredited NGO Observers.

A Marine Spatial Data Infrastructure (MSDI) is that element of an SDI that focuses on the marine input in terms of governance, standards, ICT and content. The concept of MSDI is now gaining wider appreciation in terms of the way a variety of data types might be combined for efficient analysis by a wide range of disciplines, such as spatial planning, environmental management and emergency response. This requires the data to be held in a generic way, rather than for a particular product for a limited user group or for a specific purpose. An MSDI is not a collection of hydrographic products, but an infrastructure that promote interoperability of data at all levels.

An MSDI can be described as a framework comprising 4 key component. 1) Policy and Governance. A policy should exist defining the need to create information that is interoperable. This policy is often linked to a regional, national or organizational strategy for sharing and exchanging geographic information 2) People & Organizations. Functional MSDI requires willingness and practical co-operation

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**Mr Jens Peter Weiss
Hartmann**

Senior Adviser, IHO MSDI
Chair and Baltic Sea and
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Danish Geodata Agency –
Danish Hydrographic Office



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The IHO Marine Spatial Data Infrastructures Working Group. (MSDIWG)

between the various organizations that create, share and use information to implement the overall policy. There should also be a clearly defined governance structure and transparency in decision-making and reporting to foster a shared sense of working towards a common goal. 3) Enablers. The enablers in MSDI are the essential building blocks that provide the framework for data acquisition, management, updating and dissemination. 4) Content. Arguably, the most important component of SDI is the information content which is available to users. Without content, expressed within a consistent coordinate reference system, SDI is of minimal use. At the core of this information is reference information (i.e. the common datasets, themes or spatial data layers that "most people use most of the time" and which collectively make up a digital base "map" that can be viewed and queried).

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**Rear Admiral
Massimiliano Nannini**

Director
Italian Hydrographic Institute



www.marina.difesa.it

Rear Admiral Massimiliano Nannini graduated from the Naval Academy in 1990 achieving a Maritime and Naval Sciences degree. He attended International Cat “A” Course on Hydrography achieving a Master’s degree in Geomatics. Rear Admiral Nannini spent most of his career as Hydrographer, in different positions mainly focused to Geo-Metoc support to the Italian armed Forces. He has commanded Italian navy hydrographic vessels PIOPPO, ARETUSA, GALATEA and MAGNAGHI.

From 2013 to 2017 he served abroad as Italian Liaison Officer and Branch Head to USFFC, Norfolk, VA (USA).

From October 2017 to October 2018 served as Squadron Commander deployed five months to the North Pole and four months to Lebanon.

From March 2019 to July 2019 served as Chief of Staff for the EU Operation ATALANTA EUNAVFOR Somalia.

Admiral Nannini is married to Federica. They have one daughter, Cecilia

The role of the National Hydrographic Service

The study and management of the marine domain is one of the challenges that a State should face in order to promote its blue sustainable development. For data driven decisions, multiple aspects of the Ocean and their complex relationships should be analysed through marine geospatial information, balancing between the need to be aligned to opportunities given by the new technologies and the basic traditional knowledge that the measurement of the Ocean needs.

The Italian national hydrographic service though the Italian Hydrographic Institute has been facing these challenges since its foundation 150 years ago, in order to give to the nation marine geospatial information needed. Three main sectors are under constant exploration and analysis, connected to the need of the service to be technologically up to date into a data-information-people-centric approach.

Catching what the hydrographic data collection technology offers is an opportunity, but the increasing changing rate of the systems available obliges to focus to the key technological drivers that enable the capability of the hydrographic service to promote its role of contributing to the benefits for society, economy and environment.

The data-information centric approach is a challenge that all geospatial organization are facing in order to shift their activities from traditional charts and products to pure data and information, focusing the content of the data and not their representation. It is the vision to promote “map once and use many times”, strongly connected to use and re-use of data and information in a sustainable development and inclusive view.

The people centric approach is a reflection on which knowledge is needed for marine geospatial analysts involved in management of marine geospatial information; traditional roots of marine geomatics are connected of new data management tools. The way in which the new generation of hydrographers are growing up will determine the future of marine geospatial information and no one of them can be left behind.

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Dr Mathias Jonas

Secretary General

International Hydrographic
Organization



www.iho.int/en/

Dr Mathias Jonas is the Secretary-General of the International Hydrographic Organization (IHO) since 2017. Prior to this appointment he held the posts of Vice President of the Federal Maritime and Hydrographic Agency and National Hydrographer of Germany with responsibility for sea survey and sea cartography. Being a mariner, Dr Jonas has been involved in integrated navigation matters since the beginning of the nineties. In addition he has completed the world's first technical certification of an Electronic Chart Display and Information System in 1999 and has continuously contributed to IMO and IHO standardisation activities for navigation equipment, survey and cartography since. As one of the responsibilities of his current post he holds the chair of the Hydrographic Commission on Antarctica.

Global Trends in Hydrographic Geodata Management

The initial mission of IHO's MSDI Working Group to give IHO Member States guidance on their dealings with their respective national Spatial Data Infrastructure was articulated at its first meeting in 2007. The guidance to be given should cover all SDI aspects, including spatial data strategy/policy, people/networking, data management, frameworks / standards, and dissemination. Fifteen years have elapsed since and all hydrographic offices underwent the digital transition and data centrality has become a reality for most of them. The management of survey data has become a "big data" issue; digital products have been established in parallel to all printed materials if not replaced them completely. The early ambition to promote hydrographic offices to become THE national hub for marine spatial data has not materialized, simply because of the sheer diversity and amount of marine data. Coastal states tend to maintain a decentralized approach with a coordinating agency in the center which is not necessarily the Hydrographic Office. National MSDI projects are now encapsulated either into regional frameworks with the European solution named INSPIRE as a prominent example or international initiatives such as "International Oceanographic Data and Information Exchange" (IODE) programme of the Intergovernmental Oceanographic Commission IOC. The IHO itself has started to run GIS services for hydrographic meta data with global relevance. The principal value of geoinformation is addressed on highest political level by the establishment United Nations initiative on Global Geospatial Information Management (UN-GGIM). The relevant deliverable of this body is the Integrated Geospatial Information Framework (IGIF). The IGIF provides a basis and guide for developing, integrating, strengthening and maximizing geospatial information management. The interpretation of the IGIF for the purpose of marine geodata management will meet the original mission for guidance placed to the agenda of the MSDI Working Group in a contemporary way. The second major observation made at the first meeting was the expected uptake of the S-100 Standards series. The S-100 ecosystem has now matured to a level which allows application for the creation of data services. Increased focus should now be given create best practice example how the core expertise of Hydrographic Offices in bathymetric data nautical information management can be combined with amending marine related geoinformation of other domains under this standardization paradigm. The new overarching vision supported by MSDI should be the digital twin of the ocean.

