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**PROJECT APPLICATION GUIDELINES AND FORM**

**Relating to**

**IHO - SINGAPORE INNOVATION AND TECHNOLOGY LABORATORY**

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## **APPLICATION GUIDELINES FOR PROJECT PROPOSAL UNDER THE IHO – SINGAPORE INNOVATION AND TECHNOLOGY LABORATORY**

### 1. SCOPE

The collaboration between the International Hydrographic Organisation (IHO) and Singapore to establish the IHO-Singapore Innovation & Technology Laboratory (IHO Lab) is to encourage Member States, including stakeholders, to jointly undertake Innovative testbedding, or proof-of-concept, related to Hydrography. The IHO Lab would also be a registry of projects in order to avoid duplication of effort and optimise the use of resources. The project application guidelines and form, including the registration of the project, appear as **Annex A and B**, respectively.

Projects could either be self-funded by collaborating partners or, where available, some funding support provided by the IHO Lab.

### 2. QUALIFYING ORGANISATIONS

Participating parties undertaking the projects under the IHO Lab have to be :

- IHO Member States;
- IHO with other International Organisations; or
- Stakeholders in partnership with an IHO Member State(s).

### 3. CO-FUNDING

Where available, the IHO Lab may co-fund up to 50% of the total qualifying project costs comprising manpower and equipment, either engaged or acquired for the purposes of the project, and other operating expenditure incurred for the purposes of the project.

Though the total project costs could include the cost of existing staff, equipment and use of the qualifying organisation's Intellectual Property (IP), the funding generally may not cover such costs. If, however, the project is undertaken mainly by the qualifying organisation's research, technology development and engineering staff, the co-funding of the staff directly involved in the project could be considered on a case-by-case basis. Nevertheless, the decision of IHO Lab Governing Board on the qualifying project cost items shall be final.

### 4. DISBURSEMENT

If approved, the funds will be disbursed on a reimbursement basis at six-monthly intervals or upon successful completion of the project, if earlier, and in accordance with the Terms of Funding (Schedule B).

### 5. TECHNOLOGY PROFILING

The project may be selected for profiling in IHO-sponsored publications, or be showcased at conferences, exhibitions or other publicity efforts organised by IHO or its member States. Any project profiling shall be subject to parties' mutual agreement, and will not compromise the applicant's IPR filing process, if any.

6. APPLICATION AND APPROVAL

To apply for funding support by the IHO Lab Fund, please:

- a. mail the duly completed Application Form set out in Annex A and the signed project proposal and supporting documents, to the following address:

General Manager  
IHO-Singapore Innovation and Technology Laboratory; or

- b. email a softcopy of all of the items described in sub-paragraph (a) above, to the IHO Lab mailbox at IHO\_Lab@.org copying the General Manager in charge.

IHO Lab reserves the right to reject any application in the event of failure of the Applicant to fulfil any of the eligibility criteria. If approved, the IHO will notify the Applicant by way of a Letter of Offer. If rejected, IHO Lab will also notify the Applicant.

7. SUPPORTING DOCUMENTS TO BE SUBMITTED

Applicant(s) to fulfil and provide:

- a. Signed Letter of Collaboration from all project partners, the letter should include description of each collaborators' roles and contribution towards the project; and
- b. For commercial stakeholder to provide latest Organisation's business profile dated not more than 6 months from the date of application submission.

**Project title:** S-131 Marine Harbour Infrastructure Database Project

**Project description:** The S-131 Marine Harbour Infrastructure Database Project aims to create a S-131 database and infrastructure that will improve the information exchange between harbours and hydrographic offices (HOs) by acting as a neutral repository of harbour information.

A Graphical User Interface (GUI) will be created to help harbours enter their data easily. An Application Programming Interface (API) will also be created to help HOs retrieve the data by connecting their GIS systems directly to the database. The access for data upload and download will be federated.

This effort is to help the exchange of information between harbours, HOs and mariners compliant with the S-101 and S-131 standards and IMO BLU CODE.

