PRO- 2.4 PROPOSAL TO ESTABLISH A JOINT IHO-SINGAPORE INNOVATION AND TECHNOLOGY LABORATORY

Submitted by: Singapore & United States of America

Supported by: Brazil, Canada, Denmark, France, Germany, Indonesia, Italy, Malaysia, Netherlands, Norway, Portugal, South Africa, Spain, United Kingdom and Uruguay.

PROPOSAL

Noting the endorsement by the Council, the Assembly is invited:

- to approve the proposal to establish an IHO innovation and technology laboratory in Singapore to coordinate and testbed initiatives.

EXPLANATORY NOTE

1. At the 3rd Council Meeting, Singapore introduced its proposal to set up, host and finance an IHO innovation and technology laboratory. The proposed laboratory would facilitate research or investigative projects and/or test-bedding in the field on behalf of Member States, IHO bodies or other stakeholders; create knowledge for standard-setting; and promote a multidisciplinary, collaborative environment under the guidance of a governing board chaired by the IHO Secretary-General or his representative and including representatives of Member States. The cost of the required workspace and human resources, estimated at US$ 163,000 per annum, would be borne entirely by Singapore.

2. The Council acknowledging that it could fill a gap in long-term planning and innovation, which is often difficult for national hydrographic offices overwhelmed by immediate demands. The Council directed Singapore to provide more details of the proposed governance structure for the new laboratory, expressing concerns about its relationship with HSSC and the regional ENC coordinating centres (RENCs), and the potential involvement of academia and the private sector.

3. The Secretary-General noted that the laboratory might be placed in a new governance structure, called the “IHO Technology and Innovation Network” or similar, with two other subsidiary bodies with an unconventional status, namely the Data Centre for Digital Bathymetry (DCDB), and the IHO Geospatial Information Registry, which both were governed by a Memorandum of Understanding. IHO’s role would be to coordinate the work of the laboratory with that of other IHO bodies, for instance through the Chair of HSSC.

4. The laboratory would provide an opportunity to direct the work of the private sector towards the strategic goals of IHO, potentially under the guidance of a Governing Body comprising an IHO Director, chairs of the HSSC and IRCC and nominated members.

5. The Council recognized the need to accelerate innovation in our fields of endeavour and supported the principles for the establishment of an IHO Innovation & Technology Lab noting that innovation & technology should therefore also be reflected in the proposed Revised Strategic Plan.

6. With guidance provided by the Council, Singapore with the assistance from volunteer drafters from the Council is submitting the proposal, including terms of reference, a draft implementation plan and on governance for the Assembly’s consideration and approval.

Annex to PRO 2.4

For Discussion and Approval

PROPOSAL TO ESTABLISH A JOINT IHO-SINGAPORE INNOVATION AND TECHNOLOGY LABORATORY

Submitted by: Singapore and the United States of America.

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RATIONALE FOR AN IHO INNOVATION AND TECHNOLOGY LABORATORY

1. There is a critical need to coordinate international efforts to develop and harness emerging hydrographic-related technologies that support safe maritime navigation and protection of the marine environment, As the world stands at an interesting crossroad of technological exploration and exploitation, the IHO as a technical standardisation body is confronted with the challenge to harness the rapidly evolving technologies. These, in turn, will drive the ever accelerating transformation processes on the roles and services of Member States hydrographic offices. It is timely that the IHO examines ways for a faster transition of knowledge into the standardization process and – in turn - accelerated application of the resulting new standards to enable extended use of hydrographic products and services. This strategy of closer linkage of the standardization process with emerging technical solutions is seen as a more efficient way to deliver extended benefits on hydrographic aspects to users and society in navigational and non-navigational areas.