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Effective and Integrated Marine Geospatial Information Management

10 – 12 MAY 2022

PLENARY SESSION 02

Availability and accessibility of marine geospatial information for sustainable societies, economies and environment



Dr Jani Tanzil

Deputy Facility Director
(SJINML), Senior Research
Fellow (TMSI)

St. John's Island National
Marine Laboratory,
Tropical Marine Science
Institute, National
University of Singapore



<https://sjinml.nus.edu.sg/>

Dr Jani Tanzil is a marine ecologist whose research on marine ecosystem dynamics focuses on better understanding the marine environment and coral resilience to climate and environmental disturbances. Jani hopes her work can better strategies for environmental assessments, policies for resource management and ecosystem rejuvenation. Jani has a BSc in Biology from the National University of Singapore, an MSc in Tropical Coastal Management from the University of Newcastle upon Tyne, and a PhD in Computational Science from the University of Amsterdam. Jani is currently the Lead PI of the Marine Environment Sensing Network project which aims to expand Singapore's marine monitoring network for research and education, and to facilitate collaborations for the future of our shared marine environment.

Marine Environment Sensing Network: expanding Singapore's marine monitoring network for research, education, and collaborations

Singapore's reliance on a healthy marine environment is expected to grow. Set against a backdrop of climate change, Singapore strives to increase food production from mariculture, water from desalination, port operations as a global maritime hub, all while meeting the other varied needs of society and sustainable development goals in a coastal urban landscape. Understanding of the processes that govern our complex and dynamic shared marine environment is needed to predict impacts and realise effective yet sustainable solutions. For this, marine scientists and engineers will need access to quality long-term and continuous environmental data and a platform for test-bedding of novel marine technologies. This talk will introduce the Marine Environment Sensing Network (MESN) project in the context of Singapore's dynamic marine environment, and how MESN aims to expand the value of Singapore's seawater monitoring network and provide a test-bed platform for the R&D of marine sensing technologies. MESN hopes to help establish Singapore as a key player in global ocean monitoring networks by providing accessible data for marine and climate science research, and will collaborate with GeoSpace-Sea to expand use-cases beyond research (e.g., with governments, industry etc)

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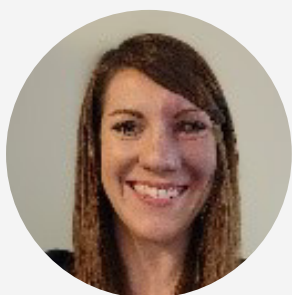
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Ms Caitlin Johnson

Lead GEOINT Analyst
National Geospatial-
Intelligence Agency



Caitlin Johnson is a Lead GEOINT Analyst in the Maritime Safety Office at the National Geospatial-Intelligence Agency (NGA). In her current role, she supports the production and operations of digital nautical chart products mainly used to support the United States military and to fulfill Safety of Navigation obligations. Additionally, Ms. Johnson serves as NGA's Strategic Engagement Representative to the International Hydrographic Organization Marine Spatial Data Infrastructures Working Group and United Nations Committee of Experts on Global Geospatial Information Management Working Group on Marine Geospatial Information. Ms. Johnson received a Bachelor of Science in Geographic Science from James Madison University.

National Geospatial-Intelligence Agency (NGA) Disaster Response and Data Availability

The presentation, National Geospatial-Intelligence Agency (NGA) Disaster Response and Data Availability, will provide an overview of how and when NGA delivers data and services to public users in a disaster or crisis scenario. A demonstration of NGA's Humanitarian Assistance and Disaster Relief portal featuring a snapshot of NGA's response to Hurricane Matthew (2016), Hurricane Katrina (2005), and the 2015 earthquake in Nepal will be provided. Additionally, a tour through the Arctic Digital Elevation Model and Wildlife Trafficking portals will highlight some other key areas of interest for public users.

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Dr Paul Elsner

Lecturer in Geographic
Data Science

Birkbeck, University
of London



www.bbk.ac.uk

Dr Paul Elsner is Lecturer in Geographic Data Science at Birkbeck, University of London where he directs the MSc in Climate Change. He has a long-standing interest in global ocean management, with particular focus on offshore energy. He provides expert advice to a range of international institutions such as IOC-UNESCO, the International Seabed Authority, and the Asian Development Bank. Dr Elsner was educated in Germany (University of Hamburg), Canada (Dalhousie University) and the UK where he holds Ph.D. from the University of Cambridge.

Offshore wind for a sustainable ocean economy: the key role of geospatial data systems for marine spatial energy planning

Large-scale offshore wind parks play a central role in the transition to a low-carbon global energy system. In the past decade this renewable energy technology has rapidly matured and now delivers electricity at lower costs than traditional fossil fuel-based power stations.

The advent of operational offshore floating platforms substantially increases the potential areas where offshore wind could be developed. The emerging approach to convert offshore electricity to hydrogen in-situ is also promising to remove the need to connect offshore wind platforms to grid networks on land. These trends create vast economic opportunities to exploit offshore wind resources and also to mitigate climate change.

Accurate and highly-resolved marine geospatial information is of central importance when developing offshore wind projects in new markets around the world. To date, many coastal states lack comprehensive and planning-ready data systems. This leads to delays in policy making, marine spatial planning, and licensing. Such delay carries a large carbon footprint, as fossil-fuel based energy practices continue longer than necessary.

There is therefore substantial scope for an integrated effort in the marine data community to develop a bespoke data infrastructure that supports offshore wind energy planning on a global scale. Initiatives such as actions within the context of the United Nations Decade of Ocean Science for Sustainable Development (2021-2030) could help to address this challenge.

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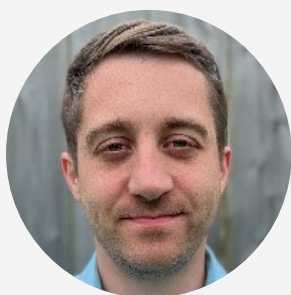
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Mr Jace Ebben

Lead analyst

National Geospatial-
Intelligence Agency,
United States of America



Mr Ebben has worked for the National Geospatial-Intelligence Agency for over a decade. He is currently assigned to the Maritime Safety Office where he serves in a variety of roles supporting the production and dissemination of safe-for-navigation nautical products. He's an active participant in multiple International Hydrographic Organization working groups promoting marine spatial data initiatives and facilitating worldwide coverage of electronic chart products supporting the safety of life at sea.