**Summary of project objectives:**

- **Create a S-131 database infrastructure and a database** that will improve the information exchange between harbours and hydrographic offices by acting as a neutral repository of harbour information.
- **Support the creation of S-131 (and S-101) products** that help ports and shipping to be compliant with:
  - IMO A.893(21): safe berth to berth navigation
  - IMO A.862(20): recommended contents of port information books (BLU Code)

Demonstrating that Hydrographic Offices and Port Authorities have worked together to discharge their collective SOLAS responsibilities as per Chapter V Regulation 9.

To that end support exchange of:

- Port infrastructure for Nautical Charts and Sailing Directions
  - Port depths for Nautical Charts
  - Port information for Sailing Directions
- **Facilitate the exchange of information between harbours, HOs and port users (e.g., mariners, shipping lines, trading floors)** compliant with the S-101 and S-131 standards

**Summary of project deliverables:**

- **Operational S-131 database and infrastructure** that is compatible with S-101
- **A physical implementation of the database suitable for access by contributors and participants**
- **A Graphical User Interface (GUI)** that permit the source originators, such as harbour masters, to easily input and validate information, in a secure mode, while also allowing authorised hydrographic offices to review and extract needed information suitable for their products which are to be made available to end-users, the mariners.
- **Create an Application Programming Interface (API)** to simplify and expedite the information flow between harbours that have a GIS system in place and authorised hydrographic offices by connecting their GIS systems and extract information. The API should be based on open API standards, for example, OGC API Features.
- **Documentation** which include details about the management and configuration of the database, GUI and API sufficient for database operator

- **Documentation** for all system users and administrators

#### **Practical relevance to Hydrographic Community/Industry:**

##### Challenges with nautical data use:

- **Port Infrastructure in Nautical Charts.**  
Masters are obliged to navigate berth to berth by using official Nautical Charts and Sailing Directions to fulfil SOLAS carriage requirements. This is however a challenging undertaking if the terminal, berth and/or berth position is not displayed on the nautical chart, or if the information differs between, for instance, the Nautical Chart and the Sailing Directions. Shipping lines have requested to improve quality and availability of nautical port information.
- **Port depths in Nautical Charts.**  
Masters often experience difficulties when optimizing the deadweight of the vessel and applying a safe Under Keel Clearance if local depths are different from those illustrated on the Nautical Chart, or if the Under Keel Clearance definitions differ.
- **Port information in Sailing Directions.**  
Voyage planning becomes more difficult if local Port Information Publications differ from the local Sailing Directions.

##### Challenges for Hydrographic Offices:

- Official Nautical Charts and Sailing Directions are issued by, or on the authority of, a Government authorized Hydrographic Office (HO), or other relevant government institution. Most HO's act in accordance with the IHO recommendation to distribute ENC's through a controlled process of validation and distribution through RENC and VAR's. Taking also into account an external dependency on the update mechanism on board, the time between actual measurement or sounding and chart update on board a ship today may typically be about 4 weeks.
- Hydrographic Offices (HO's) of the IHO Nautical Information Provision Work Group experience a lack of data availability and consistency of port authorities, resulting in HOs being unwilling to publish port infrastructure data in their charts and publications as they cannot guarantee the accuracy of the data.
- If ports share their latest soundings, the amount of data may be too much for the Hydrographic Office to handle.

##### Challenges for Port Authorities

- Ports publish unofficial Nautical Charts and Sailing Directions to share data that changes more frequently than the update frequency of official Nautical Charts and Sailing Directions (e.g. updates of soundings if ports are affected by siltation) and/or to answer questions from multiple publishers of port information.
- Ports face difficulties when gathering data from all data owners in the port; as the port authority is not data owner of all port data (e.g, terminals may be the data owner of the soundings of the berthing pocket).