2. Presently, most of the investigative work involving proposals on new standards or specification for products and services of the IHO rests on the goodwill of IHO Member States and/or industry stakeholders. This arrangement is increasingly under pressure as IHO Member States and stakeholders are faced with increasing constraints in terms of manpower and funding support. We need to find a more sustainable solution of consolidating our efforts and optimizing our collective resources. At the same time, consideration should be given on how we can contribute towards addressing the growing concern on global climate change and sustainable development.

3. The lab will focus on 4 critical questions facing the IHO community:

   a. How do we identify and keep pace with rapidly-evolving technologies that will impact on the hydrographic community?

   b. How can we develop these technologies into products and services that will meet and support the present and future needs of users and society?

   c. How can we contribute to and effectively support the United Nations Decade of Ocean Science and Sustainable Development Goal 14 – Conserve and sustainably use the oceans and sea and marine resources for sustainable development? and

   d. How can we support IHO initiatives such as the use of crowdsourced bathymetry for charting purposes in areas where information is scarce or outdated?

4. Establishing an “IHO Innovation and Technology Laboratory” (IHO Lab) would be a good way to take advantage of this limited window of opportunity to move forward in finding the answers to some of these questions.

OBJECTIVE AND SCOPE

5. The mission of IHO is to create a global environment in which Member States provide adequate and timely hydrographic data, products and services to ensure the widest possible use.

6. The IHO Vision is to be the authoritative worldwide hydrographic body which actively engages all coastal and interested States to advance maritime safety and efficiency and which supports the protection and sustainable use of the marine environment.

7. Towards achieving this end, the proposed IHO Lab would have the following objectives:

   a. Facilitate the conduct of innovative or investigative projects in the laboratory and/or test bedding in the field proposed by IHO Member State(s), IHO organs, or other stakeholders.

   b. Enable knowledge creation and foster collaboration to evaluate specifications of global standard setting within the scope of IHO standardization activities at the request of e.g. IHO Member State(s) in order to explore their faster transition, application and development of technologies enhancing safety at sea; and

   c. Foster a multidisciplinary and collaborative environment for investigators such as technical experts, scientists, engineers and user communities to interact learn and promote new solutions and technologies, including collaboration and cooperation with other international organizations research and development bodies active in the maritime domain under the guidance of a Governing Board.

RATIONALE FOR THE LABORATORY TO BE BRANDED UNDER THE IHO FLAG

8. The IHO represents the global hydrographic community, including stakeholders from the industry, institutions of higher learning, scientists and user communities as:

   a. The IHO Lab would fill the gap by moving from a local perspective to a more coordinated international approach, particularly on technical issues. This proposal offers the opportunity for Hydrographic Offices, Regional ENC Coordinating Centres (RENCs) and industry stakeholders to be in an environment to consolidate and collaborate on respective efforts. The results of the effort would then be shared freely to further enhance global navigational safety as the IHO Lab is not a business incubator. The IHO Lab will not hold or claim intellectual property rights and all intellectual property that may be generated would be in the public domain;

   b. An IHO Lab would create a space where the interrelated issues relevant to specifications, data producers, equipment manufacturers, and end users can be addressed in a comprehensive manner;

   c. The Lab would promise to be more appealing to potential International Funding Organizations, including other interested parties either with commercial or research interests to provide funding and in-kind support. This initiative would be viewed to have greater impact and benefit to a larger IHO community and societies rather than an individual member State or region;

d. It would ensure better continuity and sustainability for longer term projects such as the next- generation ENCs and use of distributed ledger technology (DLT) to augment hydrographic and cartographic processes. This is in order to keep pace with the rapidly evolving technologies and data standards; and

e. It would provide consolidation of resources and efforts to accelerate testing and better utilisation of limited funds, which can be channelled to other useful projects.

IHO LAB STRUCTURE AND COMPOSITION

9. In order to provide leadership and set direction for the IHO Lab, it will be managed by a General Manager and overseen by a Governing Board. The Governing Board will be composed of the IHO Director in-charge of the IHO Work Programme II, the Chair of the Hydrographic Services and Standards Committee (HSSC), the Chair of the Inter-Regional Coordination Committee (IRCC) and up to three (3) representatives with administrative and/or technical expertise nominated by the host country Singapore. Chairmanship of the Governing Board should be for two years and rotate between the IHO office bearers and the host Country.