An Overview of the Seabed 2030 Project, Data Center for Digital Bathymetry, and Crowdsourced Bathymetry

Conserving and sustainably using the oceans, sea, and marine resources for sustainable development is Goal 14 of the United Nations Sustainable Development Goals and a part of the blueprint for peace and prosperity for people and the planet, now and into the future. Sustainable Development Goal 14 will not be achievable without a comprehensive understanding of the world ocean floor, which is currently only 20% mapped with direct observation. This presentation will highlight three efforts supporting ocean floor mapping. The first, the Nippon Foundation-GEBCO Seabed 2030 Project, is a collaborative project to inspire the complete mapping of the world's ocean by 2030. The second is the International Hydrographic Organization (IHO) Data Center for Digital Bathymetry (DCDB), a repository for ocean bathymetry data providing long-term archiving support for GEBCO and the Seabed 2030 initiative by preserving data and offering broad public access to openly-shareable data. The third is the Crowdsourced Bathymetry initiative, a citizen-science project promoting the capture and sharing of bathymetric data by non-survey vessels (such as fishing boats or cruise ships).

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PLENARY SESSION 03

Integration of terrestrial, maritime and cadastral domains



Dr Victor Khoo

Director
Singapore Land Authority



www.sla.gov.sg

Dr Victor Khoo is the Director of Survey and Geomatics Division at the Singapore Land Authority (SLA). He received his PhD from the Nanyang Technological University (NTU), Singapore.

Victor had led several transformative initiatives such as the establishment of national positioning infrastructure, the digital transformation of cadastral survey workflow and the national 3D mapping programme. He also initiated the Digital Underground project to develop a holistic ecosystem for the mapping of underground utility networks. Currently, he is driving the digital twin development and collaborations for applied researches, which underpin the sustainable development goals, advancing geospatial intelligence to go mainstream.

Integration of Terrestrial, Maritime and Cadastral Geospatial Information

Traditionally, hydrographic surveys for production of maritime charts, national mapping and cadastral rights administration are managed by different government bodies. Yet real world economic, social, environmental needs and challenges run across all three (3) domains, oblivious to the regulatory boundaries or division of roles.

Holistic spatial planning requires integrated datasets, frictionless cohesive entities working as one. The common denominator which interconnects the domains is geospatial information which has been providing far-reaching solutions to the pressing issues facing humanity, ranging from health, education, food security, to disaster risk mitigation and resilience-building.

As our policy makers, scientists, public and private entities grapple with the challenges, join forces to innovate and formulate yet smarter solutions to support liveable sustainable cities of tomorrow, data – particularly integrated location data across the three (3) domains, is a strategic asset which drives economic growth be it the information super-highway, traditional energy supply, green energy innovation, food security facilities or logistics gateway for trade and commerce, social wellness be it coastal facilities for canoeing, wind surfing or just relaxation by the beach, and environmental efforts be it monitoring or protection for climate change adaptation and mitigation.

Some interesting coastal applications which require the integration of maritime, terrestrial, and cadastral geospatial information include coastal fish farms for food security and floating solar panels for green energy.

As we dwell deeper on how we may realise the integration, we discuss the intricacies of technologies fusion, standards interoperability, datums relationships, to bring to life a meaningful 3D digital twin for spatial planning, development, and asset management.

With data sharing, we unleash “long tail” applications across the public and private sectors, empowering community co-creation, bringing us closer to our common purpose of realising united nations’ sustainable future goals.

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PLENARY SESSION 03

Integration of terrestrial, maritime and cadastral domains



**Mr Saud Hamoud
Al-Ruways**

Director General
of Hydrography

General Authority for
Survey and Geospatial
Information



[www.gasgi.gov.sa/ar/Pages/
default.aspx](http://www.gasgi.gov.sa/ar/Pages/default.aspx)

Education

- Master of Science in Hydrography, FIG/IHO/ICA Certified Cat 'A'
University of Plymouth, Plymouth, UK
- Bachelor of Naval and Military Science
King Fahad Naval Academy, Al-Jubail Saudi Arabia

Specialties

- Geospatial Information Systems
- Project Management
- Survey Planning
- Financial and Budget Management

Experience

- Director General of Hydrography
- Operations and Training Manager in Hydrographic Department
- Hydrographic Surveyor

Remarks

Mr Al-Ruways' many years of service in the Saudi Arabian government has given him an in depth understanding of the processes, policies and regulations associated with survey and business management. During his time at General Directorate of Military Survey he had extensive experience in survey voyages, project management and day to day operational tasks at head office.

Hydrographic Survey and Geospatial Information

General Authority for Survey and Geospatial Information (GASGI) is the benchmark organization in the Kingdom of Saudi Arabia, for surveying, mapping, geospatial information and hydrography. General Authority for Survey and Geospatial Information (GASGI) was established in the Kingdom of Saudi Arabia on 13 February 2006 through a resolution of the Saudi Cabinet. Kingdom of Saudi Arabia is the member No. (78) of International Hydrographic organization (IHO) since 2007 represented by GASGI.

Hydrography under the GASGI has been formulated for Supervising, monitoring and promoting Hydrographic survey sector in the Kingdom of Saudi Arabia to achieve quality outcomes, improve hydrographic performance and developing national competencies.

GASGI is working together with other national and international organization to enabling sectors and many digital areas through geospatial data, applications, spatial analyzes, and training of employees in a manner that leads to raising efficiency, improving services and business, and making location-based decisions.

GASGI as a national geospatial data provider always working hard to make marine geospatial data and products available for the primary purpose of safety of navigation and in support of all other marine activities, including economic development, security, and defense, scientific research, environmental protection, and sustainability.

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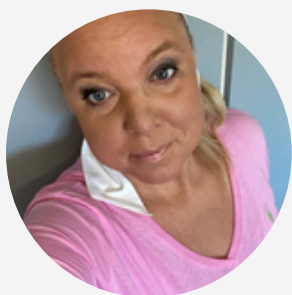
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**Mrs Johanna
Fröjdenlund**

Business Developer
Lantmäteriet

Johanna Fröjdenlund works as a Business Developer at the unit of Geospatial Information in Lantmäteriet Sweden. Main area of expertise is geographic information. She has a long experience from working with geographic information at Lantmäteriet, e.g. in relation to natural hazards and learning from accidents. She has a B.S. in Spatial Planning.

Magdalena Andersson is working as a Business Developer at the unit of Real Property Information, Geospatial Information in Lantmäteriet Sweden.

Main area of expertise is real property information as well as marine information in relation to the real property register.