The Marine Harbour Infrastructure database will be an IHO-operated database to collect harbour information in a form compatible with S-101 and S-131 as developed by NIPWG. Given that the IHO is an intergovernmental organisation, hosting such a database by the IHO Secretariat could help to build up a trusted environment where harbour authorities know where their data is being stored, **and that it is held securely**. The data entered would be S-101 and S-131 compliant and so harbours will not be requested to become familiar with the technical details S-100 or S-131

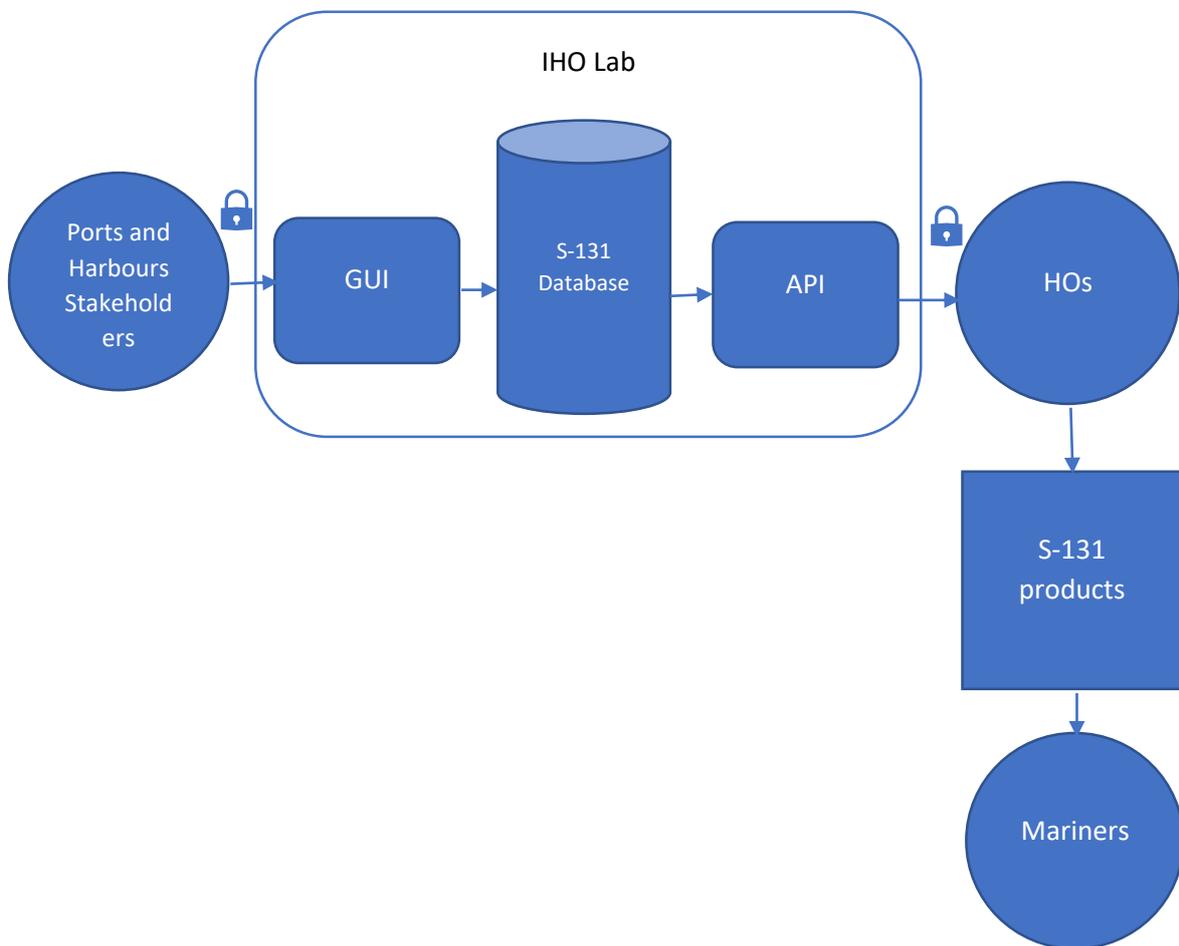
encoding. HOs can use the extracted S-131 compliant data to then implement them more easily into their own S-100 based production platforms.