10. The Governing Board will endorse the host country´s proposal for the post of the Lab General Manager. The General Manager maintains an annual Lab Work Plan based on mutual consent to be endorsed by the Governing Board.

11. The Chair of the Governing Board assisted by the General Manager reports to the IHO Council annually on the Lab Work Plan, activities and outcomes.

12. The IHO Council advises the Lab on themes and projects regarded as supportive to the IHO Work Programme.

13. Singapore would provide the administrative support to the Governing Board.

14. The proposed Governing Board Structure and the Terms of Reference are shown in the **Appendices 1 and 2**, respectively.

POTENTIAL INNOVATION AND TECHNOLOGY PROJECTS

R&D Areas	**Potential Projects**	**Potential Partners**
S100 Products and Specifications	Test bedding in the Singapore and Malacca Straits the following S-100 products: S-101 – Electronic Navigational Chart (ENC) S-102 – Bathymetric Surface S-104 – Water Level Information for Surface Navigation S-111 – Surface Currents S-122 – Marine Protected Areas S-123 – Marine Radio Services S-124 – Navigational Warnings S-129 – Under Kiel Clearance Management	• Indonesia • Malaysia • Singapore • Rep of Korea Other IHO member states • RENCs • Industry Stakeholders e.g. OEMs and others tbd

	Use of distributed ledger technology (DLT) to augment hydrographic and cartographic processes. This is in order to keep pace with the rapidly evolving technologies and data standards.	• IHO Member State(s) • Industry Stakeholders *others tbd
	Test bedding a dual fuel hybrid ECDIS with capabilities of displaying S57 & S101 in support of IHO's roll out implementation plan for the S-100 products and services.* *to work closely with the IMO and other certification authorities to ensure compliance with safety standards.	IHO Member State(s) • Industry Stakeholders *others tbd
Smart ENCs	• Development of next generation of "Smart ENCs", we could explore how machine-readable data could be used in promoting E-Navigation and testing of autonomous shipping in a high vessel density traffic area. • Test bedding of integrated ENC and topographic details that could be used for positioning. This would complement the global navigation satellite positioning systems which would be under the purview of the HSSC.	• IHO Member State(s) • IMO • IALA • UN-GGIM WG on MGI and OGC *others tbd
Marine Spatial Database Infrastructure (MSDI)	• Explore the use of artificial intelligence (AI) to assist in ensuring and improving processing of hydrographic data to ascertain, for example, survey quality and intervals between the conduct of hydrographic surveys. • Monitor and support the United Nations Sustainable Development Goal 14 - Conserve and sustainably use the oceans and sea and marine resources for sustainable development.	• IHO Member State(s) and MSDI WG. • Industry stakeholders Others tbd
Autonomous Shipping	Autonomous Shipping Readiness- with a potential project on testing and refining hydrographic services to support IMO Maritime Autonomous Surface Ships (MASS) implementation.	• IHO Member State(s). • IMO, IALA and other international bodies

RISKS ANALYSIS

15. Financial risk is generally low as the IHO Lab will be funded by the government of Singapore.

16. Funding of each project would be usually for a short fixed period either through financial or in-kind contributions.

INDUSTRY PARTNERS

17. The IHO maintains close relationships with Original Equipment Manufacturers (OEMs) and it is important to continue maintaining and enhancing it going forward as they are in the forefront of the technological changes and have access to shipboard navigational systems.

18. There is also a need to consider further cultivating closer cooperation with other industry partners such as the Classification Societies as they are responsible for type approval of navigational equipment required by the International Maritime Organisation (IMO).