She has a long experience from working in Lantmäteriet; earlier working areas has included e.g. information security and project management in Accra, Ghana.

She holds a B.S. in Systems Science and a degree in French.



**Mrs Magdalena
Andersson**

Business Developer
Lantmäteriet

Geodata in Sweden cooperation and development

Presentation on geodata in Sweden, co-operation and development. Importance of geodata in society and how to make it available for different users. Special focus on co-operation in different areas, e.g. the maritime area as well as in the planning and building context. On-going development and digitalization in the terrestrial, maritime and cadastral domains.

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PLENARY SESSION 04

Effective governance, policy and legal frameworks and financing for integrated marine geospatial information management



Prof Dan Friess

Associate Professor
National University
of Singapore



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Dan is an Associate Professor and Dean's Chair in the Department of Geography, National University of Singapore, and Deputy Director of the NUS Centre for Nature-based Climate Solutions. His research concerns the use of coastal ecosystems (particularly mangroves and seagrasses) as nature-based solutions for climate change mitigation (e.g., blue carbon) and adaptation (e.g., coastal protection).

Geospatial information to value coastal nature-based solutions

Coastal ecosystems such as mangroves are a key component of many tropical coastlines, yet are under threat in many locations due to human land use change. However they are now gaining massive attention for their potential to be a nature-based solution to help us mitigate and adapt to climate change. They can do this through sequestering and storing carbon from the atmosphere at rates that often exceed terrestrial ecosystems, while simultaneously protecting coastal communities from coastal storms and sea-level rise. Gaining a better understanding of their economic and social value as a nature-based solution provides decision makers with the information required to incorporate coastal ecosystems into coastal management planning. Geospatial data and techniques have been instrumental in the valuation of coastal nature-based solutions, since these habitats are often fragmented over large areas. This presentation will give examples of how we have used geospatial approaches to quantify and monitor a range of different ecosystem benefits, and how it can provide the baseline data from which valuation studies can be conducted, and how it can contribute to the sustainable financing of nature-based solutions in the tropics.

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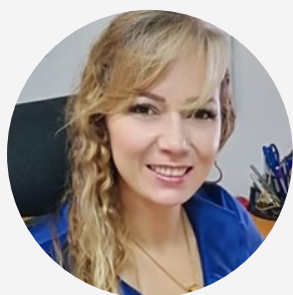
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Ms Yidda Karim Handal

UN-GGIM: Américas
Focal Point

PAIGH- National Section
of Honduras



**Sección Nacional
de Honduras**

www.ign.hn/

Architect with Master's degree and specialties oriented to territory planning with an emphasis on natural resource management, More than 22 years of experience in managing Cadastre information systems and property registration; municipal information systems and its integration with the Property Registry; interoperability of Geographic Information Systems between national and local governments; development of Local Plans, Urban Planning, land use and zoning regulations for Territory Planning and Management of Land Projects.

Integrating Spatial Data Infraestructure

The presentation for this international seminar will show the experiences acquired for the integration of geospatial data with the municipalities and the steps that were key to achieving acceptance of the integration project. It will show the steps we have taken with some of the countries in the region to support the integration of platforms and technologies that seek data standardization.

Likewise, he will talk about the challenges that were overcome to make spatial information available and the challenges encountered in local governments.

Finally, i will talk about the benefits achieved by integrating data and map information, technology and platforms, and the importance for Honduras of achieving the integration and classification of marine information, since it is a strategic axis according to the country's plan to activate and boost the economy through the development of tourism and infrastructure projects in harmony with the environment.

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Dr John Nyberg

Deputy National Hydrographer,
Co-Chair UN-GGIM Marine Geospatial Information Working Group,
UN-GGIM Americas Vice President,
IHO IRCC Vice-Chair,
IHO WEND WG Chair
Italian Hydrographic Institute

National Oceanic and Atmospheric Administration (NOAA)



<https://nauticalcharts.noaa.gov/>

John Nyberg is the Deputy National Hydrographer at NOAA's Office of Coast Survey.

Nyberg's previous positions at NOAA include chief and deputy chief of the Marine Chart Division between 2010 and 2020 where he helped direct Coast Survey's chart modernization to digital products, changing the operational focus from paper-based chart compilation to electronic navigational charts. Prior to his work in the Marine Chart Division, Nyberg spent 12 years in Coast Survey's Navigation Services Division moving from Coast Pilot cartographer to deputy division chief where he helped manage the procurement of the research vessel Bay Hydrographer II and initiated the modernization of the United States Coast Pilot's production system.

Bathymetric Data Licensing For the NOAA Office of Coast Survey

The UN-GGIM-Working Group on Marine Geospatial Information is in the process of authoring a supplementary volume of the Integrated Geospatial Information Framework (IGIF) which will present a perspective on the domain of water, including oceans and seas, internal waters, the coastal zone, and other waterways. The IGIF-H intends to guide those who are implementing the IGIF for geospatial programs that focus on water including for navigation, the new blue economy, coastal resilience, marine spatial planning, and more. This presentation will introduce the document as it enters its consultative phase.

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Dr Myeonghun Jeong

Associate Professor
Chosun University



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[https://www.khoa.go.kr/
eng/Main.do](https://www.khoa.go.kr/eng/Main.do)

Dr Jeong, Myeonghun is an Associate Professor in the Department of Civil Engineering at Chosun University, Republic of Korea, leading the Geo-Spatial Data Science Group. His research interests are in three main areas: Geo-Spatial data science, dynamism, and uncertainty with visualization. He utilizes GeoAI, robust statistic methods, and topological structures to get a better overall sense of what the data are like. These research interests advance the core algorithms and methodologies in spatiotemporal data modeling and analytics. He closely cooperates with Korea Hydrographic and oceanographic Agency for international MSDI cooperations.

Governance, policy and legal framework, and financing for establishing MSP and MSDI in the Republic of Korea

Dr Jeong will deliver a speech on effective governance, policy and legal frameworks, and financing for integrated marine geospatial information management in the Republic of Korea. The Ministry of Oceans and Fisheries is responsible for Marine Spatial Planning (MSP). The Korea Hydrographic and Oceanographic Agency is taking the lead in Marine Spatial Data Infrastructure (MSDI) development in the Republic of Korea. He will explain how two organizations utilize governance, policy and legal frameworks, and financing to develop and improve MSP and MSDI in the Republic of Korea.