Marine Harbour Infrastructure database will facilitate the information exchange between harbours and HOs. The database content will be S-101 and S-131 compliant and will contribute to allow ports and shipping to be compliant with the relevant IMO resolutions:

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Demonstrating that Hydrographic Offices and Port Authorities have worked together to discharge their collective SOLAS responsibilities as per Chapter V Regulation 9.

The technology developed should be free from proprietary restrictions, open and adaptable and made available free for HO's to implement in their own country.



**Project team** (Please include details of all team members in Appendix 1)

**IHO Lab**

First 3 years hosting of server and technical support, before transferred to IHO secretariate

**Project governance:**

Louis Maltais, Director, Navigation Geospatial Services and Support, Canadian Hydrographic Service

**Team leader:**

Shwu-Jing Chang, Professor & Director, National Taiwan Ocean University | NTOU · Department of Communications, Navigation and Control Engineering, NIPWG member

**Technical development leader:**

Jonathan Pritchard, Senior Technical Manager at IIC Technologies, NIPWG member

**Programmers:** junior programmers provided by National Taiwan Ocean University (NTOU)

**Team members:**

Raphael Malyankar, LLC Member/Manager, Portolan Sciences LLC, NIPWG member

- IHO input, Data model questions (advisor)

Matilde Skjæveland Skår, Senior engineer at Norwegian Hydrographic Office, Kartverket - Norwegian Mapping Authority, NIPWG member

- IHO input, Source consumer advisory role

Charline Giffard, Sailing Directions Officer, Canadian Hydrographic Service, NIPWG member

- IHO input, Source consumer advisory role

**Applicant(s) information:**

Eivind Mong, Canadian Coast Guard, NIPWG Chair

Charline Giffard, Canadian Hydrographic Service, NIPWG member

Stefan Engström, Traficom, NIPWG Vice-chair

Laura Hall-King, UKHO, NIPWG Secretary

**Collaborators information:**

Volunteer ports (to be identified) and HOs for testing phase

**Project schedule** (Please provide project schedule in Appendix 2):

Design and development database infrastructure: 3 months

Design and implement API interface: 3 months

Design and implement workflow and GUI: 3 months

Testing and pilot phase: 3 months

Beta mode operation with programming support: 2 years

**Summary of project cost** (Please provide detailed breakdown of budget estimates and description of costs in Appendix 3)

Design and development database infrastructure  
 Design and implementation of API  
 Design and implementation of GUI  
 Documentation of operating and training manuals for port and HOs  
 Implementation and testing coordination and support for ports and HOs  
 Updating S-131 with observations from the project  
 Project documentation

| Project items               | Project costs   | Funding support required |
|-----------------------------|---|--------------------------|
| Manpower                    | 1 project lead and 2 programmers (±€40K funded by NTOU)               | In-kind                  |
|                             | 1 architect/Lead developer<br>1 programmer/developer                  | €70K                     |
|                             | Documentation of operating and training manuals for port and HOs      | €10K                     |
|                             | Implementation and testing coordination and support for ports and HOs | €40K                     |
|                             | S-131 updates   | €10K                     |
|                             | Project documentation   | €10K                     |
| Equipment                   | Hosting server, backup and maintenance (probably cloud based)         | €14K                     |
| Other operating expenditure | IT support  | €10K                     |
| <b>Total costs</b>          |   | <b>€164K</b>             |

**Other source of funding** (Have you attempted, applied for or obtained any other form of incentives/funding for this project or any similar project)

- **Canada** via **Canadian Hydrographic Service** is willing to contribute **€70K** per year for the first 2 years in this 3 year project
- **NTOU** is contributing in human resources and expertise with **Shwu-Jing Chang** as project lead and 2 programmers (equivalent to ±€40K per year for 2 years)

**Do you require a Workspace at IHO Lab? If so please provide:**

Work area needed (m<sup>3</sup>):

- space for the hosting server (physical or virtual)
- 2 to 3 desk office spaces

Other requirements:

IT support on call during development phase and testing and deployment phases. Possibility to working remote.