TIMELINES AND EXPECTED KEY OUTCOMES

Timeline

19. The IHO Lab is proposed to operate with a 2 x 5-years life span with a mid-term review in 2023. At the end of the 1st 5-years in 2025, the HSSC would review the status of the IHO Lab and recommend to the 4th IHO Assembly in 2026 whether to continue the IHO Lab initiative.

Expected Key Outcomes

20. Better coordinated effort to facilitate the conduct of innovative or investigative projects in the laboratory and/or test bedding across the hydrographic community.

21. Sharing of knowledge creation and foster collaboration to evaluate specifications of global standard-setting to enable faster transition to new technologies enhancing safety at sea.

22. Achieving higher recognition from International Organisations such as World Bank for funding of projects.

23. Further enhancing the international standing of the IHO for our contributions towards safety of navigation and the protection of the marine environment, including the support for the United Nations Sustainable Development Goal 14, using our comprehensive global marine database.

TEN-YEAR BUDGET

24. There will be no additional expenditure required from the IHO. The government of Singapore would be providing the workspace and manpower costs estimated at US$163,000 annually for a period of 10 years to host the IHO Lab and its operations. However, a mid-term review to evaluate the effectiveness of the IHO Lab would be undertaken.

PROMOTIONAL AND IMPLEMENTATION PLAN

25. The government of Singapore would like to offer and stand ready to host IHO Lab for the following reasons:

a. The Straits of Malacca and Singapore is one of the world's busiest Straits used for International Navigation with an advanced Vessel Traffic System that can handle more than 10,000 vessels;

b. Easy access in terms of excellent communications infrastructure for telecommunications and transportation;

c. With the recently established Living Lab for E-Navigation in Singapore, there is opportunity to facilitate system integration between ship and shore and vice versa through e.g. the sharing and use of common data standards and information such as the S-100 products and specifications; and

d. About 600 shipping lines based in Singapore and they could be sought to participate in potential projects. This number excludes Ship Management Companies, Classification Societies and OEMs from the marine industry.