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PLENARY SESSION 05

Data, innovation and standards for integrated marine geospatial information management



Dr Chow Jeng Hei

Scientist

Technology Centre for
Offshore and Marine,
Singapore (TCOMS)



www.tcoms.sg

CHOW Jeng Hei is a scientist in the Technology Centre for Offshore and Marine, Singapore (TCOMS). He is currently leading the Digital Metocean capability thrust at the Centre of Excellence for Autonomous & remotely OPERated vessels (CEAOPS) in TCOMS. His research involves digital twinning of the metocean environment, that will enable smart vessels to harnessing dynamic geospatial data for enhanced navigational safety and efficiency.

Enhancing Marine Geospatial Data with Digital Twin of the Met-Ocean Environment

With the global development of maritime autonomy capabilities and the transformation of national port waters towards smarter and more connected systems, safe and efficient maritime traffic operation is required. Currently, vessels rely on the experience and expert knowledge of mariners, as well as the Vessel Traffic Services (VTS) operators to navigate the busy waters around Singapore. In regions with strong currents and waves, vessel manoeuvrability can be affected, which in turn may increase the risk of accidents.

The enhancement of marine geospatial information from recent developments of modelling approaches in obtaining real-time ocean environment data can serve the maritime sector towards maritime vessel safety. An accurate forecasting of the vessel's operating wave environment enhances the predictability of the vessel's responses, which can be harnessed for autonomous vessel navigation and control. By incorporating the sea state forecast into navigation and control systems, the performance of Maritime Autonomous Surface Ship (MASS) and other smart maritime solutions can be further enhanced. Furthermore, the prediction of the hydrodynamic environment can also be used to improve the coordination of multi-vessel interactions at the VTS level, given that the manoeuvrability of each vessel will be affected by the surrounding environmental forces.

Further contributions of marine geospatial information and real-time ocean environment data on the maritime industry and other ocean systems includes enhancing energy efficiency and smart energy management of vessels, optimising coastal protection & climate change risk mitigation strategies, enhancing aquaculture productivity and other blue economy opportunities that support UNSDGs. The session will introduce the different numerical and data-driven models, and data assimilations in the development of a high resolution and accurate digital twin. Beyond the development of the fundamental physics-based capabilities, advanced data-sharing with a forecasting visualisation platform can promote dissemination of marine geospatial information to maritime stakeholders.

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Mr Sheldon Carter

Database Manager
International Seabed
Authority



www.isa.org.jm

Sheldon Carter is the database manager at the International Seabed Authority, he joined the Authority in 2017. He currently has over 12 years of data management experience and holds an MBA in Management Information Systems from the Mona School of Business in Kingston Jamaica. Since joining the ISA, Sheldon has developed and launched its DeepData information system. He has also recently completed the development of the updated reporting templates used by contractors to submit geological and environmental data to the Authority. He has also developed the ISA's Data Management Strategy which is currently undergoing a review process.

Sheldon is married and has two sons, he is a lover of football/soccer and is a former rugby player.

The Evolution of ISA Data Management Strategy: Deep Dive into Geospatial Data Management

The presentation will highlight the role of the ISA within the Area, and its mandates under UNCLOS. It will then introduce the ISA Data Management Strategy as the framework for the management of data in the Area. It will then dive into the evolution of the ISA DeepData database and its geospatial features. We will close by briefly speaking of ongoing work to make bathymetric data collected during deep seabed exploration publicly available.

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Mr Trevor Taylor

Senior Director, Member
Success, and Development,
Global

Open Geospatial Consortium



www.ogc.org

Trevor Taylor, currently accountable for global member success and development at OGC, has over thirty years of experience in the international geospatial community. With a background in Geography, Mr. Taylor has worked on a wide variety of applications such as Marine, Land Information, Disasters Management, Agriculture, Mapping, Forestry and Environment.

Mr. Taylor has substantial global experience in a wide variety of technical, client services, project, business and strategic planning activities. Prior to joining OGC staff, Mr. Taylor was a member representative for a commercial company to OGC, supporting OGC interests at the technical, principal, and strategic member levels, particularly in Asia, South America, India, and Europe.

Innovation for Hydrospatial Information management - IHO and OGC - The Story so far

Improving the community's ability to Find, Access, Interoperate and Reuse (FAIR) Hydrospatial data and information, taking a standards-based approach (IHO and OGC) is key to unlocking the value of data collected, especially data that is beyond nautical charts. Recognizing the importance of making practical progress, the international community is collectively working to improve access to data to enable easier integration across domains, regions, and jurisdictions. Critical to the success so far, are a series of initiatives that will be outlined in this talk, leading to the key question - what is next from both thematic and technology perspectives?

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PLENARY SESSION 06

Partnerships, capacity development and advocacy for integrated marine geospatial information



Dr Parry Oei

General Manager of
the Joint IHO-Singapore
Innovation and Technology
Laboratory, Adviser
(Hydrography)

Maritime and Port Authority
of Singapore



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SINGAPORE

www.mpa.gov.sg

Dr Parry Oei is an Adviser (Hydrography) at the Maritime and Port Authority of Singapore and the General Manager of the Joint IHO-Singapore Innovation and Technology Laboratory. He was the former Chief Hydrographer of Singapore, and he chaired the International Hydrographic Organization (IHO) Inter-regional Coordination Committee (IRCC) and the East Asia Hydrographic Commission (EAHC) Charting and Hydrographic Committee.

Partnerships, Capacity Development and Advocacy for Integrated Marine Geospatial Information Management

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Partnerships, capacity development and advocacy for integrated marine geospatial information



Mr Andrick Lal

Senior Geodetic Surveyor
Pacific Community (SPC)



<http://pgsc.gem.spc.int/>

<https://gem.spc.int/>

<https://www.spc.int/>

Mr Andrick Lal, originally from Suva, based at the Geoscience Energy and Maritime Division of Pacific Community, in Suva, Fiji. He has been involved in projects such as Pacific Sea Level & Geodetic Monitoring Project and the Regional Maritime Boundaries Project for more than fifteen (15) years in thirteen (13) Pacific Island Countries, supporting a range of thematic areas which includes geoscience, maritime, hydrography, geodesy and geodetic surveys using technologies such as Total Station, Global Navigational Satellite System & Unmanned Aerial Systems. Andrick is the focal point for the SPC Pacific Geospatial & Surveying Partnership Desk.

Collaborative initiatives of the Pacific Geospatial & Surveying Council

Geospatial information underpins the social and economic development activities in the world today. The services provided by Pacific Island geospatial scientists and surveyors contribute to the security and well-being of Pacific people, supporting numerous industries and sectors. These include natural resource management, civil engineering, climate change adaptation, disaster risk reduction, transport, land ownership, health, agriculture oceans and maritime, to name a few.