**Declaration by applicants:**

We the Applicants hereby declare that the information provided in this Application form, including the supporting documents attached hereto, are true and correct. We have read and understood the terms set out herein, including the Terms of Funding and we agree to be bound thereby.

**Name of Applicant:**

NIPWG - NAUTICAL INFORMATION PROVISION WORKING GROUP

Eivind Mong, Canadian Coast Guard, NIPWG Chair

Charline Giffard, Canadian Hydrographic Service, NIPWG member

Stefan Engström, Project manager at Traficom, NIPWG vice chair

Laura Hall-King, Maritime Advisor – Sailing Directions/Geographic Technical Lead, UKHO, NIPWG secretary

**Date:**

**Engagement of Contributor:**

Canadian Hydrographic Service

National Taiwan Ocean University

## REGISTRATION OF PROJECT AT IHO LAB

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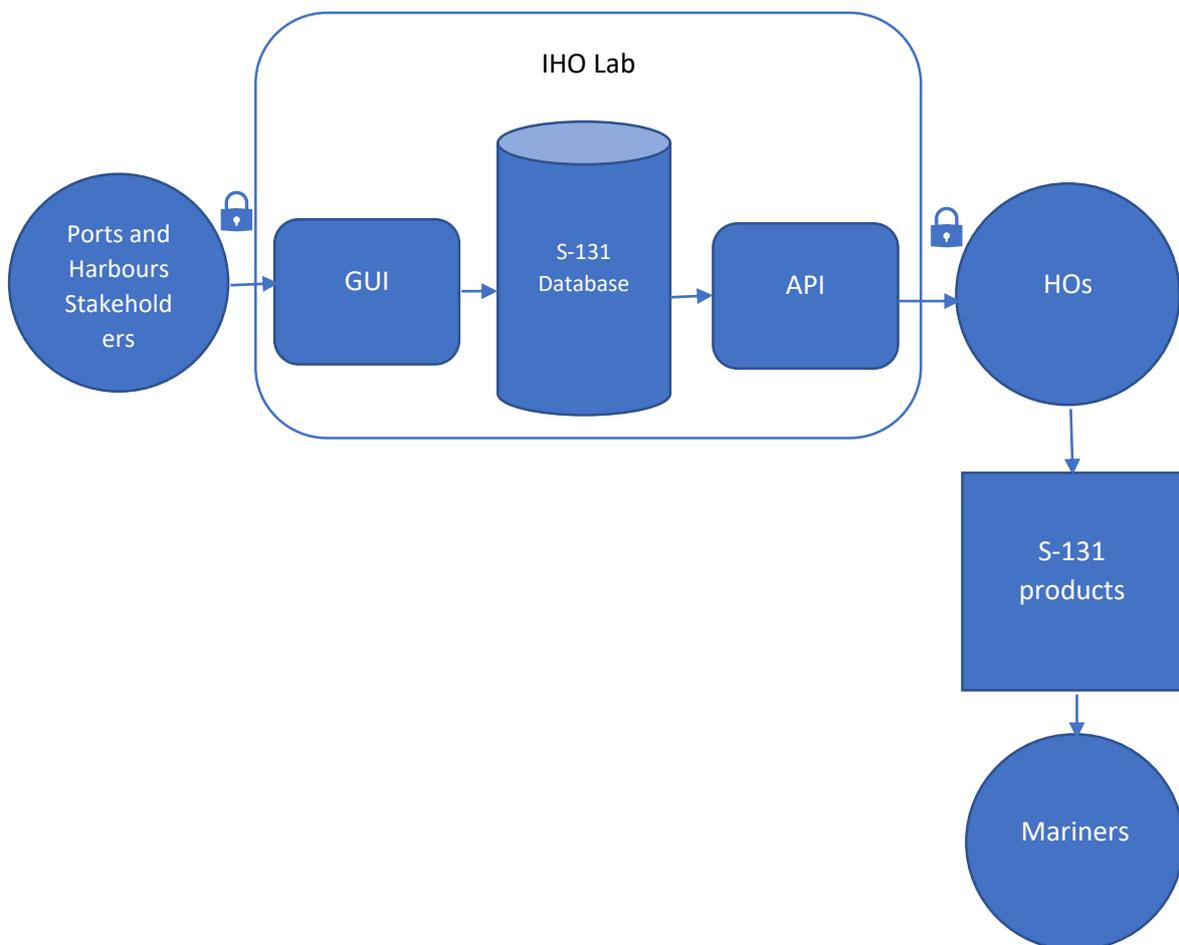
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Documentation of operating and training manuals for port and HOs