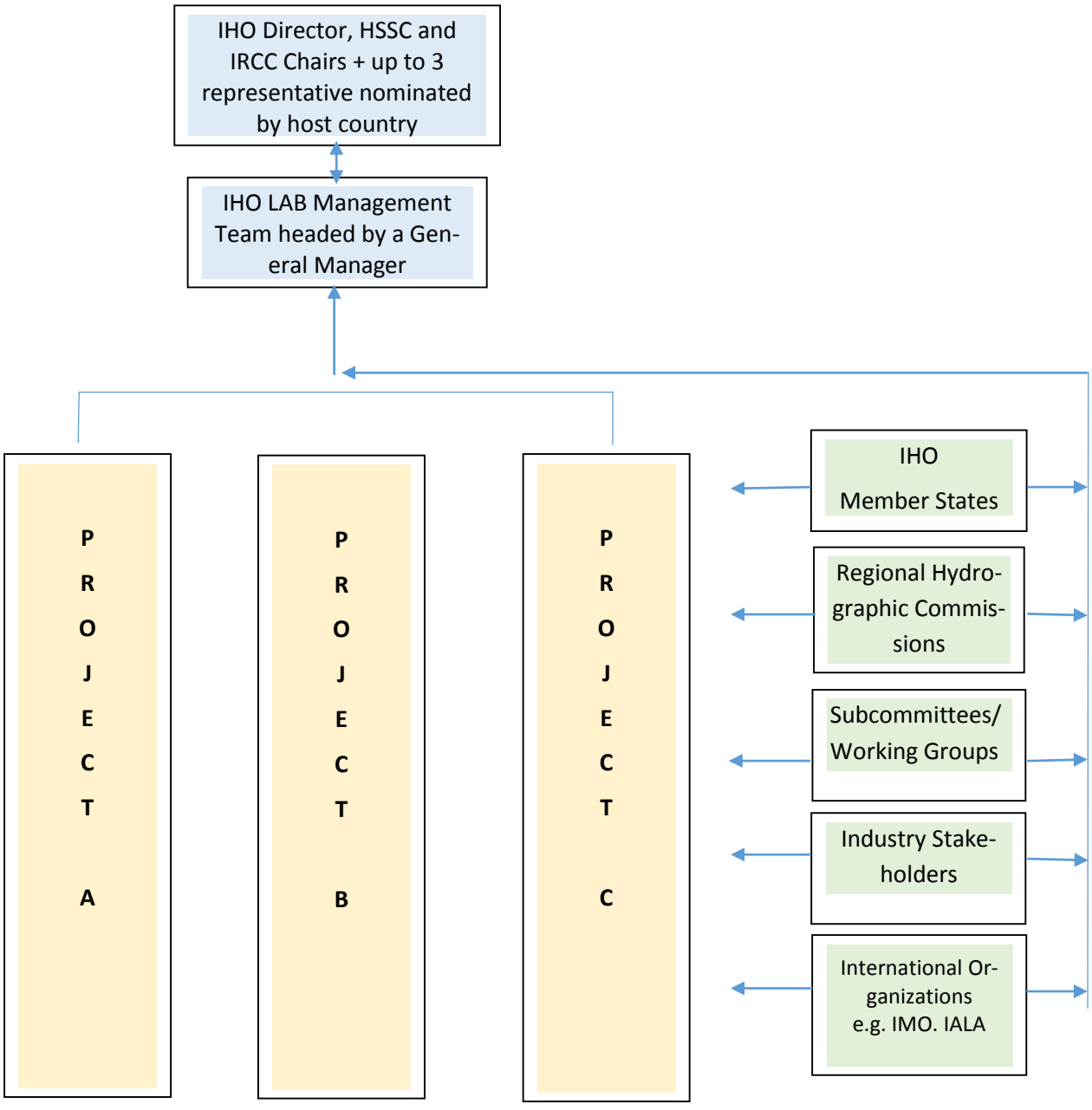
26. The proposed IHO Lab would be fully funded by the government of Singapore and there would be no cost implication on the IHO. To kick off the IHO Lab, the government of Singapore would also be willing to consider contributing seed money for collaborative joint research and development or investigative work. For a start, it is also proposed that the IHO Lab operates for a term of 10 years and review be made at mid-term and before the end of the term.

27. Member State(s) or stakeholder(s) are welcomed to jointly conduct or jointly fund the projects, subject to the approval by the Governing Board. The framework for the operational component of the processes related to the proposal needs to be further worked out.

APPENDIX 1 to ANNEX PRO 2.4

GOVERNANCE STRUCTURE

Proposed Governance Board Structure



APPENDIX 2 to ANNEX to PRO 2.4

TERMS OF REFERENCE FOR GOVERNING BOARD AND MANAGEMENT TEAM OF THE IHO INNOVATION AND TECHNOLOGY LABORATORY

IHO Director and Chairs of HSSC and IRCC:

a. Setting strategic directions of the IHO Lab;
b. Endorsing IHO Lab" annual work plans, budgets, projects and initiatives;
c. Overseeing IHO Lab's innovation and technology project(s) milestones, progress and outcomes; and
d. Submitting Annual Report and Recommendations to the IHO Council.

General Manager, IHO Lab

Reviewing the proposed work plans;

a. Monitoring IHO Lab's project activities, progress and outputs; and
b. Managing the technical reviews of IHO Lab's projects and new proposals.
c. Proposing and executing IHO Lab's work plans;
d. Managing IHO Lab's operations and project activities;
e. Driving IHO Lab's to deliver outcomes;
f. Attending HSSC and IRCC meetings to update on the IHO Lab's project activities, progress and outputs; and
g. Where appropriate, to attend RHC meetings to share activities and knowledge with IHO Member States.