In November 2014, a group of Pacific regional surveying and geospatial experts met in the margins of the annual Pacific Geospatial Information Systems and Remote Sensing (GIS/RS) User Conference in Suva, Fiji. It was at this meeting that the Pacific Geospatial and Surveying Council (PGSC) was first envisaged and a charter governing its mission and objectives was developed for: -

- Building the capacity of regional surveyors and geospatial experts.
- Improving and standardising geospatial information gathering and dissemination
- Maximising economic growth and alleviating poverty
- Informing natural resource management, disaster risk management and climate change adaptation

The PGSC aims to achieve these goals by coordination, communication, and collaboration as well as sharing resources and applications of location information through regional and global partnerships.

And with the formulation of its 10-year geospatial and surveying strategy (pgsc.gem.spc.int/wp-content/uploads/2018/04/PGSC-Strategy-2017-2027_low-res.pdf) consolidated the partnership from global to regional, down to national level. As has been so many times emphasised, we cannot do it alone, we still rely on the assistance from the expert groups outside the region. Being a member of and participated on the above-mentioned bodies and their activities, our understanding of the Why, How and with What, for the initiatives in the geospatial and surveying industries are strengthened. At the national level, the ministry now has fully understood and appreciate the significance of having a modern and robust international geospatial reference system and its applications especially for a disaster-prone low-lying island state, so there be it, a storm surge or tsunami, you need an accurate positioning system.

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Mr Leonel Manteigas

Assistant Director

International Hydrographic
Organization



www.iho.int/en/

Leonel Manteigas is the Assistant Director for Coordination & Capacity Building of the International Hydrographic Organization (IHO) since June 2020. Before this appointment he was a member of the International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers (IBSC). In the Portuguese Hydrographic Institute he had several positions such as, the Director of the Portuguese School of Hydrography and Oceanography and the Head of the Hydrography Division responsible for the hydrographic surveys and all nautical cartographic production. Among others, he holds a Specialization in Hydrography recognized by the IBSC with category "A" and a Master of Engineering in Geomatics Engineering.

Capacity Building Challenges and Initiatives

The IHO Capacity Building Sub Committee aims to contribute to the creation of capacities to a sustainable development of the Member States and other states, being a strategic objective of the IHO. It continuously assesses the status of hydrographic surveying, nautical charting and maritime safety information worldwide, establishes and maintains close relationships with national agencies and international organizations, which may provide funding or other support for developing countries and cooperates with Regional Hydrographic Commissions in the assessment of needs, in raising awareness on the importance of hydrography and in the provision of education and training.

The level of activity of the IHO Capacity Building (CB) Programme in the last years was clearly affected by the COVID 19 Pandemic. Traditionally most of the activities were executed in an in-person format but like many other areas, the CB also demonstrated a capacity to adapt.

Some of the activities that by their nature needed to be executed in-person were deferred and their respective funds secured for to the following years. Other activities were adjusted to VTC and Hybrid formats that not only maintained an important level of activity but also brought out the main advantage of these formats, the ability to reach more people without the significant costs associated with travels. The opportunity to have more attendants increased the possibility of sharing the regional activities with participants from other regions, establishing different levels of partnerships that can surely be expanded in the future.

However, despite the fact that we are going through a difficult period of adaptation towards a potential new normality, new projects have emerged and have been developed. One of them is the IHO E-learning Center, a proposal from Republic of Korea endorsed by the 2nd Session of the IHO Assembly that seemed to anticipate the pandemic and the increased urgent need for remote activities, such as the training ones. The 2nd IHO Assembly also approved the adoption of a new work item related to the Empowerment of Women in Hydrography (EWH) to the Work Programme of the IHO CBSC which aims to develop a series of initiatives to enable more women to participate equitably in the field of hydrography and to assume more leadership roles within the hydrographic community.

To ensure the consistency with the new IHO Strategy, the Capacity Building Sub-Committee also created a project team to revise and align the CB Strategy.

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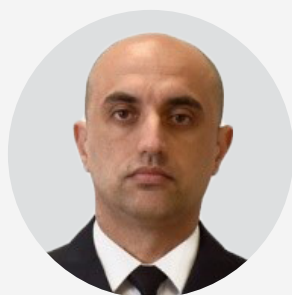
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**Commander Nicola
Marco Pizzeghello**

Head of production
department

Italian Hydrographic
Institute



www.marina.difesa.it

Commander Nicola Pizzeghello is hydrographer of the Italian Navy Hydrographic Service. Graduated in political science, he balanced his studies between marine geospatial information management and marine strategic policy. He worked more than ten years on board Italian navy hydrographic vessels, commanding the Italian navy hydrographic vessels Galatea and Magnaghi and the NATO Research Vessel Alliance. He worked at the Italian Navy Hydrographic Institute as head of different departments, moving from data gathering and management to service delivering by products. Commander Pizzeghello is married with Elena and he has two children, Matteo and Alice.

The Italian capacity development programme in the Mediterranean region

The complexity of marine geography, where only One Ocean is connecting people around a Planet where 70% is water and 90% of goods are carried by ships, needs an bridge through which a Nation can actively projecting collaborations in the marine domain from national to global.

The activities of the Italian Navy Hydrographic Institute are focused in the Mediterranean Region, the geographical bridge from national to global levels, though the cooperation nation to nation between Navies, between States, between Hydrographic Services and nation to region by the regional bodies of the International Hydrographic Organization and the United Nation Global Geospatial Information Management.

National bilateral cooperation in the hydrographic field can be realized in different ways. Starting from cooperation between hydrographic services, promoted by the common belonging to Navies, the coproduction of nautical charts under the Safety of life at Sea binding terms is the most rigid but very well structured cooperation framework under the strong IHO standard principles.

On the other hand, starting from State to State cooperation, a complete project of creation of a new national hydrographic service can be a way to promote the need of hydrography and marine geospatial information at a national level for the benefit of society, economy and environment.

Regional multilateral cooperation is the third way, explored though the role of the Ambassador as promoter of Marine Spatial Data Infrastructure perspective into the regional bodies of the International Organizations active in the Mediterranean region.