Implementation and testing coordination and support for ports and HOs

Updating S-131 with observations from the project

Project documentation

**PROJECT TEAM LEADER AND MEMBERS**

Please provide the following details below:

- A) Name
- B) Designation
- C) Education / Professional Qualifications
- D) Department
- E) Organisation
- F) Postal Address
- G) Tel No.
- H) Email Address

Please provide details of Research, Scientists and Engineers (RSEs) participating in the project, indicate the Names, whether Existing/New hire.

**NTOU (ENC Centre) PROJECT TEAM LEADER**

|    |   |   |
|----|---|---|
| A) | Name                                    | SHWU-JING CHANG   |
| B) | Designation                             | Distinguished Professor<br>(Director of ENC Centre, NTOU /<br>Technology Director of Taiwan ENC Center) |
| C) | Education / Professional Qualifications | Ph.D. in Electronics Engineering  |
| D) | Department                              | Dept. of Communications, Navigation and<br>Control Engineering  |
| E) | Organisation                            | National Taiwan Ocean University  |
| F) | Postal Address                          | 2, Pei-Ning Rd., Keelung, 20224 Taiwan  |
| G) | Tel No.                                 | +886-930310620  |
| H) | Email Address                           | sjchang@email.ntou.edu.tw   |

**Research Engineers participating in the project from ENC Centre, NTOU**

Shih-Ming CHANG and Yong-Jiang WU

They are both "Mater in Communications, Navigation and Control Engineering" and have more than 5 years working experience in application software development. They are both quite experienced in developing web-based application systems. Some of the applications developed have functionalities similar to those required in this S-131 project.

**Incentive/Funding/Similar project**

One of the projects ongoing in ENC Centre (NTOU) is in cooperation with Taiwan ENC Centre under the Ministry of the Interior (MOI), thus funded by the MOI. This is the 2nd year of a 4-year project focusing on S-100 data production, technology development, cooperation and infrastructure building. Participation of NTOU in this S-131 project matches NTOU's existing research plan, therefore could be mostly self-funded.

## PROJECT TEAM AND MEMBERS

### Norwegian Hydrographic Office

|    |   |   |
|----|---|---|
| A) | Name                                    | Matilde Skjæveland Skår   |
| B) | Designation                             | Senior engineer responsible for supervision and facilitation.<br>Project leader for the Norwegian port data Product specification |
| C) | Education / Professional Qualifications | Master in geography   |
| D) | Department                              | Department of supervision and facilitation  |
| E) | Organisation                            | Norwegian Hydrographic Office, Kartverket - Norwegian Mapping Authority   |
| F) | Postal Address                          | Professor Olav Hanssens vei 10, 4021 Stavanger, Norway  |
| G) | Tel No.                                 | +47 47859667  |
| H) | Email Address                           | Matilde.skar@kartverket.no  |

### LLC Member/Manager

|    |   |   |
|----|---|---|
| A) | Name                                    | Raphael Malyankar                           |
| B) | Designation                             | LLC Member/Manager                          |
| C) | Education / Professional Qualifications | Ph.D. (Computer Science)                    |
| D) | Department                              |   |
| E) | Organisation                            | Portolan Sciences LLC                       |
| F) | Postal Address                          | 995 E Baseline Rd #2146 Tempe AZ 85283, USA |
| G) | Tel No.                                 | +1.480.491.3997                             |
| H) | Email Address                           | raphaelm@portolansciences.com               |

Raphael Malyankar is the current developer of the S-131 Edition 1.0.0 Product Specification. He has experience in software architecture and design, GML, XML authoring and publishing frameworks, interface design, databases, and information modelling. He has work experience in both industry and academic research.

### Canadian Hydrographic Service

|    |   |  |
|----|---|--|
| A) | Name                                    | Charline Giffard   |
| B) | Designation                             | Senior hydrographer, Sailing Directions Officer, Chair of National Canadian SDWG |
| C) | Education / Professional Qualifications | Geographer   |
| D) | Department                              | Sailing Directions   |
| E) | Organisation                            | Canadian Hydrographic Service  |
| F) | Postal Address                          | 850, route de la Mer, C.P. 1000, Mont-Joli, QC, G5H 3Z4                          |
| G) | Tel No.                                 | 418-775-0505   |
| H) | Email Address                           | Charline.Giffard@dfo-mpo.gc.ca   |

**PROJECT SCHEDULE**

Please provide details on the following:

A) Detailed project work plan

Design database infrastructure: 3 months

Design GUI: 3 months

Design API: 3 months

Testing phase: 3 months

Operate in a beta mode with programming support: 2 years

B) Overview in Gantt Chart format

(Applicant May Submit a Separate Attachment for the Gantt Chart)

|   | Year 1 Q1 | Year 1 Q2 | Year 1 Q3 | Year 1 Q4 | Year 2 | Year 2 | Year 3 | Year 3 | Parties Involved   |
|---|-----------|-----------|-----------|-----------|--------|--------|--------|--------|--|
| Design database infrastructure                  |           |           |           |           |        |        |        |        | <ul style="list-style-type: none"> <li>Development team plus advisors</li> </ul>           |
| Design API                                      |           |           |           |           |        |        |        |        | <ul style="list-style-type: none"> <li>Development team plus advisors</li> </ul>           |
| Design GUI                                      |           |           |           |           |        |        |        |        | <ul style="list-style-type: none"> <li>Development team plus advisors</li> </ul>           |
| Testing phase                                   |           |           |           |           |        |        |        |        | <ul style="list-style-type: none"> <li>Development team, Ports and relevant HOs</li> </ul> |
| Operate in a beta mode with programming support |           |           |           |           |        |        |        |        | <ul style="list-style-type: none"> <li>IHO Lab, ports, HOs and development team</li> </ul> |

**SUMMARY OF PROJECT COSTS (To Indicate Cash or In-Kind)**

| Qualifying Project Costs   |   | Cost of Item<br>€K | Collaborator<br>Contribution (If Any)<br>€K                  |
|--|---|--------------------|--|
| Category*  | Details of Items  |                    |  |
| <b>Manpower</b><br>(Please provide itemised details and budget breakdown)                    | 1 project lead and 2 programmers (±€40K funded by NTOU)               | In-kind            | In-kind from NTOU  |
|  | 1 architect/Lead developer  |                    | <b>70€K per year</b> (for the first 2 years) from CHS Canada |
|  | 1 programmer/developer  | €70K               |  |
|  | Documentation of operating and training manuals for port and HOs      | €10K               |  |
|  | Implementation and testing coordination and support for ports and HOs | €40K               |  |
|  | S-131 updates   | €10K               |  |
| Project documentation  | €10K  |                    |  |
| <b>Equipment</b><br>(Please provide itemised details and budget breakdown)                   | Hosting server, backup and maintenance (probably cloud based)         | €14K               | <b>Request to IHO Lab</b>                                    |
| <b>Other Operating Expenditure</b><br>(Please provide itemised details and budget breakdown) | IT support  | €10K               | <b>Request to IHO Lab</b>                                    |
| <b>Total €K</b>  |   | <b>€164K</b>       |  |

\*The Cost of Item indicated shall include any Collaborator Contribution(s) obtained for the same item.

\*The Governing Board needs to discuss what are the qualifying expenses eligible for co-funding.