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An operational framework for integrated marine geospatial information



Ms Pearlyn Pang

Co-Chair, UN-GGIM Working
Group on Marine Geospatial
Information

Vice-Chair, IHO Marine
Spatial Data Infrastructures
Working Group

Maritime and Port Authority
of Singapore

Pearlyn is Co-Chair of the UN-GGIM Working Group on Marine Geospatial Information, Vice-Chair of the International Hydrographic Organization (IHO) Marine Spatial Data Infrastructures (MSDI) Working Group and at other activities including those of the Open Geospatial Consortium (OGC) Marine Domain Working Group. Pearlyn is Assistant Hydrographer at the Maritime and Port Authority of Singapore (MPA). At MPA, she is part of a team responsible for Singapore's National Marine Spatial Data Infrastructure called GeoSpace-Sea, she supports MPA's hydrographic S-100 transition, and contributes to capacity building. Pearlyn holds a MSc. In Applied GIS and completed the FIG/IHO/ICA Category B recognised UKHO Marine Cartography and Data Assessment programme.

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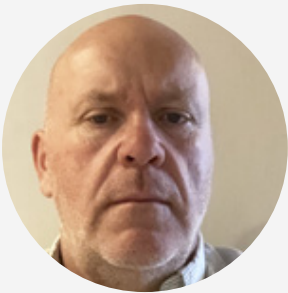
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An operational framework for integrated marine geospatial information



Mr Jonathan Pritchard
Senior Technical Manager
IIC Technologies



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Jonathan Pritchard has over twenty years experience in Hydrography and more than thirty years in the technology industries. He works for IIC Technologies in the United Kingdom where he is the senior technical manager. Jonathan is an active contributor and participant in many of the leading IHO working groups developing technical standards for marine geospatial phenomena. He is a former IHO working group chair, a current co-chair of the ENC conversion subgroup and also co-chair of the OGC's Marine Domain Working Group.

“the case for change integrate, integrate, integrate”.

The Operational framework for integrated marine geospatial information poses some interesting challenges for the community involved with the creation of standards and broader uses of such data. This brief presentation takes the theme of “the case for change” and “integrate, integrate, integrate” and shows how the concept of integration can be viewed across multiple different, complementary axes. The concept of integration, in itself, is both a tactic (e.g. for geospatial data, institutional arrangements and land/sea) but also a fundamental component of the framework itself. It is therefore a key component of future models of the framework by all implementing participants at all stages. Value is a core component, driving choices made for integration across the many axes. In the presentation we examine the roots of integration, its relationship to value, to re-use and the value propositions described in the IGIF-Hydro in the hope of showing how a flexible approach is warranted in adapting the IGIF-Hydro examples. examples across different technologies and data are given to illustrate the key challenges and a way forward across different sectors using the unique marine value propositions. This lays the foundations for the IGIF-Hydro implementation within the framework

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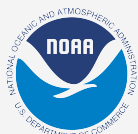
An operational framework for integrated marine geospatial information



Ms Julia Powell

Chief, Navigation
Services Division

National Oceanic and
Atmospheric Administration,
United States of America
(United States – NOAA)



<https://nauticalcharts.noaa.gov/>

<https://marinenavigation.noaa.gov/>

Julia Powell is the Chief of the Office of Coast Survey Navigation Services Division. NSD provides a focal point for customer requests on charting issues, short-term (fast response) hydrographic surveys, and Nautical Publications, such as Coast Pilot. The division coordinates and represents OCS at constituent events such as harbor safety meetings, waterways management meetings, cooperative workshops, conferences, and trade shows, as well as standing up NOAA's Precision Marine Navigation Program. Julia graduated with a degree in Geological Sciences from Cornell University and has a Masters in Information Systems from the University of Maryland.

She is chair of the IHO's S-100 working group that is working on the framework standard that underpins the next generation navigation products, such as underkeel clearance management, high-resolution bathymetry and other integrated products.

Precision Marine Navigation - Information Infrastructure for the New Blue Economy

The Precision Marine Navigation (PMN) program is developing innovative services and products that make NOAA's weather, oceanographic, and bathymetric data more accessible. The collective value of NOAA datasets is significantly greater than when they are disseminated separately or are not easily discovered, and PMN is building out the information infrastructure that enables the full use of this data for navigation purposes. Through standardized data formats and a national processing and dissemination system, the PMN program is providing support tools for mariners as they plan and transit within U.S. waterways and ports. In June of 2020, NOAA and the Bureau of Economic Analysis released the first comprehensive assessment of the U.S. marine economy. It was the first time that the marine economic data was considered for its specific contribution to the overall economy compared to other larger industry sectors. The results showed a total marine economy that is growing faster than the U.S. economy as a whole and contributed nearly \$373 billion to GDP while supporting ~2.3 million jobs. Globally, today's marine economy is valued at approximately \$2 trillion annually and is projected to grow to greater than \$3 trillion by 2030.

Mariners can use data from the Precision Marine Navigation to optimize their routes and make critical decisions while at sea, as well as safely maneuver in congested seaports. For example, by taking advantage of a strong current, a ship can operate well below its maximum speed and reduce its fuel use and greenhouse gas emissions; accurate water level forecasts and high-resolution bathymetry can reduce the need for lightering and cut down on port congestion; and real-time water levels, currents, wave, bridge clearance, and weather observations can ensure that a ship avoids a grounding, an accident, or serious weather hazards while in transit. These tools represent the next generation of the nation's navigation services, and they will serve as the foundation for the growth of the new Blue Economy while improving the safety, efficiency, and sustainability of the nation's marine transportation system.

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Coordinated and coherent integrated marine geospatial information management



Prof Vladan Babovic

Scientist

National University
of Singapore



www.nus.edu.sg/

Vladan is a leading scientist in the field of hydroinformatics where he has been spearheading research in artificial intelligence, machine learning and computer modeling of hydraulics and hydrological phenomena from 1990s. In more recent years, his work on real options pertaining to decision-making under deep uncertainties in climate-related domain is gaining wider recognition.

In addition to being a leading researcher and educator, Vladan is a scientist entrepreneur who secured research funding several applied and fundamental research organisations, as well as VC investments for several start-up companies.

Vladan is a Chartered Engineer and a Member of the Institution of Engineers (Singapore).

Honours & Awards

- Fellow, International Water Association
- Council Member, International Association for Hydro-Environmental Research and Engineering
- Albert Winsemius Award for entrepreneurship and scientific leadership
- Arthur Thomas Ippen Award, International Association for Hydro-Environmental Research and Engineering
- Talent Award, Danish Academy of Technical Sciences
- Jaroslav Cerni Award as the best Civil Engineering Graduate

Artificial Intelligence based real-time sea surface current quantification and dissemination framework

Accurate sea surface currents and water levels in the ship navigation channel are important components of port management and operation. Water levels in most coastal areas can be predicted based on tidal constituents derived using the harmonic analysis performed on historical water level measurements at a particular location. Such numerical models can also include the effect of physical forcing such as tide, surge and atmospheric-based (wind and air pressure), which play a major role in the hydrodynamic behavior in the sea. However, the modelled currents may not be of sufficient accuracy as there are limitations to numerical model such as resolution, accuracy of input data, limited measurement points for calibration, and missing (unknown) forcing.

Tapping on the developments in Artificial Intelligence, innovative ways can be used to quantify sea surface currents. This is particularly the case in sea waters where ships are required to broadcast Automatic Identification System (AIS) messages mandated by International Maritime Organisation (IMO) to report their position, speed, heading, etc. This represents a signal of opportunity for re-purposing existing resources - in this case AIS messages using AI to quantify the sea surface current of the area. Deterministic numerical models can then be blended with the AIS-derived currents to provide more accurate spatial currents hindcast and forecast in real-time.

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Prof Adam D. Switzer

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Adam D. Switzer holds concurrent positions as Assistant Dean (Development) at the College of Science, Nanyang Technological University, Director of Undergraduate Research Experience on Campus (URECA), Associate Professor at the Asian School of the Environment, and Principal Investigator at the Earth Observatory of Singapore (EOS). He is a broadly trained coastal geoscientist with BSc and PhD degrees from the University of Wollongong. Adam is an internationally recognized expert in coastal science, coastal hazards and coastal systems and his work aims to facilitate the development of safer and more sustainable coastal communities in Asia. He has been PI or Co-I on 18 grants in Singapore (worth >\$18.5M) and he has authorship on >100 peer-review publications. He is a founding editor of the Journal Communications Earth and Environment from Nature and he is passionate about science communication.

On the need for marine geospatial information for monitoring coastal hazards, sea level rise, or geomorphological processes.

Accurate marine geospatial information (MGI) is essential for monitoring and modelling coastal hazards, sea level rise, or geomorphological processes. Datasets on bathymetry and natural sea floor characteristics (e.g. rocky outcrops, seamounts, sediment characteristics) are a vital to modelling tides, storm surges, tsunamis and anomalous currents in the region. Beyond a basic need for detailed bathymetry, tide gauge data, coastal GPS station data and data on coastal currents are other MGI vital to the assessment of coastal hazards and sea level impacts. The availability of such datasets is spatially and temporally limited and for much of southeast Asia there remains an urgent need for updated MGI for assessing coastal risk in most major coastal cities in the region. For the purpose of investigating hazards and processes space the primary needs for marine geospatial information lay at either end of the depth spectrum. Coastal data are essential for studies of storm surge and tsunami inundation and for investigating the potential for changes in compound flooding associated with rising sea level and changing rainfall patterns. In the deeper ocean there is a clear need for improved bathymetry to assess the tsunami risk posed by subduction zone earthquakes, submarine landslides and volcanic seamounts. Today the need for MGI datasets has never been greater as growing coastal populations and the cities and infrastructure they rely on face the challenges of coastal and port management in a changing climate likely to exacerbate the effects of physical hazard posed by storms and tsunamis.

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Master Mariner Mr Jens Schröder-Fürstenberg

Head of Nautical
Information Service Division

Federal Maritime and
Hydrographic Agency (BSH),
Germany



BUNDESAMT FÜR
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UND
HYDROGRAPHIE

www.bsh.de

Jens Schröder-Fürstenberg is a Master Mariner who studied Navigation at the University of Rostock.

He sailed on bulk carrier and container feeder vessels and worked in ship operation and handling for many years.

He is working with the German Maritime and Hydrographic Agency (BSH) since 1999 and he is the Head of the Nautical Information Service Division.

Jens was Chairman of the IHO Nautical Information Provision Working Group for about 10 years.

Since 2003, he has been working as ECDIS basics instructor at the Maritime Education and Training Centre Warnemünde of University of Applied Sciences Wismar.

Mariners' Routeing Guides, marine geospatial information management applications in perfection

The International Hydrographic Organization (IHO) is responsible for defining standards to ensure the greatest possible uniformity of nautical information provision.

As a specific sea chart, the Mariners' Routeing Guide (MRG) contains geospatial information for selected sea areas around the globe characterised by complex routeing system, comprising several related routeing measures with lengthy special provisions and associated recommendations on navigation by vessels using the system.

Being an own IHO standard, the Mariners' Routeing Guide standard development considers various Geospatial Information System aspects and approaches. The potential content of a Mariners' Routeing Guide was assessed and categorised into Essential, Useful and Not Appropriate.

During the development of a routeing system in the Baltic Sea area between Kadetrenden and Bornholm, existing and planned geospatial infrastructure aspects were taken into account.

The routeing system is in force and has proven its worth.

The current publication method is paper. Several stakeholders established or tested a digital version. Taking the responsibility, the IHO is working to make a standardised digital provision possible.

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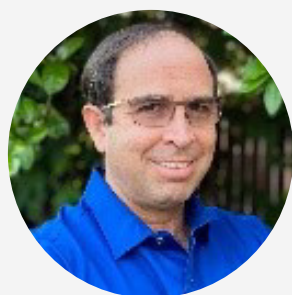
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Mr Rafael Ponce

Professional Services,
Principal Executive
Consultant – Maritime
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Rafael Ponce graduated from the Mexican Naval Academy, served 25 years in the Mexican Navy in different posts onboard destroyers, and other types of ships. His posts include Commanding Officer of a Hydrographic ship. He retired as a Captain. Mr. Ponce holds a Master of Science degree from the University of Southern Mississippi and is a category A hydrographer. He was the deputy director of the Mexican Hydrographic Office and represented Mexico at IHO committees and working groups and was candidate to IHO Director in 2017. Mr. Ponce has worked for Esri since 2007 and is the principal maritime consultant and maritime practice lead.

Marine Data Sharing and Collaboration: The keys for a successful Hydrospatial Strategy Implementation

The speed and vast amount of data being collected by many organizations, make challenging the efficient coordination among agencies and the consolidation of these data into accessible and useful information. The Integrated Geospatial Information Framework, developed by the UN and the World Bank, provides governments nine strategic pathways for creating an integrated geospatial infrastructure. But investing in an integrated infrastructure to support the collection, management, analysis and sharing, that converts these abundant data resources into valuable information, requires organizations to focus on three main activities: 1) the development of an integrated and interoperable geospatial technology, 2) the development of focused programs and partnerships and 3) the resources to support user success. Tools for creating this infrastructure already exist and are broadly refer to as geospatial technology. Sharing authoritative content is the government's responsibility, and the combination of data governance with the appropriate geospatial technology is essential. This presentation will focus on the best practices for establishing efficient data sharing and collaboration among the different contributors and stakeholders of the MSDI that enable the best use of their wealth of data.

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